Cliff Head Offshore Operations Environment Plan

Triangle Energy (Operations) Pty Ltd Controlled Document

10HSEQENVPL01

Revision 10

Issue date: 24/01/2023

Document control and revisions

This Cliff Head Offshore Operations Environment Plan shall be revised in the following circumstances: on discovery of a significant new environmental effect or risk with a significant change to the operation.

Approvals

This Cliff Head Offshore Operations Environment Plan has been reviewed by Triangle Energy (Operations) Pty Ltd and is approved for the Cliff Head Operation.

Approval: Triangle Energy (Operations) Pty Ltd

Name	Signature	Date
Bryce Donaldson Manager HSE & Regulatory Triangle Energy (Operations) Pty Ltd		24/01/2023
Address for Communication	Bryce Donaldson Ground Floor, 100 Havelock Street West Perth WA 6005 PO Box 51 West Perth WA 6872 bdonaldson@triangleenergy.com.au	

Revision history

Rev.	AL	Issue date	Revision summary	Originator	Reviewer	Approver
10	-	24/01/23	5 yr Revision and response to Revision request by NOPSEMA – Completeness check updates	ERM	J Chidlow	B Donaldson
10	-	04/10/22	5 yr Revision and response to Revision request by NOPSEMA	ERM	J Chidlow	B Donaldson
9	c	02/06/21	Updates based on annual review and NOPSEMA inspection recommendations and annual EP review	J Chidlow	Sonia Price	B Donaldson
9	b	29/01/20	Revision to reflect update to OPEP	D Royal J Chidlow	B Donaldson	M Jacobs
9	a	20/06/19	Revision upon request by NOPSEMA to include Topside Process potential spill scenarios Revised to include IMR work on platform and variation to mooring procedure.	D Royal	T Hodge	M Jacobs
9	-	11/10/2017	Revision upon request by NOPSEMA	A Badri	D Stewart	S Gauld
8	-	22/03/2017	Revision upon request by NOPSEMA	A Badri	C Fu V Hinkley	G Napier
7		11/10/2016	Revised following receipt of comments from NOPSEMA	A Badri	C Fu	S Walker
6	a	24/08/2016	Revised to include Pipeline IMR activities for NOPSEMA review	AB	CF	SW
6	-	04/10/13	Revision upon request by NOPSEMA	AK	DS	SW
5	-	17/08/11	5yr Revision by DMP with amendments for HWU operations	DS	LC	RT
4	-	07/06/11	5yr Revision by DMP with amendments for HWU operations	JB	LC	RT
3	-	04/09/09	Revised with comments from DMP (formerly DoIR)	JA	DS	ADF
2	-	05/05/06	Final version	JM (Enesar)	PS	PH
1	-	13/04/06	Regulatory Review	JM (Enesar)	PS	PH

Rev.	AL	Issue date	Revision summary	Originator	Reviewer	Approver
0	-	27/02/06	Regulatory Review	JM (Enesar)	PS	PH

Table of Content

Tables

Figures

1 Introduction

On the 22 May 2017, Triangle Energy (Global) Ltd (Triangle) purchased Roc Oil (WA) Pty Ltd, and renamed it Triangle Energy (Operations) Pty Ltd (TEO).

TEO is the designated Operator (commenced 17th of June 2018) of the Cliff Head Oil Field Development (CHD) which is in Production Licence Area WA-31-L.

TEO operates these facilities on behalf of the Cliff Head Oil Field Joint Venture which comprises:

Triangle Energy (Global) Ltd	78.75%
Pilot Energy Pty Ltd	21.25%

1.1 Registered office

The registered office is:

Triangle Energy (Operations) Pty Ltd (ABN 83 083 143 382)

100 Havelock Street, West Perth WA 6005

Telephone Number: +61 8 9219 7111

Fax Number: +61 8 9322 9102

ACN: 083 143 382

1.2 Details of liaison person

Liaison Person: Bryce Donaldson

Email: bdonaldson@triangleenergy.com.au

Telephone Number: +61 8 9219 7111

Suite 2, Ground floor, 100 Havelock Street, West Perth WA

1.3 Notification for change in titleholders or liaison person

In the event that there is a change in the titleholders, the titleholders' nominated liaison person or a change in the contact details for the titleholders or liaison person, TEO will notify the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) by email (submissions@nopsema.gov.au) as soon as reasonably practicable.

1.4 Environment plan scope and objectives

This Environment Plan (EP) has been developed in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations* 2009 (OPGGS(E) Regulations). The objective of this EP is to address the 5-year update of the Cliff Head Operations EP and ensure that for the Cliff Head (CH) offshore activities:

- Operational requirements for the next five years are reflected
- Significant environmental aspects and potential environmental effects of the described activities are identified
- Environmental risks of described activities are identified and assessed
- Appropriate environmental management and mitigation measures will allow identified environmental risks to be avoided or reduced to As Low As Reasonably Practicable (ALARP) and are acceptable.

It is expected that Cliff Head Offshore Operations will transition to the Non Production Phase (NPP) within the five year period covered by this EP, with a current cessation of production targeted for mid 2025 (based on best estimate 2P Reserves position). Activities within the NPP are therefore covered within the scope of this EP. Future decommissioning activities, including plug and abandonment of wells, will be conducted under separate EPs.

This EP details the environmental standards applicable to the activities, sets out environmental performance outcomes and provides criteria for measuring performance against those outcomes.

In terms of areal extent, the EP covers all activities conducted on the CHA platform and the pipeline up to the Commonwealth-State boundary (~6 km from the CHA platform), as well as vessel activities when inside the 500 m exclusion zone around CHA and within 500 m of the pipeline section within Commonwealth waters. The types of vessel activities covered are detailed in Section 2.5. Where necessary, the EP discusses onshore support facilities, such as the onshore control room, which whilst not part of the Commonwealth scope of the EP, are essential to the CHA operation. The accompanying Cliff Head Oil Pollution Emergency Plan (OPEP; 10HSEQENVPL15) addresses potential spills originating in Commonwealth and State waters, for operational practicality reasons, whilst fulfilling all requirements of the OPGGS(E) Regulations. This EP however, only addresses impacts of hydrocarbon spills originating in Commonwealth waters.

Operations occurring in State waters are covered under a separate EP approved by the Department of Mines, Industry Regulation and Safety (DMIRS).

1.5 EP Summary

A summary of the Cliff Head Offshore Operations EP, as required under Regulation 11(4), is outlined in Table 1-1.

Table 1-1: EP Summary

EP summary material requirement	Relevant section of EP containing EP summary material
The location of the activity	**Section 2.1**
A description of the receiving environment	**Section 4**
A description of the activity	**Section 2**
Details of the environmental impacts and risks	**Section 6** (planned); **Section 7** (unplanned)
The control measures for the activity	**Section 6** (planned); **Section 7** (unplanned)
The arrangements for ongoing monitoring of the titleholder's environmental performance	**Section 8.8**
Response arrangements in the oil pollution emergency plan	**Section 8.5**
Consultation already undertaken and plans for ongoing consultation	**Section 10**
Details of the titleholder's nominated liaison person for the activity	**Section 1.2**

1.6 Request for Revision to Environment Plan

This 5-year update of the Cliff Head Operations EP also addresses a request from NOPSEMA under Regulation 18 of the OPGGS (Environment) Regulations for TEO to revise the EP to address specific matters relating to TEO's plans to decommission the Cliff Head offshore operations. The revision request was received 4th July 2022 and follows NOPSEMA Inspection (RMS 2519 – March 2022) findings. Table 1-2 provides the specific matters within the revision request and references the relevant sections of this EP where applicable.

Table 1-2: NOPSEMA Specific Matters to be Addressed in EP

Specific Matters	Relevant Section of EP
1. Description of all property brought onto the title, including its status, condition and proposed decommissioning end states.	Section 8.6.1 and Table 8-4
2. Description of the planning and timetable associated with the plugging or closing of wells and removal of remaining property from the title area to meet the requirements of s 572(3) of the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (the Act).	Section 8.6.2.1, Section 2.6 and Section 8.6
3. Description of the planning processes and timetable of activities to support the decommissioning. In particular, proposed decommissioning methodology, scope of work to support the decommissioning end states and how decommissioning activities would be provided for with respect to execution strategy, financial and organisational capacities.	Section 8.6.2 and Figure 8.3
4. Provision of the schedule of activities including proposed submission of permissioning documents to support decommissioning.	Section 8.6.2
5. Consultations with relevant persons and stakeholders as required by regulations 11A and 16(b) e.g., regulators and other stakeholders who may be impacted by proposed decommissioning end-states of pipeline and marine structures.	Section 8.6.3 and Section 10.5
6. Description of how TEO will maintain all property on the title as required by s572(2) of the Act to ensure that wells can be plugged or closed off and decommissioning end states are not precluded.	Section 8.6.1 and Section 2.6

1.7 EP validity

This EP remains valid for 5 years from date of acceptance by NOPSEMA. During this period, if any changes are required, these will be made pursuant to the process described in Section 8.9. Prior to expiry of the EP, a revision to the EP must be submitted to NOPSEMA if operations will continue. The types of activities undertaken under this EP, and predicted timelines for completing them is provided in Section 2. This EP details ongoing operations at the Cliff Head Platform which has a design life of 23 years (extending from the original design life of 10 years in 2016 as part of the Asset Life Extension). This EP covers ongoing operations activities at the Cliff Head platform that could occur during the life of the facility with a focus on those activities that are expected to occur over the next 5 years. As the Cliff Head offshore operations approach end of field life, TEO is maturing plans for decommissioning in accordance with requirements under the OPGGS Act and EPBC Act Approval Conditions (EPBC 2003/1300) (refer to Section 8.6). TEO does not currently have plans to decommission the Cliff Head offshore facilities within the scope of this EP. Subsequent environmental approvals to undertake decommissioning of the Cliff Head facilities will be sought closer to the time of the activity under separate EPs.

1.8 Health, safety & environment policy

HEALTH SAFETY AND ENVIRONMENT POLICY STATEMENT

Triangle Energy (Operations) Pty Ltd (**Triangle / the Company**) is committed to protecting the health and safety of all people, and ensuring that the Company's activities have minimal impact on the environment and the greater community. This applies throughout the life of our projects, from development through to maturation and asset retirement.

Triangle's vision is that whilst undertaking activities it will cause "No Harm" and that:

- All accidents are preventable.
- No task is so important that the risk of injury to people is justified.
- Our environment will suffer no long-term effects.

To achieve its vision Triangle will:

- Create a HSE culture in which every person involved shares our HSE commitment.
- Require all workers to comply with our HSE expectations.
- Identity, assess and mitigate health, safety and environmental hazards and risks to as lows as reasonably practicable.
- Consult, listen and respond openly to workers to ensure the input of all is included in decision making processes and impacting on workplace health and safety and the environment.
- Continually strive to improve health and safety performance by establishing clear and measurable objectives and targets, auditing, reviewing and reporting performance.
- Ensure appropriate allocation of resources to implement the HSE Policy and associated procedures to reduce impacts and risks and improve sustainability of our operations.
- Comply with all applicable HSE legislation, regulations and industry standards.

Triangle requires workers to STOP work if they believe their work compromises their personal safety, the safety of others or the protection of the environment.

Conrad Todd
Managing Director
Triangle Energy (Operations) Pty Ltd

Date 24/03/2022

Triangle Energy (Operations) Pty Ltd ABN 83 083 143 382
Suite 2, 100 Havelock St, West Perth WA 6005
T +61 8 9219 7111

triangleenergy.com.au

2 Description of activities

2.1 Location

The Cliff Head oil field is located off the Western Australian coast (Production Licence WA-31-L), west of the Big Horseshoe Reef; approximately 20 km south-southwest of Dongara (Figure 2.1).

The water depth in the vicinity of the field is approximately 18 m and the closest landfall is some 11 km due east. The field itself is approximately 1,260 m below sea level. The wells are tied to the Cliff Head Alpha (CHA) (Figure 2.1) wellhead platform located at 29° 27' 00.4" S 114° 52' 12.1" E. The production and water injection pipelines traverse the seabed within Commonwealth waters, avoiding sensitive areas such as Horseshoe reef. The pipelines cross into State waters at approximately 29° 23' 59.9994" S 114° 54' 0" E.

The Operational Area includes the CHA platform and the pipeline corridor up to the State waters boundary, including the area within 500 m of the pipeline and the 500 m exclusion zone around the platform. A Petroleum Safety Zone (PSZ) of 500 m has also been gazetted around the CHA Platform facility. All planned activities described in this EP take place within the Operational Area.

2.2 Operations and maintenance

The Cliff Head Oil Field Development (CHD) consists of the following components;

- A Not Normally Manned (NNM) platform (Cliff Head Alpha - CHA) located approximately 10 km off the Western Australian coastline in Production Licence WA-31-L **(covered by this document**);
- A subsea production pipeline which directs production fluids to the onshore Arrowsmith Stabilisation Plant (ASP) onshore facilities, and water re-injection pipeline which directs treated water to CHA for reservoir reinjection. This pipeline operates under Pipeline Licence WA-12-PL (Commonwealth waters – **covered by this document**) and Access Authority AA3T (WA territorial sea - [AA3T is **not** addressed in this document]);
- The onshore Arrowsmith Stabilisation Plant (ASP) (Access Authority AA13) [**Not** addressed in this document] including:
    - The onshore production pipelines from the low water mark to the Arrowsmith Stabilisation Plant (ASP); and
    - The ASP site encompassing the activities of crude stabilisation and load-out; water treatment and reinjection facilities; power generation and other supporting site utilities.

This EP considers only the offshore components of the Cliff Head development, that occur beyond the Commonwealth-State boundaries at 3 nm from the coastline.

Production from the CHA platform involves transferring oil and produced formation water (PFW) from the offshore wellhead platform to the ASP via the offshore and onshore pipeline. At ASP, the PFW is removed from the product stream, the crude oil is stabilised and then transferred to road tankers and transported for refining.

The PFW is then transported via the water injection pipeline to the injection wells, where it is then injected into the geological formation that hosts the hydrocarbon reservoir.

During the lifetime of the facility, there may be occasions where minor construction, pre-commissioning and commissioning activities are required to ensure optimum and safe operation. Where these activities constitute a significant increase in the level of environmental risk, or might alter the design basis of the facility, an Environment Plan revision will be submitted in accordance with the *Offshore Petroleum & Greenhouse Gas (Environment) Regulations 2009*.

Where the activities do not constitute a significant increase in risk, they will be managed in accordance with the Health, Safety and Environmental Management Systems (HSEMS) and this EP.

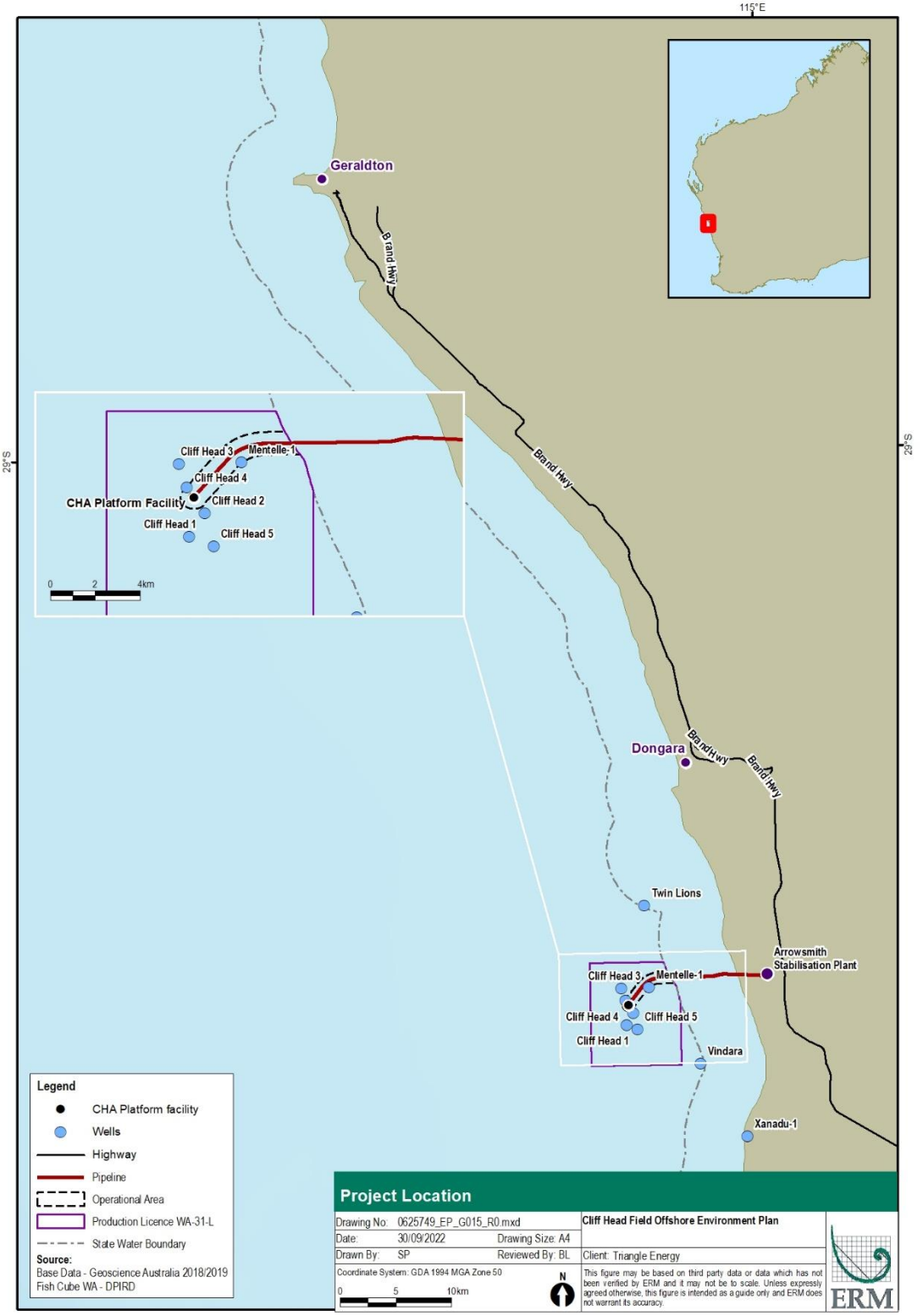


Figure 2.1: Operational Area of the Cliff Head facilities

2.3 Offshore platform and wellhead

Extraction of the crude oil from the reservoir occurs at the offshore wellhead platform CHA (Figure 2.2). The CHA platform is a steel parallel 4-leg jacket complete with drilled and grouted piles through each of the legs. Production and re-injection utilises up to nine well slots, which include the following:

- Three water re-injection wells, which receive injection water from the ASP and inject it into the reservoir to aid oil production;
- Five production wells which produce crude oil and PFW from the reservoir;
- One spare well slot.

The platform operates unmanned except for periodic visits for maintenance and inspection. The platform has four levels: the main deck, mezzanine deck, cellar deck and sub-cellar deck. The platform facilities are spread over the four levels with the helideck located at the east end of the main deck and sized to accommodate a Sikorsky S76 helicopter (maximum take-off weight of helideck is 5307 kg).

A 25-tonne platform crane is located at the Northwest corner of the main deck and is sized to suit boatlifts and support operations for the electrical submersible pumps (ESP's) and well workover. A Coil Tubing Unit (CTU) or Hydraulic Workover Unit (HWU) for workovers can be located at this level with access to all wells through deck hatches.

No accommodation or amenities are available on CHA with the exception of a portable toilet on the main deck. All waste products generated by personnel day visits are transferred onshore for disposal in line with the Prescribed Waste Management Plan (10HSEQENVPC04).

Figure 2.2: Cliff Head Alpha Platform

The mezzanine deck accommodates the chemical injection break tank skid, instrument room, high voltage transformer room and transformer room. These rooms are pressurised to protect the unrated equipment. The wellheads and wellhead control panel are located on the mezzanine deck. The cellar deck houses the Heating, Ventilation & Air Conditioning (HVAC) equipment (which uses the non-ozone depleting refrigerant 407C), production manifold and chemical distribution skid. Located on the sub-cellar deck are the pipeline isolation valves, the emergency escape ladder and Umbilical and Power Cable Termination Units.

Closed circuit television security cameras allow the operators to monitor platform activities. The wellhead platform covers an area of approximately 10m by 30m and stands 12m clear of the sea surface. It is designed and constructed to enable complete removal upon decommissioning.

CHA is controlled remotely from the Central Control Room (CCR) at the ASP. All critical operating and safeguarding parameters are monitored at this location, with facility for the operator to adjust set points and reset limited trips.

The crane on CHA has a fuel tank capacity of 1100 L. Bunding on CHA has a total volume of 19.6m3 to contain any leaks on the platform. During times that the offshore platform is unattended by operations personnel, all drain valves shall be left open to allow rain water to freely drain overboard. Upon arrival at the CHA platform, it is a requirement that the drainage system be isolated so as to not allow any liquids to be discharged overboard, this shall be achieved by closing the two valves located on the drain lines that direct liquids overboard. If required (e.g. a spill or leak has occurred), the drainage system is flushed clean to ensure no residual chemicals or hydrocarbons are left in the drainage pipe work with liquid directed to a temporary storage tank located on the cellar deck, which is transferred to a vessel for onshore disposal. Following flushing and prior to departure, drain line valves that were shut during work are opened to allow rainwater to discharge overboard.

Chemical storage drums and hydrocarbon storage containers are self-bunded and semi-exposed to rain on the lower deck. Closed Circuit Television (CCTV) on CHA can detect disturbances that could lead to significant leaks while the platform is unmanned.

2.3.1 Electric submersible pumps

The Cliff Head crude is recovered by the use of Electrical Submersible Pumps (ESPs) providing artificial lift. Each production well has an ESP located at an average depth of 880 m or 1200 m total vertical depth (TVD). The individual rated flow rate of the ESP's is in the range of 1000 to 16,000 Barrels per day (BPD).

Oil production from the wells are routed to the 200 mm production manifold via individual 100mm flowlines. Each flowline is equipped with a choke valve, oil-water flow meter and sample collection point to allow monitoring of each production well.

2.3.2 Workover activities

Work over activities are typically not a scheduled activity and are only planned as and when there is reason to carry out a well intervention activity. Historically, this is usually in the event of an ESP failure. It is then necessary to replace the ESP to allow restoration of production from that well.

Since 2006, 14 workover (ESP replacement) activities have been undertaken, each took approximately 5 weeks with the support of a CTU or HWU; workover activities are expected to be of similar frequency over the life of this EP. The frequency of workovers is determined by well performance and identification of potential issues.

Workover activities using the CTU or HWU are considered a normal operational activity on CHA.

2.3.2.1 BOP during workovers

For all workover operations, a blowout preventer (BOP) is mounted via a riser on the wellhead which can be activated in the event of an emergency. The BOP is fitted with a series of rams which act to isolate the topsides from the well. Upon activation of the BOP, additional drilling fluid can be pumped.

2.3.2.2 Coiled Tubing Unit

The CTU is contracted on an as required basis and only mobilised to CHA during workover activities.

The CTU comprises the following major equipment items:

- Diesel powered power pack to provide hydraulic power to the injector head;
- Control Cabin to provide control and monitoring functions during CTU operations;
- Coiled tubing spooler to reel coiled tubing into well through injector head. A swivel system is used to facilitate the injection of fluids downhole through the coiled tubing at any time;
- Hydraulic oil in reel;
- Injector head and gooseneck to grip and run coiled tubing in and out of well;
- Skidding and jacking frame to allow injector head to be moved over the desired well;
- BOPs to control the wells,
- BOP test stump, and
- Packer/Stripper.

2.3.2.3 HWU Components and Operation

The HWU and substructure is brought to the field on a vessel (with a maximum fuel tank capacity of 500 m^3) operating under its own power and is lifted onto CHA using the platform's crane. Upon completion of the HWU workover operations the unit and structure are dismantled and shipped back to shore.

The HWU consists of the following key subsystems:

- Workbasket and support frame;
- Hydraulic unit and rotary table;
- Hydraulic power unit and associated diesel engine;
- Circulation system; and
- Blowout preventer and associated hydraulic controls.

The rotary table shall be provided (if required) in order to provide rotational energy to the drill string and downhole milling equipment.

Hydraulic power for the short stroke hydraulic unit, gripper system, rotary system and associated controls is provided by a diesel driven HWU hydraulic power unit. The hydraulic power unit uses Panolin HP Synth (or similar), a synthetic ester-based fluid as the motive fluid.

The diesel engine has a local storage capacity of circa 400 litres and is self-bunded and is refilled manually via pump and hose as required from the bulk diesel storage container adjacent to the crane.

2.3.2.4 Workover scope

Workover activities which may be performed using the CTU/HWU include:

(1) ESP Change-out
This is the most common workover operation conducted at CHA. Each production well has an ESP installed to supplement the limited natural flow from the reservoir. ESPs are changed

out on failure, with the old pump taken onshore for maintenance whilst a new or refurbished pump is re-installed into the well.

(2) Acid Wash
This activity cleans downhole equipment. The acid wash solution[1] is blended in Perth by a chemical contractor, transported to CHA and continuously injected down-hole until the container is empty. The fluid mixes with PFW which is separated onshore at ASP.

(3) Slickline/Wireline
This equipment may be used to manipulate downhole tools, e.g. set slickline plugs or for logging purposes. These operations require installation of a slickline/wireline winch and associated pressure control equipment.

(4) Milling
It may become necessary to mill out an ESP, if it cannot be pulled and recovered using the HWU. For this operation, the Tubing Retrievable Safety valve (TRSV) and lubricator valves would be closed and the upper well column flushed with brine. The mud pumps would then be used to circulate brine to facilitate the retrieval of cuttings to the surface. Once the ESP has been milled and any remaining cuttings removed, a new ESP would be installed in the well.

(5) Replacement of Production String
It may become necessary to pull production tubing if there are leaks in the production tubing which cannot be remediated, or to install larger diameter production tubing. As the production tubing is removed from the well, make up fluids would be added to account for the lost displacement of the tubing string.

2.3.2.5 Chemical Usage for workover operations

Workover operations may require the use of flush and wash chemicals such as the organic acid blend described above. Nitrogen is also often used as a means to perform pressure tests, diagnostic and potentially wellbore cleanout for both CTU and HWU operations.

Other than milling operations which is only planned to be done with the HWU, there is no difference to general chemical usage between CTU and HWU.

There are currently no fire suppression systems on CHA (and therefore no additional chemicals used in this process) other than portable fire extinguishers.

2.3.2.6 Chemical usage during milling

The circulation fluid (refer to Appendix A for typical workover fluid composition) is pumped down the well through the drill pipe and returns within the annulus between the drill pipe and the production tubing. The fluid returns to the surface at near atmospheric pressure and travels through an opening in the side of the bell nipple, down through the flowline to the mud tanks.

If an influx of reservoir fluids is experienced, the return discharge from the bell nipple can be directed through a degasser before going to the mud tanks. The degasser will then cold vent any removed gas to a safe location and will disperse.

A shale shaker may be used during any milling operations to separate out returned cuttings or swarf which are then contained and shipped to shore for disposal.

Active and Trip tanks, and a Reserve tank are provided during the operation. Fluid levels in the mud tanks (volume 200 Bbls) are monitored locally and if needed, additives can be used to control the loss of drilling fluid into the formation. Level alarms are installed on the mud tanks which also sound in the Koomey module. As a contingency against unexpected well flow a stabbing connection is also available on the BOP.

[1] Solution is a 50% SCAL16312A (or equivalent organic acid) and EC9610A (mutual solvent) (Refer Appendix A for chemical assessment).

2.3.2.7 Additional Workover Chemical/Fuel Systems required for HWU Usage

Additional temporary diesel systems may be provided on CHA to support HWU operations including:

- Bulk diesel storage tank, double skinned, circa 1,800 litres, adjacent to the crane on the main deck;
- Electric driven transfer pump and piping / nozzle from bulk storage to local storage;
- HWU hydraulic power unit diesel engine with local 400 litre tank, on the HWU support module; and
- Mud pump diesel engine 400 litre tank, on the main deck.

The 1,800-litre bulk storage container will be changed out on an as required basis using the CHA crane and a support vessel (i.e. there are no diesel bunkering facilities on CHA). Manual diesel transfer via pump and hose from the bulk storage container to local equipment will be conducted on an as needs basis and shall be disconnected at other times. All equipment is located within the main deck bunding. Additional temporary chemical inventories will be required during HWU operations (refer to Appendix A). All items will be stored within the existing main deck bunding and will be accompanied by Safety Data Sheets (SDSs).

Workover activities will primarily utilise Potassium chloride (KCL) brine which is a listed PLONOR substance. Workover fluid chemical additives identified for proposed use during the workover program are detailed and environmentally assessed in Appendix A.

Workover fluids are recirculated during the activity with the intention that excess brine is either processed through the CHA production system or collected in tanks for onshore disposal. Cuttings and swarf (from milling operations) contained within the brine will be captured and disposed onshore via waste disposal (skip bins) (i.e. not discharged overboard). Chemicals utilised for acid washing activities will also be processed through the CHA production system, collected in tanks for onshore disposal or disposed downhole.

2.3.3 Platform inspection, maintenance and repair activities

A variety of platform/topside inspections, maintenance and repair (IMR) activities may also be undertaken, as outlined in Table 2-1.

A support vessel may be required for some of these activities.

These methods are well understood and commonly used; they are considered essential for the safe operation of the topsides and cannot reasonably be avoided. Indicative frequencies and durations are provided for impact and risk assessment context.

Table 2-1: Platform IMR activities in Commonwealth waters, with indicative frequencies and durations

Activity	Indicative Frequency	Approx. Duration (days)
Integrity inspection via NDT, e.g. ultrasonics, radiography, visual	Per RBI, typically 0.5 to 8 yearly	1-5
Corrosion coupon inspections	6-monthly	0.5
Surface preparation and painting of piping, supports and/or structure	As needed	1-10
Emergency wrapping/clamping	As needed	1-4
Piping, valve, instrumentation replacements	As needed	1-3
Rope access inspection and maintenance (painting and blasting, structural work, conductor inspections etc.)	Annual	1-10
EEHA inspections and maintenance	Annual	1-5
Crane maintenance	3 monthly routine, 1-12 yearly non-routine activities	1-5
Subsea Conductor Centraliser Installation	As needed	3-4

2.3.3.1 Integrity Inspections via Non-Destructive Testing (NDT)

Inspections of piping, vessels and/or structure using non-destructive testing methods, such as ultrasonic thickness measurements, time of flight diffraction, eddy current testing, magnetic particle inspections etc., to ensure integrity of said items are maintained. Typically completed using hand held tools, potentially via rope access depending on location.

2.3.3.2 Corrosion coupon inspections

Typically completed 6-monthly by a third party with specialised high-pressure access tools which allow retrieval of the corrosion coupons while the pipe remains online, without exposing personnel to pressure hazards. Retrieval of the coupons allows visual and other inspections to look for and, if applicable, measure active corrosion growth.

2.3.3.3 Surface preparation and painting of piping, supports and/or structure

Remediation of coatings, e.g. by hand tools, water and/or material blasting and painting via hand tools or air powered application, on piping, supports, structure.

2.3.3.4 Emergency wrapping/clamping

Emergency wrapping or clamping is not planned to be carried out routinely during IMR activities, these will only be undertaken in response to a failure of the piping. Should a defect be identified in a pipe, vessel or similar equipment, composite material wraps or a pipe repair clamp may be installed to ensure ongoing pressure retention until a permanent repair can be made. Typically requires surface preparation via hand tools.

2.3.3.5 Piping, valve, instrumentation replacements

As needed replacement of process equipment. Once process adequately isolated, equipment may be replaced simply by unbolting and re-bolting where flanges are available, alternatively cutting and welding may be required in some instances.

2.3.3.6 Rope access inspection and maintenance (painting and blasting, structural work, conductor inspections, etc)

Rope access, conducted as per IRATA requirements, to allow access to structure and other components out of reach from available decks. Activities range from simple inspections to surface preparation and painting as above.

2.3.3.7 EEHA inspections and maintenance

Visual inspection and maintenance (including by replacement once adequately isolated) of electrical equipment in hazardous areas to ensure ongoing fitness for purpose and prevention of ignition sources.

2.3.3.8 Crane maintenance

Routine inspection, testing and maintenance of crane, including pull tests, oil sampling and replacement, inspection and NDT of lifting components e.g. wire rope, hoist and hook block, non-routine replacement of components ranging from bolts and hoses to engine block.

2.3.3.9 Subsea Conductor Centraliser Installation

Bracing of the conductors within structural guides. This maintenance work is carried out to prevent damage caused by movement and fatigue.

2.3.4 Sidetrack Activities

Sidetrack activities are not a scheduled activity and are only planned as and when there is reason to carry out a well sidetrack activity. In this case, a well has been identified as being a suitable technical candidate for a sidetrack.

In a sidetrack event the production interval(s) are abandoned in compliance with the approved WOMP (Well Operations Management Plan). An oriented whipstock is then set further up the well. The whipstock orients the exit direction from the casing. A casing milling assembly is run in hole and a 'window' is milled into the casing. A drilling assembly is then used to drill to total depth of the well. A liner is run into the well to isolate the reservoir interval. The well is then completed with an ESP run on production tubing. The well is then brought online with production managed through the existing Xmas tree and surface pipework and production safety systems.

Sidetrack activities using the HWU are not a normal operational activity on CHA.

2.3.4.1 BOP During Sidetrack Activities

For all sidetrack operations with the HWU, a blowout preventer (BOP) is mounted via a riser on the wellhead which can be activated in the event of an emergency. The BOP is fitted with a series of rams which act to isolate the topsides from the well. Upon activation of the BOP, additional drilling fluid can be pumped.

2.3.4.2 HWU Components & Operation

The HWU and substructure is brought to the field on a vessel (with a maximum fuel tank capacity of 500m^3) operating under its own power and is lifted onto CHA using the platform's crane. Upon completion of the HWU workover operations the unit and structure are dismantled and shipped back to shore.

The HWU consists of the following key subsystems:

- Workbasket and support frame;
- Hydraulic unit and rotary table;
- Hydraulic power unit and associated diesel engine;

- Circulation system; and
- Blowout preventer and associated hydraulic controls.

The rotary table shall provide rotational energy to the drilling and milling equipment.

Hydraulic power for the short stroke hydraulic unit, gripper system, rotary system and associated controls is provided by a diesel driven HWU hydraulic power unit. The hydraulic power unit uses Panolin HP Synth (or similar), a synthetic ester-based fluid, as the motive fluid.

The diesel engine has a local storage capacity of circa 400 litres, and is self-bunded and will be refilled manually via pump and hose as required from the bulk diesel storage container adjacent to the crane.

2.3.4.3 Sidetrack scope

Sidetrack activities which may be performed using the HWU include:

(1) Well abandonment

In this scenario, the ESP and installation/production tubing are recovered to surface. The reservoir zone is then isolated and abandoned with cement. The isolation is verified as per the conditioned in the approved Well Operations Management Plan.

No well abandonment activities will be undertaken without an approved Well Operations Management Plan. An update to the present WOMP will be required before this activity can occur.

(2) Slickline/Wireline

This equipment may be used to manipulate downhole tools, e.g. set slickline plugs or for logging purposes. These operations require installation of a slickline/wireline winch and associated pressure control equipment.

(3) Milling

It will be necessary to mill a window in the casing to sidetrack the well towards the new reservoir target. For this operation, the bottom of the well will be isolated by cement and the upper well column flushed with brine. The mud pumps would then be used to circulate brine to facilitate the retrieval of cuttings and swarf to the surface. Once the window has been milled and any remaining cuttings removed a drilling bottom hole assembly will be run in the well.

(4) Drilling

The new hole will be drilled from the casing exit depth to the new reservoir target. For this operation, mud pumps would then be used to circulate drilling fluid based on KCl brine and approved chemicals in the PLONOR list. The drilling fluid would facilitate the retrieval of drilled cuttings to the surface. Once the required depth is reached, the hole will be displaced to a stable KCl brine-based fluid.

(5) Running production casing and production liner.

Production casing will be run and tied back to the original casing string. Casing maybe cemented from the surface by pumping cement into the annulus between the casing and the wellbore. This will isolate reservoir fluids and provide well integrity. A production liner will also be run to provide a seal bore for the ESP to be landed in. The production liner will be displaced to a KCl brine based fluid that is in compliance with the PLONOR list.

(6) Running an ESP and Production String

An ESP will be run on a production tubing string and landed in the production liner seal bore assembly above the reservoir. Reservoir fluids will be produced through the production liner and into the ESP and up the production string.

2.3.4.4 Chemical Usage for sidetrack operations

Sidetrack operations may require the use of flush and wash chemicals such as the organic acid blend described above.

Sidetrack operations will use the same chemicals as documented in a regular ESP workover. As well, there will be KCl brine-based drilling fluids that are in compliance with PLONOR list.

There are currently no fire suppression systems on CHA (and therefore no additional chemicals used in this process) other than portable fire extinguishers.

2.3.4.5 Chemical usage during side tracking and milling

The circulation fluid (refer to Appendix A for typical workover fluid composition) is pumped down the well through the drill pipe and returns within the annulus between the drill pipe and the production tubing. The fluid returns to the surface at near atmospheric pressure and travels through an opening in the side of the bell nipple, down through the flowline to the mud tanks.

If an influx of reservoir fluids is experienced, the return discharge from the bell nipple can be directed through a degasser before going to the mud tanks. The degasser will then cold vent any removed gas to a safe location and will disperse.

A shale shaker may be used during any sidetrack operations to separate out returned cuttings which are then discharged into the sea at or near sea level.

Active and Trip tanks, and a Reserve tank, are provided during the operation. Fluid levels in the mud tanks (volume 200+Bbls) are monitored locally and if needed, additives can be used to control the loss of drilling fluid into the formation. Level alarms are installed on the mud tanks which also sound in the BOP control module. As a contingency against unexpected well flow a stabbing connection is also available on the BOP.

2.3.4.6 Additional Workover Chemical/Fuel Systems required for side track operations

Additional temporary diesel systems may be provided on CHA to support HWU operations including:

- Bulk diesel storage tank, double skinned, circa 1,800 litres, adjacent to the crane on the main deck;
- Electric driven transfer pump and piping / nozzle from bulk storage to local storage;
- HWU hydraulic power unit diesel engine with local 400 litre tank, on the HWU support module; and
- Mud pump diesel engine 400 litre tank, on the main deck.

The 1,800-litre bulk storage container will be changed out on an as required basis using the CHA crane and a support vessel (i.e. there are no diesel bunkering facilities on CHA). Manual diesel transfer via pump and hose from the bulk storage container to local equipment will be conducted on an as needs basis and shall be disconnected at other times. All equipment is located within the main deck bunding. Additional temporary chemical inventories will be required during HWU operations (refer to Appendix A). All items will be stored within the existing main deck bunding and will be accompanied by Safety Data Sheets (SDSs).

Sidetrack operations will primarily utilise KCL brine which is a listed PLONOR substance. Drilling fluid chemical additives identified for proposed use during the workover program are detailed and environmentally assessed in Appendix A.

Drilling fluids are recirculated during the activity with the intention that excess brine is either processed through the CHA production system or collected in tanks for offshore disposal. Cuttings contained within the brine will be captured and disposed offshore (i.e. discharged overboard).

2.4 Offshore pipeline

The Cliff Head development includes the operation of two pipelines:

- The production pipeline carries the well stream fluids from the wellhead platform (CHA) to the onshore plant (ASP).
- The water injection pipeline transports PFW and additional potential make-up injection water from the ASP to CHA as required (indicative added chemicals are outlined in Appendix A).

The two pipelines are essentially identical in size (273.1mm, i.e., 10”) and design, they are constructed from steel (wall thickness 14.3mm) and insulated with special high-density polyurethane foam and encased in concrete (concrete thickness is 25-40 mm).

In addition, there is an 80mm integrated power cable complete with fibre optic cables and a 60mm umbilical flat pack for the chemical injection fluids. Both the power cable and umbilical are strapped to the production line.

The pipeline system includes an offshore and onshore component. At CHA, the pipelines are tied into the platform riser using flanged connected spool pieces. The offshore pipelines then run 10.4 km along the seabed from the CHA to the shore crossing. The offshore component of the pipeline is unburied and uses the concrete coating weight and rock dumping to provide stability.

2.4.1 Chemical injection

The chemical injection package for CHA is located at ASP. The chemicals are supplied to CHA via four stainless steel tubes (encapsulated in a flatpack), one is blocked and is out of service, one is dedicated to a mixture of scale inhibitor and corrosion inhibitor, and the other two allocated as spares. On CHA, the flat-pack is terminated on the Topsides Umbilical Termination Unit (TUTU) and chemicals are routed to the allocated break tanks on the Mezzanine Deck. Chemicals from the break tanks are gravity fed to the multi-head injection pumps. Chemicals are injected continuously down-hole to each well via injection pumps on the chemical distribution package.

Indicative added chemicals are outlined in Appendix A.

TEO has a Chemical Management Procedure (Document Ref: 10OPGOPC06) in place which sets out the selection, assessment and on-site controls of downhole and process chemicals for the Project and also defines the duties and responsibilities of site and Perth-based personnel.

New downhole and process chemicals, chemical inventory changes and chemical substitution are risk-assessed and managed as an Environmental Change Form (10HSEQENVPC07FM01) through the Chemical Management Procedure, the Cliff Head Management of Change Procedure and the Cliff Head Engineering Management of Change Procedure. Chemical substitutes will be assessed prior to service and only those with an equivalent or better environmental performance selected.

2.4.2 Pipeline inspection, maintenance and repair activities

A variety of pipeline IMR activities may also be undertaken, as outlined in Table 2-2 using a vessel with a fuel tank < 500 m^3. These methods are well understood and commonly used; they are considered essential for the safe operation of the pipelines and cannot reasonably be avoided. Pipeline IMR activities will predominately be performed during daylight hours. However, support vessels may mobilise and demobilise from the Operational Area during hours of darkness. Emergency repairs may be required on a 24-hour basis. Indicative frequencies and durations are provided for impact and risk assessment context.

Table 2-2: Pipeline IMR activities in Commonwealth waters, with indicative frequencies and durations

Activity	Frequency	Approx. durations (days)
Internal pigging with a biocide train*	Weekly	1 day
Continuous corrosion inhibitor injection*	Continuous	NA
Aerial survey	Every 3 weeks (minimum)	1 day
Smartball inspection*	Every 3 months	1 day
Ultrasonic wall thickness testing	Every 3 months	CHA – 1 Day ASP – 5 Days
Intelligent pig*	Every 2 years	5 days
Visual / Remote operated vehicle (ROV) surveys	Every 2 years	5 days
Free span rectification	As needed, typically less than once every 5 years	10-25 days
Time-of-flight diffraction (ToFD) ultrasonic inspection (subsea)	As needed	10 days
Marine growth removal	As needed, less than once every 10 years	10-25 days
Cathodic Protection (CP) inspection and rectification including Field Gradient Survey	Every 2 years (as part of ROV surveys)	5 days
Emergency clamping	As needed	10 days
Umbilical or subsea cable repair	As needed	10-25 days
Pipeline repair / replacement	As needed	Up to 2 months.

* *These activities are completed at ASP, travel internally to the pipeline and do not require actively entering Commonwealth Waters*

2.4.2.1 Biocide Pigging

Chemical treatments, such as biocide, are used to combat microbiologically influenced corrosion (MIC), which is caused by the build-up of microorganisms in pipelines. Biocide applications are performed during pigging by placing a biocide “pill” in a pipeline coinciding with the pig(s). The pig is launched from the Pig Launcher located at the ASP into the injection water pipeline. It travels through a Pig Loop at the CHA that connects the two pipelines and returns via the produced fluids pipeline into the Pig Receiver at ASP.

In order to manage internal corrosion biocide pigging will be performed at a frequency identified in Table 2-2. Batch treatment volumes will be in accordance with the TEO pipeline inhibition program. All biocides will be selected and managed in accordance with TEO’s Chemical Management Procedure (10OPGOPC06).

2.4.2.2 Continuous Corrosion Inhibitor Injection

Pipelines are subject to potential internal and external corrosion if not managed appropriately. A continuous corrosion control system is in place. The rate of internal corrosion is inspected at least annually by ultrasonic wall testing to monitor effectiveness of the corrosion inhibitor. By utilising this data, the corrosion inhibitor dosage rate is adjusted to effectively eliminate corrosion in the pipelines. The ultrasonic wall testing inspections are conducted from CHA and ASP.

The corrosion inhibitor is selected in accordance with TEO's Chemical Management Procedure (10OPGOPC06).

2.4.2.3 Aerial Survey

Aerial surveys are undertaken at least every three weeks via helicopter to inspect for hydrocarbon leaks on the water's surface. The helicopter travels from Dongara and travels the length of the Operational Area and returns (Figure 2.3). The helicopter flight altitude will range from 150 feet (ft) onshore and 500 to 1000 ft offshore. The helicopter will refuel on land.

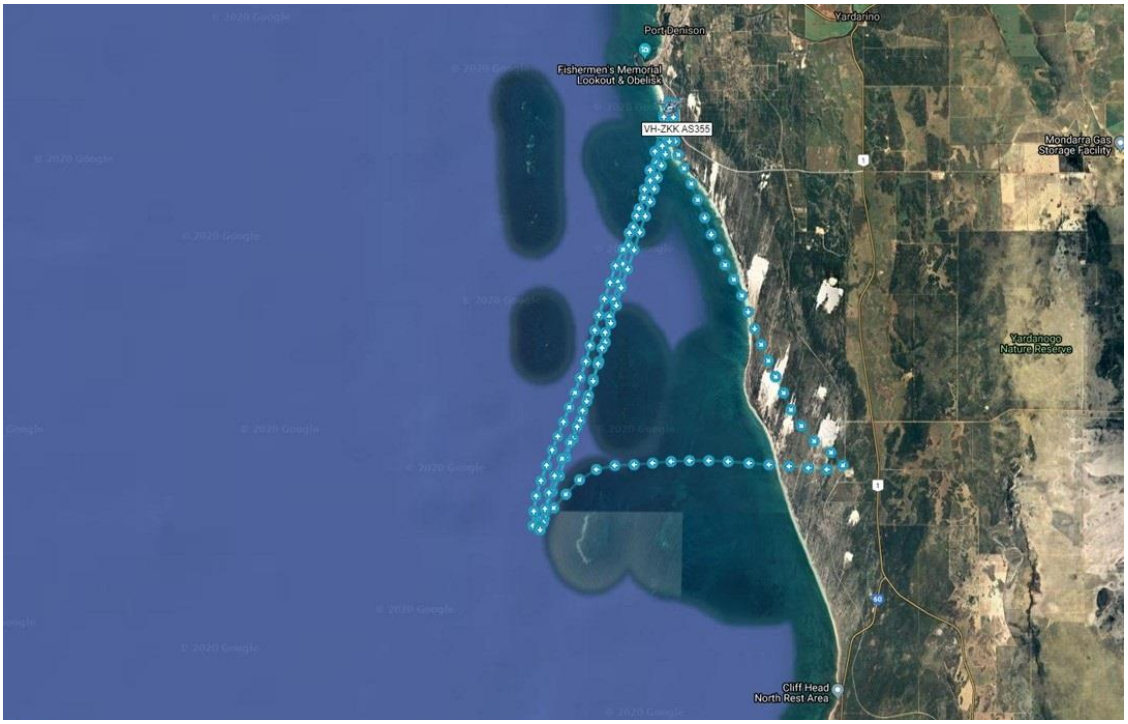


Figure 2.3: Pipeline Inspection Helicopter Flight Path

2.4.2.4 Smartball Inspection

The Smartball is a leak detection tool utilising acoustic technology. A Smartball inspection is performed every three months to detect any active leakage within the pipelines and does not scan for corrosion. As with the biocide pig, the Smartball is launched from the pig launcher located at ASP into the injection water pipeline and travels through the pigging loop at the CHA that connects the two pipelines and returns via the produced fluids pipeline into the pig receiver at ASP.

2.4.2.5 Intelligent Pigging

Intelligent Pigging is an in-line inspection (ILI) technique whereby an inspection probe, often referred to as a "smart" pig, is propelled through a pipeline while gathering important data, such as the presence and location of corrosion or other irregularities on the inner walls of the pipe.

An ILI tool will be used to scan the entirety of the pipeline to detect areas where the pipeline may be damaged by corrosion. To date, TEO has applied Magnetic Flux Leakage scanning technology equipped to the pig although will continue to assess the best technology choice.

The pig travels at approximately 1 metre per second (m/s) and it takes approximately 12 hours to complete the Activity. As with the biocide pig, the intelligent pig is launched from the Pig Launcher located at ASP into the injection water pipeline and travels through a Pig Loop at CHA that connects the two pipelines and returns via the produced fluids pipeline into the Pig Receiver at ASP.

2.4.2.6 Visual / ROV Surveys

Visual inspection of the pipelines will be undertaken approximately every two years to identify any areas that require further attention. Visual inspection will typically be carried out by an observation or micro class ROV deployed from a vessel. The pipeline is then surveyed at a designated speed, with all footage recorded and CP readings taken at available areas.

Visual inspections may also be carried out by other methods, such as by divers.

A typical vessel used for this activity is described in Section 2.5.2.

2.4.2.7 Freespan Rectification

Freespans are sections of pipework which are unsupported by the seabed, caused by gradual erosion and material removal from natural wave, tide and current movements. Freespan rectification may be undertaken on sections of the pipeline where the seabed has been scoured from below the pipeline, resulting in reduced support for the section of pipeline. The reduced support may increase the mechanical stress on the pipeline, and subsequent decline in the integrity of the pipeline over time.

Freespan rectification works may be undertaken to provide additional support to the pipelines. Freespans are identified and surveyed during visual remotely operated vehicle (ROV) inspections.

Freespan rectification works may be undertaken by placing support below, around and above the pipeline to fill spans and provide stabilisation. Stabilisation may be carried out using industry standard techniques such as rock dumping or grout bagging. An engineering assessment will be completed prior to any span rectification activities. Visual inspection during freespan rectification activities would be carried out by an 'eyeball' ROV for survey, positioning and as-built records. The area of the seabed expected to be disturbed during freespan rectification activities will be dependent on the scale of the span. Typical freespan rectification will affect approximately 8 m^2 of seabed for each linear meter of pipeline span, due to the additional gradient required to prevent subsidence and abrasion during material positioning.

Freespan rectification works will be undertaken from vessels (Section 2.5.2), with the vessel type and size dependent on the freespan rectification methodology selected but always with a diesel tank volume of <500m^3. Typically, the vessel will be positioned using a temporary mooring spread. The moorings will be installed by the vessel prior to commencing rock placement.

2.4.2.8 Time-of-Flight Diffraction Inspection

Time-of-flight diffraction inspection (ToFD) is used to perform measurement of wall thickness externally. ToFD inspections are typically carried out using a tool deployed on an ROV, but may also be carried out by divers. The tool is attached directly to the pipeline and requires the generation of a temporary span (removal of sediment immediately adjacent and below a short section of the pipeline) to allow the tool to encircle the pipeline. Preparatory work prior to inspection may also include high pressure water jetting to remove insulation for pipeline inspection and to create temporary spans to facilitate inspection (e.g. equipment that envelops the pipeline). Water jetting to remove the pipeline coating results in the coating and foam being reduced to very fine particles and some larger pieces. ToFD inspection is carried out from on-board project vessels.

ToFD inspections are undertaken on an as needed to confirm findings from in-line inspections.

2.4.2.9 Marine Growth Removal

A marine growth removal program may be implemented, which entails removing fouling organisms from the pipeline to reduce the hydrodynamic drag the pipeline is subject to. Fouling organisms include a range of biota such as sessile invertebrates (e.g. bivalve molluscs, ascidians) and macroalgae. Marine growth removal will typically be carried out by high pressure water jetting with the water jet mounted onboard an ROV. Other methods may be employed, such as using abrasives to remove marine growth. Marine growth removal may also be carried out by divers, if required.

Marine growth removal is undertaken on an as needed, typically less than once every 10 years

2.4.2.10 Cathodic Protection (CP) Inspection and Rectification

CP inspection involves using a CP measurement tool to assess the electrode potential of anodes. The CP inspection is undertaken every two years, as part of the ROV inspection (Section 2.4.2.6). The CP inspection tool is typically mounted on an ROV, however, may also be operated by divers. The CP inspection tool is pushed onto the pipeline to read the voltage difference. A field gradient survey can also be completed as a more comprehensive test of CP. A field gradient survey is undertaken by ROV equipped with a probe as part of the CP inspection at a frequency of every three years as defined in the Cliff Head Pipeline and Umbilical Integrity Management Plan. Field gradient surveys can assist in determining the level of activity of an anode on the pipeline to complement the CP survey. Replacement of anodes may be carried out using ROV or divers.

2.4.2.11 Emergency Clamping

Emergency clamping is not planned to be carried out routinely during IMR activities. Emergency clamping will only be undertaken in response to a failure, or structural failure, of the pipelines. Emergency clamping will consist of a sleeve that will be mounted around a section of pipeline of concern, which will then be pressed onto the pipeline surface. Emergency clamping will be undertaken by divers or an ROV operating from a vessel.

2.4.2.12 Pipeline, Umbilical or Subsea Cable Repair or Replacement

Where inspections have indicated that repair or replacement of a section of umbilical, cable or pipeline is in need, TEO will carry out such activities. TEO may utilise ROV and/or divers to undertake any required repairs or replacements of the umbilical, cables or pipelines.

Pipeline repair will depend on the nature of the damage and may consist of deploying a sleeve over a section of pipeline (similar to emergency clamping described above).

Internal pipeline repairs such as applying an expandable patch within the pipeline may also be undertaken if required, although such works are expected to be undertaken from onshore and do not introduce any additional activities or risks in State waters.

Pipeline replacement consists of replacing a section of pipeline with a new segment. Pipeline operations will be halted and flushed with injection water prior to cutting to remove the hydrocarbons. All pipeline flushing fluids will be received at the ASP. The expected volume for the 10.4 km pipeline with a 10-inch diameter is approximately 710 kilolitres (kL). It is anticipated that the water will be free of hydrocarbons once cutting of the pipeline commences.

A single section of pipeline is likely to be 12 m in length. Depending on the scale of damage, the Activity could take up to two months. The activity will be undertaken by divers, who will reside on a support vessel during the activity.

Rock dumping may be required, which is similar to free span rectification as described in Section 2.4.2.7.

2.5 Helicopters and vessels

2.5.1 Helicopter

Personnel and light equipment will be transferred to the platform primarily by dedicated helicopter which is based at the Dongara airport. During normal operations, helicopter visits are approximately fortnightly. During workover operations (see Section 2.3.2 above), there are approximately six trips daily. Helicopter refuelling will not be undertaken on CHA.

In addition, a helicopter flies over the pipeline at least every 21 days undertaking visual surveillance over the area to detect any leaks to surface (as identified through the presence of a sheen).

2.5.2 Project Vessels

Marine support is required for the duration of any operations at CHA. This support falls into two main categories;

- emergency support provided by the standby vessel (SBV), and
- supply operations for general maintenance and workover operations.

All vessels used in relation to CHA operations will be commercial vessels with a suitable survey class for the activities required.

All project vessels will run on marine diesel (or lighter) grade fuel; no intermediate or heavy fuel oils will be used. The largest fuel tank volume size would be <500 m^3, for a large pipelaying/ construction vessel. This has been used to determine the maximum credible marine diesel spill scenario (Section 7.3). It is expected that other vessels will have considerably smaller maximum credible spill scenarios than this.

Vessel type and specifications will depend on vessel availability and specific activity requirements. The number of vessels conducting operational activities is expected to consist of approximately one to two vessels on site at a given time.

Project vessels will support pipeline IMR activities and CHA operations where required. The vessels will either be holding station or moored during activities, depending on the operational requirements of the Activity.

Two dedicated mooring buoys (located 50 m NW and SW from the structure) (approximately 2.5t clump weight and 110 m of 32 mm chain) are in place around the CHA platform to minimise seabed disturbance from anchoring. These moorings are inspected every 2 years via a vessel to ensure their integrity. They are removed to the vessel deck, checked for damage to assure moorings' integrity, and replaced on the seabed. The replaced moorings will be replaced in same location or in close proximity of the replaced ones. In case it is not practical to remove the moorings for inspection, they will be left on the seabed.

For major IMR activities, temporary moorings will be installed for up to two months and when required for short periods, will be in place for 2 to 3 weeks. Moorings will be installed prior to commencing activities and recovered following completion of an activity. The size of the mooring is dependent on the load that it is required to hold, which is a function of vessel size and weather conditions. Given that IMR activities will require calm weather conditions, and the relatively small size of the potential vessels, temporary moorings are expected to be relatively small in size.

Prior to placing temporary moorings on the seabed, it is not always feasible to place an ROV in the water for a visual check; it results in additional time and costs to deploy the ROV and review footage prior to commencing the activity, extending the overall duration of the activity. Given the relatively shallow waters in the Operational Area, the substrate type is sometimes visible from the sea surface and moorings can be positioned over bare patches, for example, rather than the seagrass.

Two types of temporary moorings; Stingray anchors and Clump weights, are utilised, depending on the particular IMR activity requirements. Stingray anchors will only be deployed and retrieved once (as per the mooring procedure with clump weights). In general, Stingray anchors will set where laid within a 5 m target box area. The setting process involves the chain being laid out on the seabed in the direction required and the movement of the chain will fly by 1-3 m left and right due to the length of mooring line. Dependent on the seabed, Stingray anchors should usually "set" immediately and are not expected to drag. For Clump weight moorings, the seabed is only expected to be disturbed by the direct footprint of the clump weights, given the use of floating lines. Disturbance around the clump weight due to chain disturbance, potential drag associated with setting of the mooring and the area impacted by the clump weight is conservatively estimated at approximately 9 m^2. Clump weights are up to 1.5 m in diameter and <3 t in weight.

An indicative project vessel for activities that may be undertaken is the Southern Spirit, supplied by Harbour Services Australia, with typical vessel specifications provided in Table 2-3. The Southern Spirit is the SBV typically used to support aerial inspections and CHA operations and, therefore, the vessel specifications are representative of those that will be most commonly used during normal CHA and pipeline operations.

Table 2-3: Indicative Vessel Specifications (taken from Southern Spirit)

Specification	Detail
Survey	Uniform Shipping Laws (USL) Codes 1B, 1C and 1D
Year	2005
Length	21 m
Beam	5.7 m
Draft	1.8 m
Hull	Aluminium
Main engines	2 x 750hp MTU Diesel
Fuel capacity	8 m^3
Maximum speed	20 knots
Cruising speed	18 knots
Radar	Furuno
Anchor	CQR/Plow style anchor weighing approximately 80 kg

For vessels greater than 35 m in length, a SOPEP must be on-board, and for vessels greater than 400 gross tonnage, an oil record book must be on-board.

At sea refuelling is unlikely to be required given the close proximity of the ports of Dongara and Geraldton, but is included in the scope of this EP.

2.5.2.1 Stand-by vessels:

Any vessels selected will have fuel tank capacity less than 500 m^3.

The stand-by vessel's (SBV's) emergency role is to assist in;

- the collection of life rafts deployed from CHA,
- the recovery of personnel from life rafts to the SBV,
- the recovery of personnel who have directly entered the sea from CHA, and
- the transfer of personnel from the field to shore.

When personnel are present on the CHA facility, the SBV will be moored at one of two dedicated mooring buoys The selection of mooring location will depend upon prevailing conditions.

The SBV is not intended to fight fires occurring on the CHA platform. The adopted philosophy is that, in the event of a significant fire, personnel will evacuate the facility immediately.

2.5.2.2 Support vessels

Supply operations may be undertaken by a range of different vessels from smaller local supply boats to larger workboats. It is likely that a larger workboat will be used for the installation and demobilisation of the HWU and substructure, where lifting of heavier items will take place. Routine supply vessel operations, such as delivery / removal of drill pipe or change out of the diesel bulk storage container will more likely be undertaken by these larger vessels with support from the smaller local vessels, like the current SBV. The larger supply vessel may also remain near the platform for an extended period to provide additional laydown space, during particular workover activities.

At times a Dumb Barge may be used in combination with the support vessel (~18 gross tons).

All goods and equipment shall be securely fastened to the deck of the support vessel or barge prior to leaving the Port Denison harbour.

The CHA facility has numerous radio communications systems, including marine Very High Frequency (VHF) and handheld Ultra High Frequency (UHF) radios, which are suitable for communicating with in-field vessels. All supporting vessels will be subject to the requirements of TEO's established marine operations procedure. The vessel offloading point on the north-western side of the facility will not be changed for workover operations.

2.6 Cliff Head Non Production Phase

As described in Section 1.4, it is expected that the Cliff Head Offshore Operations will transition to the Non-Production Phase (NPP) within the period covered by this EP. The NPP is the nominal period between cessation of production and plug and abandonment of the wells at CHA, or, potentially, repurposing of the facilities. This phase would involve a substantial reduction in overall activity, however ongoing maintenance for the CHA structure, topsides, crane, pipeline and various other equipment would remain in order to ensure they are in suitable condition for decommissioning and removal. The relevant activities are similar to those described in Sections 2.3, 2.4 and 2.5, but the frequency of activities may be reduced as outlined below. No new activities will be introduced during this phase under this EP.

To transition to the NPP, the facilities will be flushed, according to an activity specific work instruction, to remove liquid hydrocarbons, purged to remove gaseous hydrocarbons and other hazardous gasses and then either preserved with corrosion inhibited fluid, drained to atmosphere or preserved with nitrogen, leaving CHA and both pipelines in a safe state pending further decommissioning activities. There will be no discharges associated with these activities in Commonwealth waters.

2.6.1 Platform inspection, maintenance and repair activities

A variety of platform/topside IMR activities will be undertaken during the NPP, as outlined in Table 2-4. Indicative frequencies and durations are provided for impact and risk assessment context. A more detailed description of these activities is provided in Section 2.3.3. While the activities will be similar to those carried out during the Operations Phase, the frequency of activities may be reduced as outlined in Table 2-4.

A support vessel (Section 2.5.2) and helicopter transfers (Section 2.5.1) may be required for some of these activities.

These methods are well understood and commonly used; they are considered essential for the safe operation of the topsides and cannot reasonably be avoided.

Table 2-4: NPP Platform IMR activities in Commonwealth waters, with indicative frequencies and durations

Activity	Indicative Frequency	Approx. Duration (days)
Integrity inspection via NDT, e.g. ultrasonics, radiography, visual	Per RBI, 1-5 yearly	1-5
Surface preparation and painting of piping, supports and/or structure	As needed	1-10
Rope access inspection and maintenance (painting and blasting, structural work, conductor inspections etc.)	Per RBI, 1-5 yearly	1-10
EEHA inspections and maintenance	Annual	1-5
Crane maintenance	3 monthly routine, 1-12 yearly non-routine activities	1-5

2.6.2 Pipeline inspection, maintenance and repair activities

A variety of pipeline IMR activities may also be undertaken, as outlined in Table 2-5 using a project vessel or helicopter (Section 2.5). These methods are well understood and commonly used; they are considered essential for the safe operation of the pipelines and cannot reasonably be avoided. Pipeline IMR activities will predominately be performed during daylight hours. However, support vessels may mobilise and demobilise from the Operational Area during hours of darkness. Emergency repairs may be required on a 24-hour basis. Indicative frequencies and durations are provided for impact and risk assessment context. A more detailed description of these activities is provided in Section 2.4.2. While the activities will be similar to those carried out during the Operations Phase, the frequency of activities may be reduced as outlined in Table 2-5.

Table 2-5: Pipeline IMR activities during the NPP in Commonwealth waters, with indicative frequencies and durations

Activity	Frequency	Approx. durations (days)
Aerial survey	Every 3 months (minimum)	1 day
Visual / Remote operated vehicle (ROV) surveys	As needed	5 days
Free span rectification	As needed, typically less than once every 5 years	10-25 days
Marine growth removal	As needed, less than once every 10 years	10-25 days
Cathodic Protection (CP) inspection and rectification including Field Gradient Survey	As needed	5 days
Intelligent pig*	As needed	5 days

Note * - These activities are completed at ASP, travel internally to the pipeline and do not require actively entering Commonwealth Waters

3 Applicable environmental legislation

3.1 Regulatory framework

This section provides a brief summary of the legal framework applicable to the Cliff Head operations and associated activities. The oil field development is located in both Commonwealth and State jurisdictions (this EP covers only operational activities in Commonwealth waters). All activities during operation of the Cliff Head Oil Field will comply with relevant Commonwealth legislative requirements. The statutory approvals process for the development phase is discussed in detail in Section 1.5 of the Public Environment Report (PER).

The Cliff Head Oil Field development received approval under the *Environment Protection Act 1986* (Ministerial Statement 670) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC reference: 2003/1300) in February 2005, as well as various subsequent permits. Table 3-1 below lists all the operating licences.

Table 3-2 provides a summary of the EPBC referral conditions (as amended) and how they are met in this EP. The key relevant Commonwealth statutes and regulations under which the project operates are listed below in Table 3-3. Operation in accordance with all legislative requirements ensures compliance and protection against legislative offences, however in itself does not ensure high standards of environmental performance and is viewed as setting the minimum environmental performance benchmark. In developing this Environment Plan, all applicable legislation is reviewed for the relevant environmental sensitivities covered by international conventions and Commonwealth legislation. Control measures adopted minimise environmental impacts and risks to these sensitivities.

Table 3-1: Operating Licences

Licence	Legislation Enacted	Description	Administering Authorities
Production Licence (WA-31-L)	*Offshore Petroleum & Greenhouse Gas Storage Act 2006*	For the operation of the offshore wells	Department of Industry, Science, Energy and Resources NOPSEMA
Pipeline Licence (WA-12-PL)	*Offshore Petroleum & Greenhouse Gas Storage Act 2006*	For the operation of the offshore pipeline in Commonwealth waters	Department of Industry, Science, Energy and Resources NOPSEMA

Table 3-2: EPBC Referral Conditions

Condition No.	Condition of Approval	Date of Condition	Applicable to the environmental management of this activity	Addressed in EP
1	The person taking the action must submit, for the Minister's approval, a plan for managing the offshore impacts of construction. The plan must include measures to: a) Design and construct the unmanned wellhead platform (platform) to allow for the complete removal of structures and components above the sea floor, and a schedule of works; b) Avoid sensitive seabed habitat types in the final selection of the platform and well locations, plus flowline paths, including surveys that demonstrate the alignment of the undersea pipeline and associated anchoring activities minimises impacts on seagrass meadows; c) Avoid impacts on Horseshoe Reef, including information on the distance of the pipeline from the reef; d) Manage the impacts on cetaceans, including interaction procedures for supply and construction vessels; e) Ensure the environmentally safe use and disposal of hydrotest water additives and the management of naturally occurring radioactive material through the use of anti-scaling chemicals; and f) Address the toxicity and biodegradability of drilling fluids, if low toxicity water-based drilling fluid additives cannot be used, as well as monitoring impacts on water quality. Offshore construction may not commence until the plan is approved. The approved plan must be implemented.	15/01/2016 (amalgamated conditions of approval)	• All construction conditions are not applicable as construction was conducted prior to 2006, when production commenced. Although this condition is specific to construction, the following are also provided for in this operations EP • Marine fauna impact caused by noise, light, physical presence, vessel strikes are discussed in the EP • Use of chemicals in routine production and workover activities and impacts of chemicals spills are discussed in the EP • Selection of drilling fluids is not applicable to this activity.	N/A 6.1.1, 6.1.2, 6.1.5, 7.2 7.3.4, 7.4.3, 2.3, 2.4

Condition No.	Condition of Approval	Date of Condition	Applicable to the environmental management of this activity	Addressed in EP
2	The person taking the action must submit for the Minister's approval an oil spill contingency plan to mitigate the impacts of any hydrocarbon spills. The plan must include an analysis of the hydrocarbon species, toxicity and biodegradability. Offshore construction may not commence until the plan is approved. The approved plan must be implemented.	7/05/2005	Although this condition is specific to construction, Oil spill response is summarised in the EP and detailed in the CHA Operations Oil Pollution Emergency Plan (10HSEQENVPL15)	7.3, 7.4
3	The person taking the action must submit, for the Minister's approval, a plan for mitigating the onshore impacts of construction on the Carnaby's Black Cockatoo. The plan must include measures to: • minimise the impacts on foraging habitat during pipeline construction; • prevent the introduction of invasive species to the area of disturbance, and; • rehabilitate disturbed native vegetation within the 50m wide easement along the pipeline route. Onshore clearing for pipeline construction may not commence until the plan is approved. The approved plan must be implemented.	7/05/2005	This condition is not applicable to offshore activities included in this EP.	N/A
4	At least twelve months before decommissioning of the offshore facility, the person taking the action must submit a decommissioning plan for approval by the Minister that addresses the removal of structures and components above the sea floor. Decommissioning may not commence until the plan is approved. The approved plan must be implemented.	7/05/2005	This condition is not applicable to this activity. A separate decommissioning plan will be submitted as per requirement closer to the end of field's life.	N/A
5	On 1 July of each year of construction, the Project Manager, of the person taking the action, must provide a certificate stating that the person taking the action has complied with the conditions of this Approval.	7/05/2005	This condition is not applicable as construction has been completed	N/A
6	The person taking the action may choose to revise a management plan approved by the Minister under conditions 1, 2, 3 and 4 without submitting it for approval under section 143A of the EPBC Act, if the taking of the action in accordance with the revised plan would not be likely to have a new or increased impact. If the person taking the action makes this choice they must: i. notify the Department in writing that the approved plan has been revised and provide the Department with an electronic copy of the revised plan;	15/01/2016	This activity is now managed under the jurisdiction of NOPSEMA and therefore must be accepted prior to implementation. Following EP acceptance, changes to the EP and OPEP will be made in accordance with the Management of Change Procedure (MoC) (10HSEQGENPC18).	8.9

Condition No.	Condition of Approval	Date of Condition	Applicable to the environmental management of this activity	Addressed in EP
	ii. implement the revised plan, program or strategy from the date that the plan is submitted to the Department; and iii. for the life of this approval, maintain a record of the reasons the person taking the action considers that taking the action in accordance with the revised plan would not be likely to have a new or increased impact.			
6A	The person taking the action may revoke their choice under condition 6 at any time by notice to the Department. If the person taking the action revokes the choice to implement a revised plan, without approval under section 143A of the Act, the plan approved by the Minister must be implemented.	15/01/2016	This activity is now managed under the jurisdiction of NOPSEMA and therefore must be accepted prior to implementation. Following EP acceptance, changes to the EP and OPEP will be made in accordance with the Management of Change Procedure (MoC) (10HSEQGENPC18).	8.9
6B	If the Minister gives a notice to the person taking the action that the Minister is satisfied that the taking of the action in accordance with the revised plan would be likely to have a new or increased impact, then: i. Condition 6 does not apply, or ceases to apply, in relation to the revised plan; and ii. The person taking the action must implement the plan approved by the Minister. To avoid any doubt, this condition does not affect any operation of conditions 6 and 6A in the period before the day the notice is given. At the time of giving the notice the Minister may also notify that for a specified period of time that condition 6 does not apply for one or more specified plans required under the approval.	15/01/2016	This activity is now managed under the jurisdiction of NOPSEMA and therefore must be accepted prior to implementation. Following EP acceptance, changes to the EP and OPEP will be made in accordance with the Management of Change Procedure (MoC) (10HSEQGENPC18).	8.9
6C	Conditions 6, 6A, and 6B are not intended to limit the operation of section 143A of the EPBC Act which allows the person taking the action to submit a revised plan to the Minister for approval.	15/01/2016	This activity is now managed under the jurisdiction of NOPSEMA and therefore must be accepted prior to implementation. Following EP acceptance, changes to the EP and OPEP will be made in accordance with the Management of Change Procedure (MoC) (10HSEQGENPC18).	8.9
7	Note: Condition 7 was revoked on the date of this consolidated notice.	7/05/2005	N/A	N/A

Condition No.	Condition of Approval	Date of Condition	Applicable to the environmental management of this activity	Addressed in EP
8	If, at any time after five years from the date of this approval, the Minister notifies the person taking the action in writing that the Minister is not satisfied that there has been substantial commencement of construction of the Cliff Head Development, construction of the Cliff Head Development must not thereafter be commenced.	7/05/2005	This condition is not applicable as construction activities have been completed.	N/A
9	A plan required by condition 1, 2 or 4 is automatically deemed to have been submitted to, and approved by, the Minister if the measures (as specified in the relevant condition) are included in an environment plan (or environment plans) relating to the taking of the action that: a) was submitted to NOPSEMA after 27 February 2014; and b) either: i. is in force under the OPGGS Environment Regulations; or ii. has ended in accordance with regulation 25A of the OPGGS Environment Regulations.	15/01/2016	Following acceptance of this EP, this condition is considered to have been met	This EP

Condition No.	Condition of Approval	Date of Condition	Applicable to the environmental management of this activity	Addressed in EP
9A	Where a plan required by condition 1 or 2 has been approved by the Minister and the measures (as specified in the relevant condition) are included in an environment plan (or environment plans) that: a) was submitted to NOPSEMA after 27 February 2014; and b) either: i. is in force under the OPGGS Environment Regulations; or ii. has ended in accordance with regulation 25A of the OPGGS Environment Regulations, the plan approved by the Minister no longer needs to be implemented.	15/01/2016	Following acceptance of this EP, this condition is considered to have been met and this EP is the in force approval for the activity	This EP
9B	Where an environment plan, which includes measures specified in the conditions referred to in conditions 9 and 9A above, is in force under the OPGGS Environment Regulations that relates to the taking of the action, the person taking the action must comply with those measures as specified in that environment plan.	15/01/2016	This EP is implemented as described, and environmental performance is measured regularly, and reported annually.	9.3.1.2

Table 3-3: Key Commonwealth Legislation

Legislation	Applicability to Operational Activities	International Convention Enacted	Administering Authority	Addressed in EP
Air Navigation Act 1920 • Air Navigation Regulations 1947 • Air Navigation (Aerodrome Flight Corridors) Regulations 1994 • Air Navigation (Aircraft Engine Emissions) Regulations 1995 • Air Navigation (Aircraft Noise) Regulations 1984 • Air Navigation (Fuel Spillage) Regulations 1999	This Act relates to the management of air navigation.	N/A	Civil Aviation Safety Authority	6 – Potential Environmental impacts: Planned Activities 7 – Potential Environmental impacts: Unplanned Activities
Australian Radiation Protection and Nuclear Safety Act 1998	This Act relates to the protection of the health and safety of people, and the protection of the environment from the harmful effects of radiation.	N/A	Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)	6 – Potential Environmental Impacts: Planned Activities
Industrial Chemicals (Notification and Assessment Act) 1989 • Industrial Chemicals (Notification and Assessment) Regulations 1990	This Act creates a national register of industrial chemicals. The Act also provides for restrictions on the use of certain chemicals which could have harmful effects on the environment or health.	N/A	Parliamentary Secretary for Health and Ageing	6 – Potential Environmental impacts: Planned Activities 7 – Potential Environmental impacts: Unplanned Activities
Offshore Petroleum & Greenhouse Gas Storage Act 2006 • Offshore Petroleum & Greenhouse Gas (Environment) Regulations 2009	The *Offshore Petroleum and Greenhouse Gas Storage (OPGGS) Act 2006* addresses all **licensing, health, safety, environmental** and royalty **issues for offshore petroleum exploration and development operations** extending beyond the 3 nautical mile limit. The OPGGS (Environment) Regulations ensure that petroleum activities are undertaken in an ecologically sustainable manner and in accordance with an environmental plan which has appropriate	N/A	NOPSEMA	6 – Potential Environmental impacts: Planned Activities 7 – Potential Environmental

Legislation	Applicability to Operational Activities	International Convention Enacted	Administering Authority	Addressed in EP
• Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011 • Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009	environmental performance objectives, standards and criteria.			impacts: Unplanned Activities
Environment Protection & Biodiversity Act 1999 Environment Protection and Biodiversity Conservation Amendment Regulations 2006	This Act focuses on environmental matters of National Significance, streamlines the Commonwealth environmental assessment and approval process and provides an integrated system for biodiversity conservation and management of protected areas. **Matters of national environmental significance** are world heritage properties; RAMSAR wetlands; listed threatened species and communities; migratory species under international agreements; nuclear actions and the commonwealth marine environment. Sensitive species contained within the associated international conventions enacted by this legislation have been identified within this EP. While the Environment Regulations under the OPGGS Act (see below) manage day to day petroleum activities and apply to any activity that may have an impact on the environment, the EPBC Act (Chapter 4) regulates assessment and approval of proposed actions that are likely to have a significant impact on a matter of National Environmental Significance (NES). Actions that are likely to have a significant impact on a matter of NES require approval by the Commonwealth Environment Minister; the assessment process is administered by the Department of the Environment, Water, Heritage and the Arts. The EPBC Act does not replace the need for an Environment Plan to be approved under the OPGGS (Environment) Regulations before an action can proceed.	• 1992 Convention on Biological Diversity & Agenda 21 • Convention on International Trade in Endangered Species of Wildlife and Flora 1973 (CITES) • Japan/Australia Migratory Birds Agreement 1974 (JAMBA) • China/Australia Migratory Birds Agreement 1974 (CAMBA) • Republic of Korea Migratory Birds Agreement 2006 (ROKAMBA) • USSR-Australia Migratory Bird Agreement • Convention on Wetlands of International Importance especially waterfowl habitat 1971 (RAMSAR) • International Convention on Whaling 1946 • Convention on the Migratory Species of Wild Animals (Bonn Convention) 1979	Department of Climate Change, Energy, the Environment and Water (DCCEEW) NOPSEMA	3 – EPBC Referral conditions 6 – Potential environmental impacts (to MNES) 7 – Potential unplanned impacts (to MNES)
Environment Protection (Sea Dumping) Act 1981 • Environment Protection (Sea Dumping) Regulations 1983	Act prevents the deliberate **disposal of wastes** (loading, dumping, and incineration) at sea from vessels, aircraft, and platforms.	Convention on the Prevention of Marine Pollution by dumping of waste & other materials 1972 (London Convention) MARPOL	DCCEEW	N/A – no planned waste disposal to sea

Legislation	Applicability to Operational Activities	International Convention Enacted	Administering Authority	Addressed in EP
Australian Maritime Safety Authority Act 1990	Facilitates international cooperation and mutual assistance in **preparing and responding to a major oil spill incident** and encourages countries to develop and maintain an adequate capability to deal with oil pollution emergencies. Requirements are given effect through AMSA.	International Convention on Oil Pollution (Preparedness, Response and Cooperation) 1990 (OPRC)	Australian Maritime Safety Authority (AMSA)	7.4 – Vessel spills
Underwater Cultural Heritage Act 2018	Protects the **heritage values of shipwrecks and relics** that have lain in territorial waters for 75 years or more. It is an offence to interfere with any shipwreck covered by the Act	• Convention on Conservation of Nature in the South Pacific (APIA Convention) 1976 • Aust-Netherlands Agreement concerning old Dutch Shipwrecks 1972 • Convention on Protection of Underwater Cultural Heritage 2001	DCCEEW	7.2,7.3,7.4 – Spills (entrained oil may reach shipwrecks)
Ozone Protection & Synthetic Greenhouse Gas Management Act 1989 • *Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995*	Regulates the manufacture, importation and use of **ozone depleting substances.**	• MONTREAL Protocol • UN Framework Convention on Climate Change 1992	DCCEEW	6.1.6 – Atmospheric emissions
National Environment Protection Council Act 1994	Council develops (in conjunction with other state authorities) through the Intergovernmental Agreement on the Environment (IGAE) on consistent environmental standards to be adopted between states. These requirements take the form of National Environment Pollution Measures (NEPM's) such as **National Pollutant Inventory (NPI).**	N/A	Natural Resources Management Ministerial Council (NRMMC)/ Environment Protection & Heritage Council	6.1.6 – Atmospheric emissions
National Environment Protection Measures (Implementation) Act 1998 • *National Environment Protection Measures (Implementation) Regulations 1999*	This Act and Regulations provide for the implementation of National Environment Protection Measures (NEPMs) to protect, restore and enhance the quality of the environment in Australia and ensure that the community has access to relevant and meaningful information about pollution. The National Environment Protection Council has made NEPMs relating to ambient air quality, the movement of controlled waste between states and territories, the national pollutant inventory, and used packaging materials	N/A	National Environment Protection Council	6.1.6 – Atmospheric emissions

Legislation	Applicability to Operational Activities	International Convention Enacted	Administering Authority	Addressed in EP
Protection of the Sea (Powers of Intervention) Act 1981)	This Act authorises the Commonwealth to take measures for the purpose of protecting the sea from pollution by oil and other noxious substances discharged from ships and provides legal immunity for persons acting under an AMSA direction.	International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties 1969.	AMSA	6.2.1 – Vessel discharges 7.4 – Vessel spills
Protection of the Sea (Prevention of Pollution from Ships) Act 1983 *Protection of the Sea (Prevention of Pollution from ships) (Orders) Regulations 1994.* • Marine order 91 - Marine pollution prevention—oil • Marine order 93 - Marine pollution prevention—noxious liquid substances • Marine order 94 - Marine pollution prevention—packaged harmful substances • Marine order 95 - Marine pollution prevention—garbage • Marine order 96 - Marine pollution prevention—sewage • Marine order 97 - Marine pollution prevention—air pollution *Maritime Legislation Amendment (Prevention of Air Pollution from Ships) Act 2007* MARPOL Convention	Regulates ship-related operational activities and invokes certain requirements of the MARPOL convention relating to discharge of noxious liquid substances, sewage, garbage, air pollution etc.	International Convention for the Prevention of Pollution from Ships [MARPOL 73/78] provisions and unified interpretations of the articles, protocols and Annexes of MARPOL 73/78, including the incorporation of all of the amendments that have been adopted by the MEPC and have entered into force, up to and including the 2000 amendments (as adopted by resolution MEPC.89(45))	AMSA Department of Infrastructure, Transport, Regional Development, Communications and the Arts	6.2.1 – Vessel discharges 6.1.6 – Atmospheric emissions 7.1 – Introduction of IMS (ballast water) 7.4 – Vessel spills

Legislation	Applicability to Operational Activities	International Convention Enacted	Administering Authority	Addressed in EP
Protection of the Sea (Harmful Anti-fouling Systems) Act 2006 • *Marine order 98-(Marine pollution-anti-fouling systems)*	Regulates the use of harmful anti-fouling systems employed on vessels and their effects on the marine environment.	International Convention on the Control of Harmful Anti-fouling Systems on Ships, 2001	Department of Infrastructure, Transport, Regional Development, Communications and the Arts /AMSA	7.1 – Introduction of IMS
National Greenhouse and Energy Reporting Act 2007 • *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015*	Introduces a single national reporting framework for the reporting and dissemination of information about greenhouse gas emissions, greenhouse gas projects and energy use and production of corporations.	N/A	Clean Energy Regulator	6.1.6 – Atmospheric Emissions
Biosecurity Act (2015) • *Quarantine Regulations 2000* • *Biosecurity Regulations 2016* • *Australian Ballast Water Management Requirements 2020*	This Act provides the Commonwealth with powers to take measures of quarantine, and implement related programs as are necessary, to prevent the introduction of any plant, animal, organism or matter that could contain anything that could threaten Australia's native flora and fauna or natural environment. The Commonwealth's powers include powers of entry, seizure, detention and disposal. This Act includes mandatory controls on the use of seawater as ballast in ships and the declaration of sea vessels voyaging out of and into Commonwealth waters. The Regulations stipulate that all information regarding the voyage of the vessel and the ballast water is declared correctly to the quarantine officers. *Requirement observed within practices developed for vessels during international transits.*	International Convention for the Prevention of Pollution from Ships Ballast Water & Sediments, 2004	Commonwealth – Department of Agriculture, Fisheries and Forestry (DAFF)	7.1 – Introduction of IMS
The National Greenhouse and Energy Reporting Act (NGER Act)	The NGER Act manifests a mandatory corporate reporting system for GHG emissions, energy consumption and production.	N/A	Federal Parliament (for NGER)	6.1.6 – Potential environmental impacts and mitigation measure: Planned Activities
Native Title Act 1993	Allows for the recognition of native title through a claims and remediation process and also sets up regimes for obtaining interests in land or waters where native title may exist.	N/A	National Native Title Tribunal	6.1.4 – Interference with other sea users
Navigation Act 2012	A number of Marine Orders enacted under this Act apply directly to offshore petroleum exploration and production	N/A	AMSA (operational)	6.1.4 – Interference with other sea users

Legislation	Applicability to Operational Activities	International Convention Enacted	Administering Authority	Addressed in EP
	activities. Those potentially applicable to the Project include: • Marine Orders – Part 12: Construction – subdivision and stability, machinery and electrical installations; • Marine Orders – Part 21: Safety of navigation and emergency procedures; • Marine Orders – Part 30: Prevention of collisions; • Marine Orders – Part 47 – Offshore Industry units; • Marine Orders – Part 50: Special purpose ships; • Marine Orders – Part 57: Helicopter Operations; • Marine Orders – Part 59: Off-shore industry vessel operations; • Marine Orders - Part 91: Marine pollution prevention—oil; • Marine Orders - Part 93: Marine pollution prevention—noxious liquid substances; • Marine Orders - Part 94: Marine pollution prevention—packaged harmful substances; • Marine Orders - Part 96: Marine pollution prevention—sewage; and • Marine Orders - Part 97: Marine pollution prevention—air pollution.		Department of Infrastructure, Transport, Regional Development, Communications and the Arts	7.4.1 – Vessel collision
Civil Aviation Act 1988	Aviation transport associated with the Project will comply with this Act.	N/A	Civil Aviation Safety Authority	6.1 – Operational activities (helicopter use)

3.2 International Conventions

Relevant international conventions include:

- Australia and Kyoto Protocol.
- Australia and Paris Agreement.
- The International Convention for the Prevention of Pollution from Ships (MARPOL 73/78).
- International Convention for the Safety of Life at Sea (SOLAS) Convention.
- Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGS).
- International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) Convention.
- Minamata Convention on Mercury 2019.

3.3 Other Guidelines

A range of industry guidelines for petroleum activities have been developed by industry and regulatory bodies that are considered to represent good industry practice in the petroleum industry. These guidelines have no legislative force and are intended to provide industry guidance. The following were reviewed during development of this EP:

- Australian Ballast Water Management Requirements (DAWR, 2020).
- Australian Biofouling Management Requirements (Commonwealth of Australia, 2022).
- Australian Petroleum Production and Exploration Association (APPEA) Code of Environmental Practice (2008).
- Australian Pipelines and Gas Association (APGA) Code of Environmental Practice. Onshore Pipelines, Rev 4 (2017).
- Biosecurity Arrangements for Vessels Arriving into Australian Ports (DAFF, 2012).
- Consultation Guidance Note (for the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009) (DMP, 2012).
- Department Of Primary Industries and Regional Development Biofouling Biosecurity Policy, 2017.
- Department of Industry, Science, Energy and Resources. Guideline: Offshore Petroleum Decommissioning (DoISER, 2022).
- NOPSEMA Guidance Note N-03000-GL926: Notification and Reporting of Environmental Incidents - Rev 4 February 2014.
- National Biofouling Management Guidelines for the Petroleum Production and Exploration Industry (Commonwealth of Australia, 2009).
- Western Australian Marine Pest Management Guidelines (WA DoF, 2012).
- NOPSEMA Guidance note N-04750-GN1344 A339814 - Environment Plan Content requirements – 11/09/2020.
- NOPSEMA Guidance note N-04750-GN1488 A382148 – Oil Pollution Risk Management – 07/07/2021.
- NOPSEMA Guideline N-06800-GL1887 A705589 – Consultation with Commonwealth agencies with responsibilities in the marine area – 29/03/2022.
- NOPSEMA Guideline N-04750-GL2086 A900179 – Consultation in the course of preparing an environment plan – 15/12/2022
- NOPSEMA Considerations for five-year environment plans revisions – Information Paper IP1764 - 14/01/2021.

- NOPSEMA Policy N-00500-PL1959 A800981 - Section 270 Consent to surrender title - NOPSEMA advice 30/06/2022.
- NOPSEMA Policy 30/06/2022 – Section 572 Maintenance and removal of property – NOPSEMA advice 09/12/2022.
- NOPSEMA Information Paper N-00500-IP2002 A816565 – Planning for proactive decommissioning – 16/12/2021.
- NOPSEMA Complying with Your Decommissioning Obligations – Brochure (NOPSEMA, 2021).
- NOPSEMA Decommissioning Compliance Strategy.
- NOPSEMA Decommissioning Compliance Plan.
- NOPSEMA Information Paper N-04750-IP1899 A715054 – Reducing marine pest biosecurity risks through good practice biofouling management –13/07/2021.
- Technical guidelines for preparing contingency plans for marine and coastal facilities. Australian Maritime Safety Authority (AMSA, January 2015).

4 Description of the environment

4.1 Environment that may be affected (EMBA)

For the purposes of this EP, the Operational Area includes the CHA platform and the pipeline up to the State waters boundary, including a 500 m exclusion zone around the platform and 500 m Operational Area either side of the pipeline. The Environment that May Be Affected (EMBA) encompasses the area that could be affected by unplanned events and is derived from modelling of worst-case hydrocarbon spill scenarios. For conservatism, the worst-case scenario, in terms of the extent of area effected, is used to define the EMBA.

Two credible spill scenarios were identified to help inform the environment that may be affected (EMBA) as outlined in Table 4-1 below, with the worst case scenario shown in Figure 4-1. In this scenario, entrained diesel (exceeding 100 ppb) has a 1% probability of occurring up to 150 km from the source (the CHA platform) and therefore a buffer of 150 km around the CHA platform was used to define the highly conservative EMBA.

Further details of hydrocarbon spill scenarios, including justification of modelling inputs, thresholds, risks and management controls are discussed in Section 7.3.

Table 4-1: Worst case credible hydrocarbon spill scenarios associated with CHA operational activities used to define the EMBA

Incident	Substance Type	Worst Case Release	Worst case extent[2]	Section
Pipeline leak (corrosion related - undetected between pipeline surveillance programme every 21 days)	Crude	Crude: 97 m^3 (0.192 m3/hour over 21 days)	Surface oil may be encountered up to 31.6 km from the source (≥1 g m^2)	7.3.3
Vessel tank rupture	Diesel	~500m^3 (3 hours)	Entrained oil may be found up to 150 km from the source (≥100 ppb)	7.4.1

[2] Distance estimated from figures provided in the Oil Spill Trajectory Modelling Report, see Section 7 for more detail

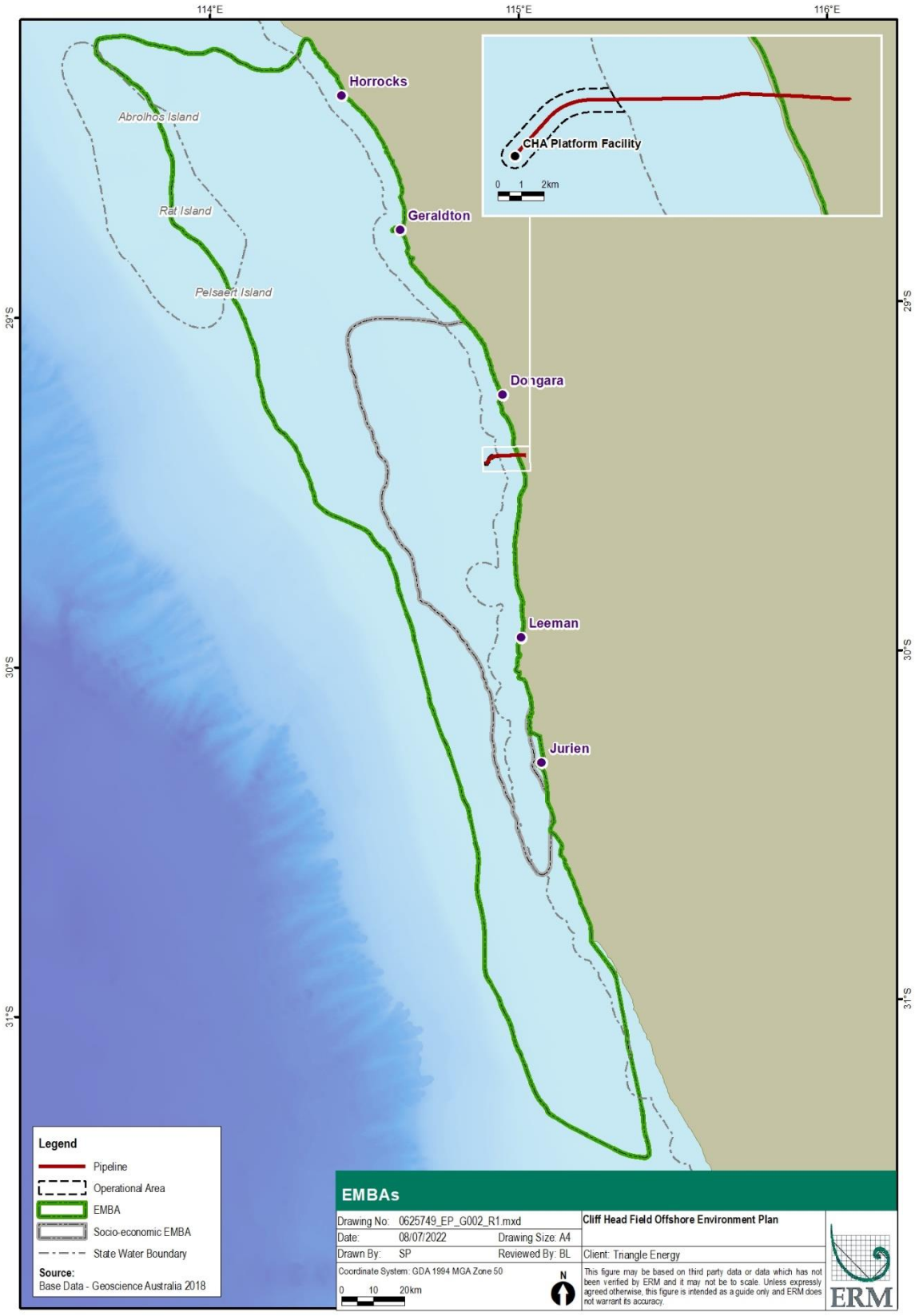


Figure 4.1: Environment that May be Affected

4.2 Regional setting

The Operational Area is in nearshore continental shelf waters within the Southwest Shelf Transition provincial scale bioregion, which is part of the wider South West Marine Region (SWMR) (Figure 4.2). The Southwest Shelf Transition bioregion consists almost entirely of continental shelf waters (>99%), with a mean water depth of 41 m. This mesoscale bioregion is comprised of two provincial scale bioregions:

- Abrolhos Islands: includes the Houtman Abrolhos island groups, which support diverse biota
- Central West Coast: includes the majority of the mesoscale bioregion, consisting of continental shelf waters, including unconsolidated sandy sediments, banks, shoals and limestone reefs.

The region includes a number of inshore lagoons, a smooth inner shelf plain, a series of shore ridges, and steep, narrow outer shelf. The surface ocean circulation is strongly influenced by the Leeuwin Current as it pushes low nutrient, low salinity sub-tropical water southward along the western edge of the continental shelf.

The region is relatively sparsely populated along the coast, with the largest population centre at Geraldton (78 km north of Operational Area). The region supports an economy that contains sectors such as oil and gas, mining, construction, primary industries (including commercial fishing) and service industries.

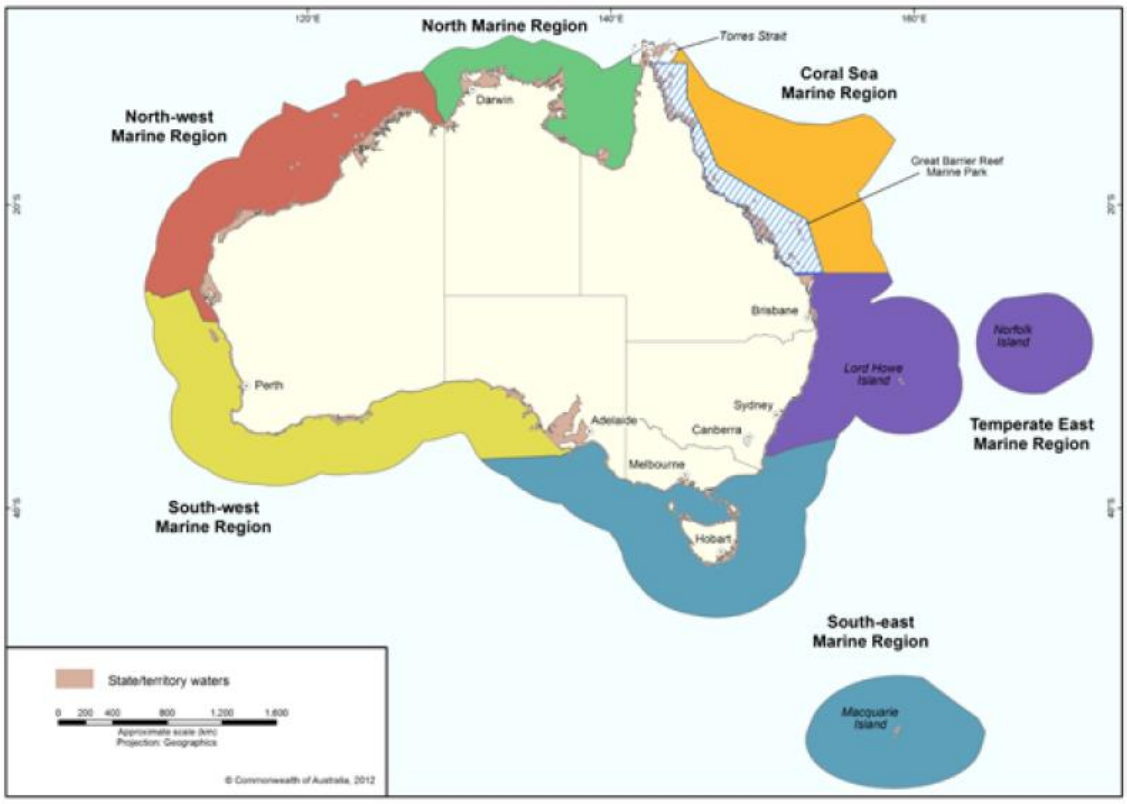


Figure 4.2: Marine regions of Australia, the South-west Region is shown in yellow (DoE 2012)

4.3 Physical environment

4.3.1 Climate

The oil field is within a region that has a Mediterranean type climate characterised by seasonal patterns of hot, dry summers and mild, wet winters, with a low number of rain days. The highest temperatures occur in January and February (19.2 to 32.4 ºC) while the lowest temperatures occur in August (8 to 19.5 ºC). These temperatures have a much smaller range compared to those on the mainland: the summer temperature is typically a degree cooler, while winter temperatures are considerably warmer. This is due, in part, to the Leeuwin Current which flows southward from more tropical waters. There is a dominant winter rainfall with approximately 86% of annual rainfall occurring between April and September; the wettest month is June where over 100 mm can be expected to fall. During summer months, rainfall is uncommon with only 70 mm expected between October and March (Pearce, 1997).

Winds over the region are relatively strong (mean 12–16 knots; maximum 30–35 knots) and are most frequently from the northwest during the summer months (September to February) and from the southeast during the winter months (May to July). March, April and August are transitional months where the wind can be from either the northwest or southeast (Figure 4.3). In addition to these seasonal wind trends, there is a daily pattern of land breezes in the morning, followed by the onset of south-westerly sea breezes in the afternoon. The pattern is caused by temperature differences between land and ocean (Pearce, 1997).

Three classes of storm have been identified for the region; 1) brief squalls which may occur between December and April, 2) tropical cyclones in the area occur roughly one in every three years and are most common between January and April; these can generate potential destructive, extremely high wind speeds, and 3) extra-tropical cyclones which occasionally pass south of Geraldton during winter. These winter gales can generate gusts of up to 35 m per second (126 km/hr), initially from the northwest and gradually moving around to southerly as the cyclone passes through the area (Pearce, 1997).

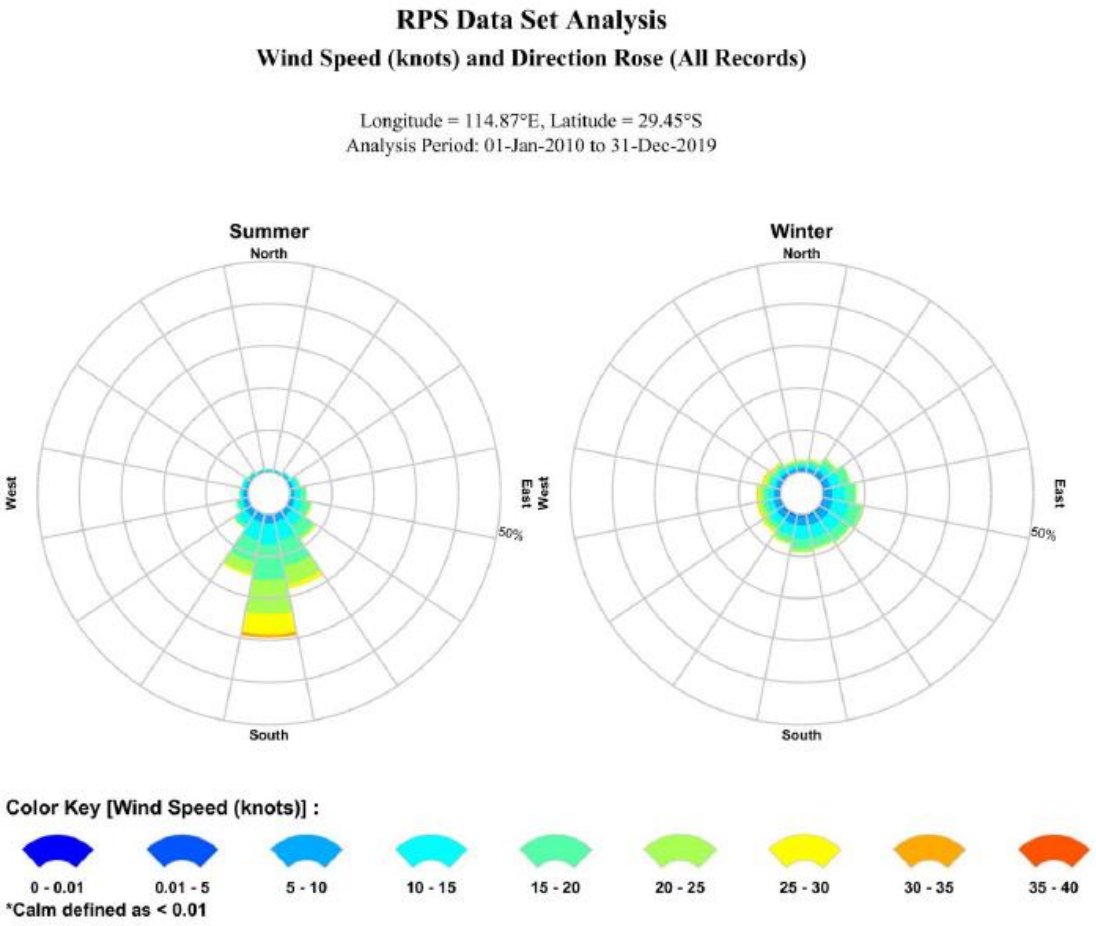


Figure 4.3: Monthly wind rose plots for the closest node CHA. Data is based on modelled conditions between 2010–2019 (inclusive). Source: RPS, 2022

4.3.2 Hydrology and oceanography

Water circulation in the area is primarily influenced by wind-driven currents, although localised wave-forced currents may occur around the shallow reefs, particularly during large swell events. The currents at the surface to mid-depth have typical mean speeds of 0.08 to 0.15ms-1 and near the seabed this is reduced to 0.06 to 0.1ms-1. The currents run mostly parallel to the local bathymetry/shoreline (WNI, 2000). As a result of the strong land/sea breezes, seas are slightly greater than swell in summer. Oceanic swells predominantly arrive from the southwest during summer. The mean swell height ranges from 0.9 to 1.3m with associated maximums of 1.7 to 3.5m; and mean periods of 12 to 16 seconds. Typical annual mean sea heights are 0.5 to 1.2m with associated maximums of 1.5 to 2.5 m and mean periods of 4 to 7 seconds (WNI, 2000).

The Leeuwin Current is the dominant oceanic current in the region. It draws warm, low salinity water of tropical origin southwards along the coast of Western Australia (Figure 4.4). This current flows all year round but is strongest during the southern hemisphere winter. In general, the Leeuwin current runs along the shelf break, although meanders, occasionally passing well out at sea and sometimes close to the shelf. Although the current is predominantly southerly, Shark Bay and the Houtman Abrolhos act together as a topographical trigger for the formation of eddies. This means that the northern area can experience currents from any direction, even when the current is flowing strongly (McClathie et al., 2006). The Leeuwin Current is weakest in summer (November to March) when winds blow from the south. Typically, the current and its eddies are about 1 knot (0.5 m/s) (Pearce, 1997).

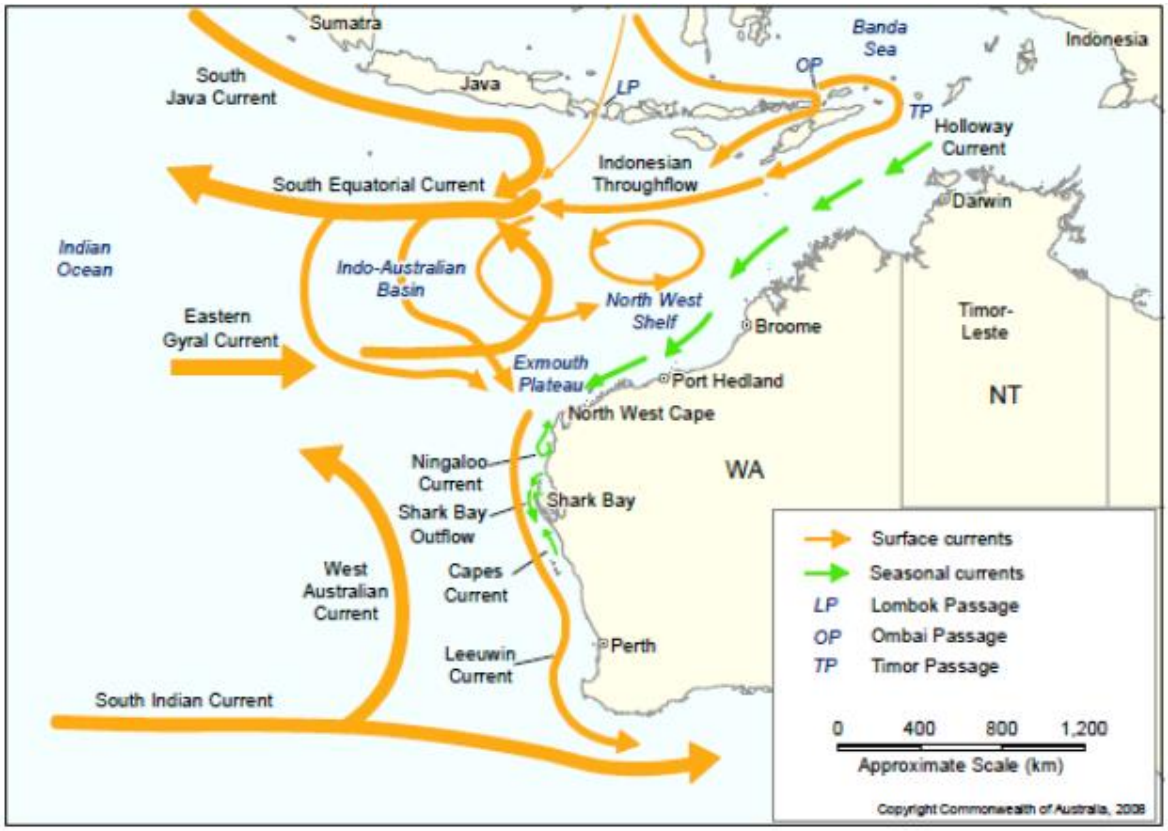


Figure 4.4: Regional oceanography and surface currents that dominate the waters off Western Australia

4.3.3 Water and Sediment quality

The waters of the temperate coastal ecosystems of Western Australia in the vicinity of Cliff Head A platform are nutrient poor as a result of both low riverine inputs and the absence of significant upwelling of nutrient rich waters from the deeper ocean (Pearce, 1997). Low concentrations of dissolved inorganic nitrogen limit biological productivity which, as a result, are characterised by a low standing crop of plankton and high-water clarity. Primary production in these ecosystems is driven by benthic plant communities, typically consisting of extensive macroalgal communities and perennial seagrass meadows. The relatively shallow coastal waters in the Operational Area are well mixed due to the prevailing metocean conditions and bathymetry, resulting in high levels of dissolved oxygen and little density stratification.

Water and sediment quality monitoring within and surrounding the Operational Area indicates that water and sediment quality is high. Water and sediment quality at monitoring sites adjacent to the pipeline were found to be high, with results below the relevant ANZECC & ARMCANZ (2000) trigger levels for all tested analytes, including metals and hydrocarbons (BMT Oceanica, 2015).

4.4 Values and sensitivities

4.4.1 Key ecological features

Key Ecological Features (KEFs) are areas of the marine environment that based on current scientific understanding, are considered to be of regional importance for either the region's biodiversity or ecosystem function and integrity. KEFs that overlap with either the Operational Area or/and the EMBA are discussed in Table 4-2 below and shown in Figure 4.5).

Table 4-2: Key Ecological Features overlapping the Operational Area or EMBA

Key Ecological Feature	Distance from Operational Area	Description	Relevant Concerns
Ancient coastline between 90 and 120 m depth	60 km west of Operational Area Within EMBA	Consists of a ridge comprised of a submerged shoreline from a glacial period when sea levels were lower. The ancient coastline between 90 and 120 m may host relatively high benthic biodiversity and be associated with increased productivity (DSEWPAC (Department of Sustainability, Environment, Water, Population and Communities) 2012a)	No relevant pressures of concern / potential concern
Commonwealth marine environment surrounding the Houtman Abrolhos islands	80 km north-west of Operational Area Within EMBA	The Houtman Abrolhos islands host a unique mix of temperate and tropical species, facilitated by the transport of relatively warm water and tropical larvae southwards by the Leeuwin Current . The islands host significant aggregations of breeding seabirds, supporting over one million breeding pairs, and include a range of benthic habitats and associated fisheries resources (DoFWA (Department of Fisheries Western Australia) 2012, DSEWPAC, 2012a).	Oil pollution – of potential concern
Commonwealth marine environment within and adjacent to the west coast inshore lagoons	Overlaps Operational Area Within EMBA	The west coast inshore lagoons KEF covers ~1,761 km^2 and includes areas that are important for benthic productivity, and breeding and nursery aggregations for many temperate and tropical marine species (McClatchie et al., 2006). The lagoons are dominated by seagrass and epiphytic algae, which provide habitat and food for many marine species (directly and indirectly). Seagrass meadows occur in more sheltered areas and in the inter-reef lagoons along exposed sections of the coast while emergent reefs and small islands create a diverse topography. This mix of sheltered and exposed environments forms a complex mosaic of habitats. The lagoons are also important areas for the recruitment of commercially and recreationally important fishery species, including western rock lobster. Extensive schools of migratory fish visit the area annually, including herring, garfish, tailor and Australian salmon (McClatchie et al., 2006).	Oil pollution – of potential concern Invasive marine species – of potential concern
Perth Canyon and adjacent shelf break, and other west coast canyons	105 km south-west of Operational Area Within EMBA	The Perth Canyon is the largest known undersea canyon in Australian waters. Deep ocean currents rise to the surface, creating a nutrient-rich cold-water habitat attracting feeding aggregations of deep-diving mammals, such as pygmy blue whales and large predatory fish that feed on aggregations of small fish, krill and squid (DSEWPAC, 2012a)	Oil pollution - of potential concern

Key Ecological Feature	Distance from Operational Area	Description	Relevant Concerns
Western demersal slope and associated fish communities	61 km south-west of Operational Area Within EMBA	Small pelagic fish are an important component of pelagic ecosystems, providing a trophic link between primary production and higher predators, such as other fish, sharks, seabirds, seals and cetaceans. Fluctuations in abundance of small pelagic fish have serious implications for the functioning of pelagic ecosystems of the SWMR (DSEWPAC, 2012a). This species group, which includes 10 species (sardine, scaly mackerel, Australian anchovy, round herring, sandy sprat, blue sprat, jack mackerel, blue or slimy mackerel, red bait and saury).	Oil pollution – of potential concern
Western rock lobster	Overlaps Operational Area Within EMBA	Covers a considerable portion (~40,000 km^2) of continental shelf waters on the lower west coast of Western Australia and was established in recognition of the presumed ecological role played by the western rock lobster (*Panulirus cygnus*) in shelf waters . For additional information on the western rock lobster refer to Section 4.7.4.	Oil pollution – of potential concern

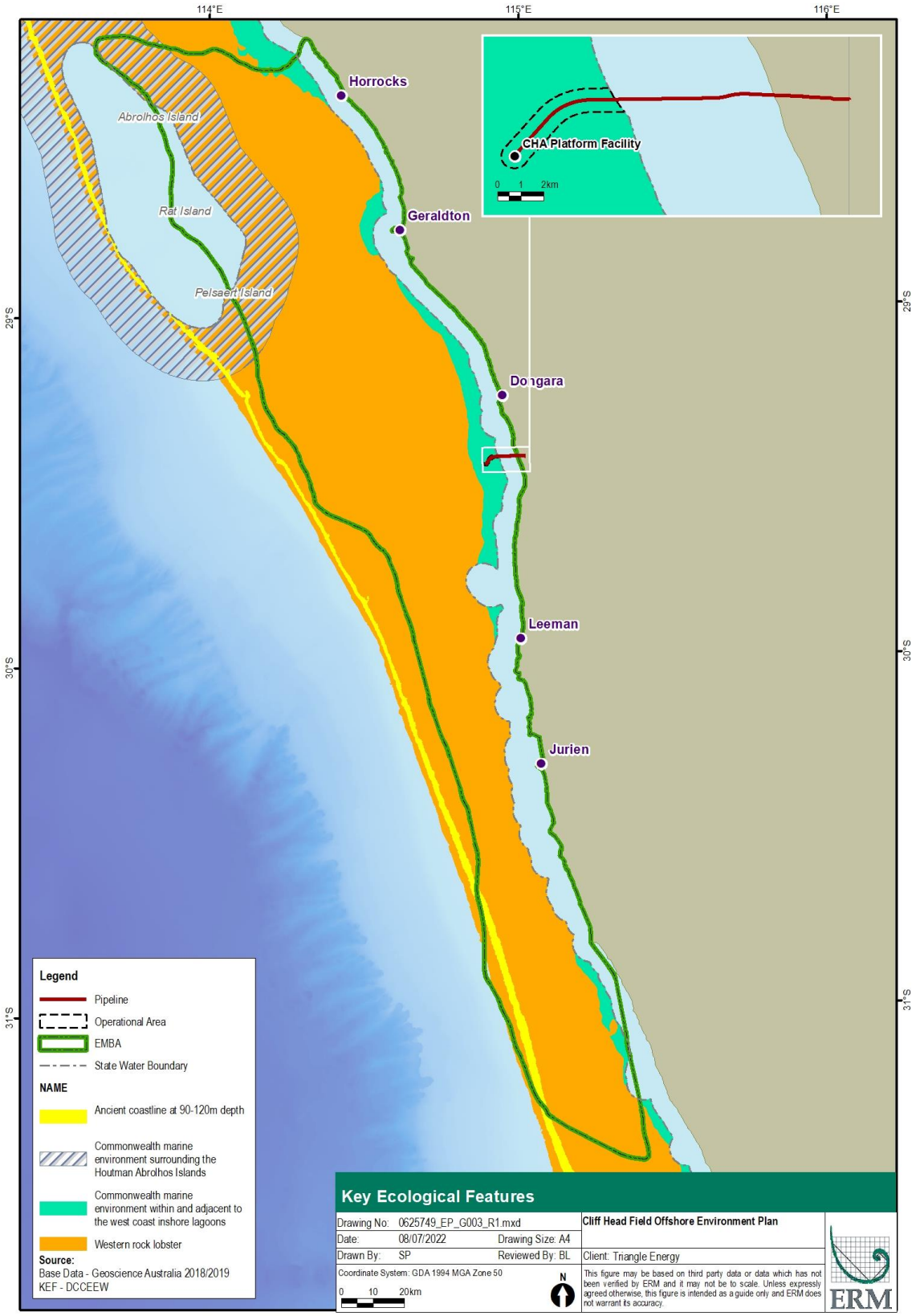


Figure 4.5: Key Ecological Features overlapping the Operational Area and EMBA

4.4.2 Protected areas

A search of the EPBC Protected Matters Database did not indicate that there were any conservation areas overlapping with the Operational Area. However, the Operational Area is 48 km to south of the Abrolhos Australian Marine Park (AMP), 228 km from the Two Rocks AMP and 80 km from the Jurien AMP, which overlap with the EMBA. Additionally, the Operational Area is 97 km from the state managed Abrolhos Islands' Fish Habitat Protection Area declared under the WA Fish Resources Management Act and 68 km to the Jurien Bay State Marine Park (Figure 4.7). A description of the key values and IUCN category of protected areas overlapping the EMBA is provided in Table 4-3 below. Table 4-4 outlines the IUCN principles for the different categories and describes how these principles have been addressed in this EP.

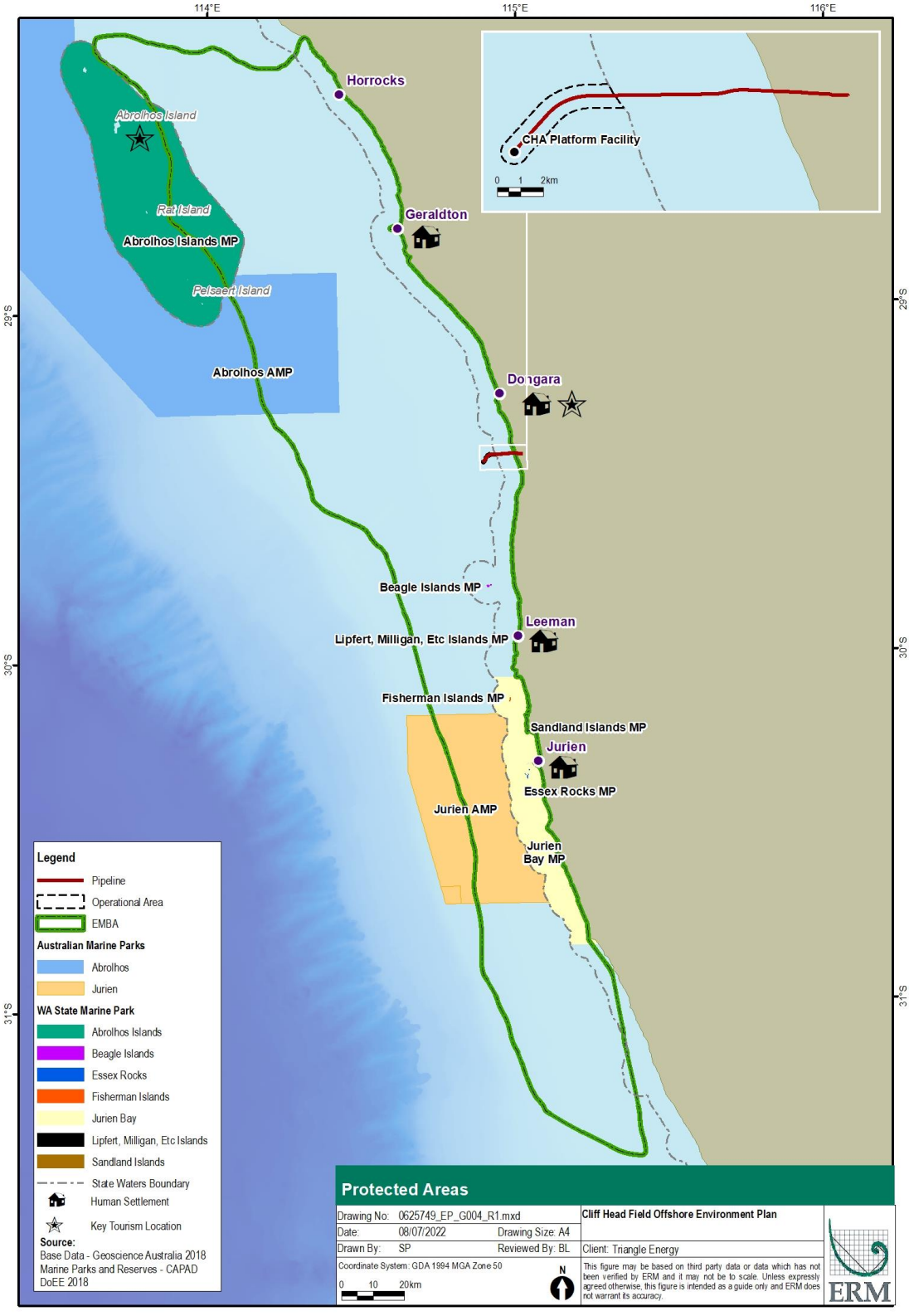


Figure 4.6: Protected areas overlapping the EMBA

Table 4-3: Protected areas in the vicinity of the EMBA

Reserve	Distance from Operational Area (km)	IUCN Categories*	Key Values
Australian Marine Parks (AMPs)			
Two Rocks	228 south	VI - Multiple use zone (867 km^2)	Key ecological features: • The Commonwealth marine environment within and adjacent to the west-coast inshore lagoons - an area that is regionally important for enhanced benthic productivity, including macroalgae and seagrass communities, and breeding and nursery aggregations for many temperate and tropical marine species • Western rock lobster (valued as a species that plays a regionally important ecological role) - plays an important trophic role in many of the inshore ecosystems of the South-west Marine Region. Western rock lobsters are an important part of the food web on the inner shelf, particularly as juveniles • Ancient coastline between 90 m and 120 m depth - high benthic biodiversity and productivity occur where the ancient coastline forms a prominent escarpment Biologically important areas within the Marine Park include foraging habitat for seabirds and Australian sea lions, a migratory pathway for humpback and pygmy blue whales, and a calving buffer area for southern right whales. The South-West Aboriginal Land and Sea Council is the Native Title Service Provider for the South-west region. Social and economic values: • Tourism • Commercial fishing • Recreation – including fishing and scientific research (Director of National Parks 2018):
Abrolhos	48 north-west	VI - Special purpose zone (5729 km^2)	Environmental values and sensitivities include: Important foraging areas for the: • Australian lesser noddy • northernmost breeding colony of the Australian sea lion • common noddy, wedge-tailed shearwater, bridled tern, Caspian tern and roseate tern. Important migration habitat for the protected humpback whale

Reserve	Distance from Operational Area (km)	IUCN Categories*	Key Values
			Second largest canyon on the west coast, the Houtman Canyon Examples of the northernmost ecosystems of the Central Western Province and South-west Shelf Transition (including the Central West Coast meso-scale bioregion) Examples of the deeper ecosystems of the Abrolhos Islands meso-scale bioregion Examples of the shallower, southernmost ecosystems of the Central Western Shelf Province provincial bioregion including the Zuytdorp meso-scale bioregion Examples of the deeper ecosystems of the Central Western Transition provincial bioregion Examples of diversity of seafloor features including: southern most banks and shoals of the North-west region; deep holes and valleys; slope habitats; terrace and shelf environments Six key ecological features: • Commonwealth marine environment surrounding the Houtman Abrolhos Islands (high biodiversity, breeding and resting aggregations) • Demersal slope and associated fish communities of the Central Western Province (communities with high species diversity) • Meso-scale eddies (high productivity, feeding aggregations) • *West-coast canyons (high productivity, feeding aggregations) • Western rock lobster habitat (species with an important ecological role) • Wallaby Saddle - a unique seafloor feature that supports aggregations of baitfish and attracts large pelagic predators including sperm whales. (Director of National Parks 2018):
Jurien	80 south	VI - Special purpose zone (1820 km^2)	Environmental values and sensitivities: a) Important foraging areas for the: • soft-plumaged petrel • Australian sea lion • White shark • roseate tern, bridled tern, wedge-tailed shearwater, and common noddy.

Reserve	Distance from Operational Area (km)	IUCN Categories*	Key Values
			b) Important migration habitat for the protected humpback whale c) Examples of the ecosystems of two provincial bioregions: the central part of the South-west Shelf Transition (which includes the Central West Coast meso-scale bioregion) and small parts of the Central Western Province d) One key ecological feature: western rock lobster habitat (species with an important ecological role). Heritage values represented by the SS *Cambewarra* historic shipwreck. (Director of National Parks 2018)
State Marine Parks			
Jurien Bay	68 south	Ia – Sanctuary zones (31 km^2) II – General use / special purpose (778 km^2) IV – Aquaculture / special purpose (14 km^2)	Environmental values and sensitivities (Marine Parks and Reserves Authority 2005): Ecological values: • Geomorphology • Intertidal reef platforms • Water and sediment quality • Seagrass meadows • Macroalgal communities • Seabirds • Invertebrate communities • Finfish • Water and sediment quality • Seagrass meadows • Macroalgal communities • Seabirds • Invertebrate communities • Finfish

Reserve	Distance from Operational Area (km)	IUCN Categories*	Key Values
			• Sea lions • Cetaceans and turtles. • Social values: • Indigenous heritage • Maritime heritage • Commercial fishing • Aquaculture • Coastal use • Seascapes • Recreational fishing • Water sports • Marine nature-based tourism • Petroleum drilling and mineral development • Scientific research • Education.

Reserve	Distance from Operational Area (km)	IUCN Categories*	Key Values
State Nature Reserve			
Beagle	39 south	Ia – Sanctuary zones	(Conservation Commission of Western Australia 2004): Conservation Values: • Rich and diverse terrestrial and marine communities and habitats, significant for the • protection of priority and threatened fauna. • Important examples of fauna and flora speciation on islands. • Significant breeding and resting habitat for Australian sea-lions. • Substantial habitat and breeding grounds for numerous seabird species. • Diverse assemblages of native vegetation and flora. • Sites of relatively undisturbed native vegetation and geomorphology. • Varied natural landscapes, seascapes and associated aesthetic values. Recreational Values: • Terrestrial and marine environment that offers varied passive recreation opportunities, • including nature appreciation and wildlife observation. • Recreational fishing from beaches and on shoreline intertidal reef platforms. Educational and Cultural Values: • Community education opportunities based on island wildlife and environments. • Display and interpretation opportunities for cultural and natural history. Scientific Values: • Chain of biogeographically unique islands that serve as important references for broader • studies of island ecosystems. • Diverse flora and fauna, influenced by overlapping marine biogeographic regions. • Dynamic ecology that may provide a sensitive indicator of environmental changes, as a result • of Leeuwin Current fluctuations and increasing urbanisation on the mainland.
Beekeepers	6 east	Ia - Sanctuary zones	
Boullanger, Whitlock, Favourite, Tern and Osprey Islands	93 south	Ia - Sanctuary zones	
Buller, Whittell and Green Islands	135 south	Ia - Sanctuary zones	
Cervantes	120 south	Ia - Sanctuary zones	
Escape	98 south	Ia - Sanctuary zones	
Essex Rocks	100 south	Ia - Sanctuary zones	
Fisherman	75 south	Ia - Sanctuary zones	
Lipfert, Milligan, Etc Islands	54 south	Ia - Sanctuary zones	
Outer Rocks	110 south	Ia - Sanctuary zones	
Ronsard Rocks	115 south	Ia - Sanctuary zones	
Sandland	84 south	Ia - Sanctuary zones	
Southern Beekeepers	113 south	Ia - Sanctuary zones	
Unnamed WA48858	148 south	Ia - Sanctuary zones	
Wanagarren	139 south	Ia - Sanctuary zones	
Wedge	155 south	Ia - Sanctuary zones	

Reserve	Distance from Operational Area (km)	IUCN Categories*	Key Values
State National Park			
Houtman Abrolhos Islands	108 north-west	II – National Park	Key ecological features: • Commonwealth marine environment surrounding the Houtman Abrolhos Islands—the islands are among Australia's most important seabird breeding sites, with extensive foraging grounds in Commonwealth waters. The islands and surrounding reefs support a unique mix of temperate and tropical species, resulting from the southward movement of species by the Leeuwin Current • Demersal slope and associated fish communities of the Central Western Province—an area that provides important habitat for demersal fish communities and is characterised by high species diversity and endemism • Mesoscale eddies—important transporters of nutrients and plankton communities that form at predictable locations off the western and south-western shelf break • Perth Canyon and adjacent shelf break, and other west-coast canyons—unique seafloor features give rise to ecologically important events of localised productivity and aggregations of marine life • Western rock lobster—plays an important trophic role in many of the inshore ecosystems of the South-west Marine Region. Western rock lobsters are an important part of the food web on the inner shelf, particularly as juveniles • Ancient coastline between 90 m and 120 m depth—high benthic biodiversity and productivity occur where the ancient coastline forms a prominent escarpment • Wallaby Saddle—a unique seafloor feature that is associated with enhanced biological productivity in an area of generally low productivity. The saddle is the site of upwellings of deeper, more nutrient-rich waters and aggregations of marine species including large predators such as sperm whales. Biologically important areas within the Marine Park include foraging and breeding habitat for seabirds, foraging habitat for Australian sea lions and white sharks, and a migratory pathway for humpback and pygmy blue whales. The Marine Park is adjacent to the northernmost Australian sea lion breeding colony in Australia on the Houtman Abrolhos Islands. Cultural values: The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Yamatji region. Additionally, the Yamatji Nation Indigenous Land Use Agreement is overseen by the Yamatji Southern Regional Corporation. Social and economic values: • Tourism

Reserve	Distance from Operational Area (km)	IUCN Categories*	Key Values
			• Commercial fishing • Mining • Recreation – including fishing
Nambung	121 south	II – National Park	Key values within the reserve include (CALM, 1998): • Important geological features including the pinnacles, sand dunes and limestone cave systems • Diverse terrestrial flora and fauna • Cultural heritage is important evidence of Aboriginal occupation and early European exploration. Yuat people traditional owners • Tourism attraction – pinnacles • Tourism activities include, snorkelling, swimming, fishing, surfing and bushwalking
State Fish Habitat Protection			
Abrolhos Fish Habitat Protection Area	97 south-east	IV – Fish habitat protection area (245 km^2)	Environmental values within the reserve include (Evans et al., 2022): • high water quality • diverse range of marine habitats, home to tropical and temperate species, including Australian sea lions, western rock lobsters and a number of other species currently listed under State and Commonwealth legislation • variety of terrestrial plant species and communities which are utilised by a diverse range of fauna, including birds. Many of these species are listed under State and Commonwealth legislation and international agreements • wide array of fish and invertebrate species, making it a popular area for commercial and recreational fishing in the Midwest region • proposed aquaculture activities, including a planned strategic environmental assessment within the fish habitat protection area • unique history including, the Batavia and subsequent shipwrecks, evidence of guano mining and commercial fishing all contribute to the heritage values • important socio-economically for the region due to tourism and recreation with a high number of visitors. Activities include boating, fishing, diving, wildlife and heritage photography and appreciation.

Note IUCN Categories: Ia – Strict nature reserve, Ib – Wilderness area, II – National Park, III – Natural monument or feature, IV – Habitat / species management area, V – Protected landscape / seascape, VI – Protected are with sustainable use of natural resources

Table 4-4: IUCN category, principles and evidence that principles have been addressed in this EP

Category IA	IUCN principles	Evidence that principles have been addressed in this EP
• Jurien Bay Marine Park • Beagle • Beekeepers • Boullanger, Whitlock, Favourite, Tern and Osprey Islands • Buller, Whittell and Green Islands • Cervantes • Escape • Essex Rocks • Fisherman • Lipfert, Milligan, Etc Islands • Outer Rocks • Ronsard Rocks • Sandland • Southern Beekeepers • Unnamed WA48858 • Wanagarren • Wedge • Unnamed WA44682	The reserve or zone should be managed primarily for scientific research or environmental monitoring based on the following principles.	Yes - Addressed throughout this table and through management of the reserve by DCCEEW
	Habitats, ecosystems and native species should be preserved in as undisturbed a state as possible	Yes – no behavioural impacts expected that would impact ecological processes. Potential impacts reduced to ALARP through controls demonstrated in this EP (Sections 6 and 7) resulting in minimal behavioural or physiological disturbance, therefore maintaining the current state of the regions, communities, resources and species
	Genetic resources should be maintained in a dynamic and evolutionary state.	Yes – no behavioural impacts expected that would impact on breeding cycles
	Established ecological processes should be maintained	Yes – no behavioural impacts expected that would impact ecological processes
	Structural landscape features or rock exposures should be safeguarded.	Yes – no anchoring or possible grounding will occur as reserve will not be entered
	Examples of the natural environment should be secured for scientific studies, environmental monitoring and education, including baseline areas from which all avoidable access is excluded	Yes - Reserve will not be entered as per reserve management requirements
	Disturbance should be minimised by careful planning and execution of research and other approved activities.	Yes – no impacts expected that would lead to disturbance of values and sensitivities
	Public access should be limited to the extent it is consistent with these principles.	Yes - Reserve will not be entered
Category II	**IUCN principles**	**Evidence of addressing principles**
• Jurien Bay Marine Park • Houtman Abrolhos Islands National Park • Nambung National Park	The reserve or zone should be protected and managed to preserve its natural condition according to the following principles.	Yes - Addressed throughout this table and through management of the reserve by DCCEEW
	Natural and scenic areas of national and international significance should be protected for spiritual, scientific, educational, and recreational or tourist purposes.	Yes – Reserve will not be entered
	Representative examples of physiographic regions, biotic communities, genetic resources, and native species should be	Yes – Park will not be entered. Potential impacts reduced to ALARP through controls demonstrated in this EP (Sections 6 and 7) resulting in minimal behavioural or physiological

Category IA	IUCN principles	Evidence that principles have been addressed in this EP
	perpetuated in as natural a state as possible to provide ecological stability and diversity	disturbance, therefore maintaining the current state of the regions, communities, resources and species
	Visitor use should be managed for inspirational, educational, cultural and recreational purposes at a level that will maintain the reserve or zone in a natural or near natural state	N/A - Covered by park management (DCCEEW) and regulator assessment of this EP.
	Management should seek to ensure that exploitation or occupation inconsistent with these principles does not occur.	N/A - Covered by park management (DCCEEW)
	Respect should be maintained for the ecological, geomorphologic, sacred and aesthetic attributes for which the reserve or zone was assigned to this category.	Yes –Impacts to the environment and the ecological values that the zone has been implemented for managed to ALARP through controls identified in this EP
	The needs of indigenous people should be taken into account, including subsistence resource use, to the extent that they do not conflict with these principles.	Yes – Consultation with all relevant stakeholders (Section 10)
	The aspirations of traditional owners of land within the reserve or zone, their continuing land management practices, the protection and maintenance of cultural heritage and the benefit the traditional owners derive from enterprises, established in the reserve or zone, consistent with these principles should be recognised and taken into account.	Yes – Consultation with all relevant stakeholders (Section 10)
Category IV	**IUCN principles**	**Evidence of addressing principles**
• Abrolhos Fish Habitat Protection Area • Jurien Bay Marine Park	The reserve or zone should be managed primarily, including (if necessary) through active intervention, to ensure the maintenance of habitats or to meet the requirements of collections or specific species based on the following principles.	N/A - Covered by park management (DCCEEW)
	Habitat conditions necessary to protect significant species, groups or collections of species, biotic communities or physical features of the environment should be secured and maintained, if necessary through specific human manipulation.	N/A - Covered by park management (DCCEEW)
	Scientific research and environmental monitoring that contribute to reserve management should be facilitated as primary activities associated with sustainable resource management.	N/A - Covered by park management (DCCEEW)

Category IA	IUCN principles	Evidence that principles have been addressed in this EP
	The reserve or zone may be developed for public education and appreciation of the characteristics of habitats, species or collections and of the work of wildlife management.	N/A - Covered by park management (DCCEEW)
	Management should seek to ensure that exploitation or occupation inconsistent with these principles does not occur.	Yes – addressed through the control measures identified in this EP (Sections 6 and 7)
	People with rights or interests in the reserve or zone should be entitled to benefits derived from activities in the reserve or zone that are consistent with these principles.	Yes – Consultation with all relevant stakeholders (Section 10)
	If the reserve or zone is declared for the purpose of a botanic garden, it should also be managed for the increase of knowledge, appreciation and enjoyment of Australia's plant heritage by establishing, as an integrated resource, a collection of living and herbarium specimens of Australian and related plants for study, interpretation, conservation and display.	N/A
Category VI	**IUCN principles**	**Evidence of addressing principles**
• Jurien Australian Marine Park • Abrolhos Australian Marine Park • Two Rocks Australian Marine Park	The reserve or zone should be managed mainly for the sustainable use of natural ecosystems based on the following principles.	Yes - Addressed throughout this table
	The biological diversity and other natural values of the reserve or zone should be protected and maintained in the long term.	Yes – addressed through the control measures identified in this EP (Sections 6 and 7)
	Management practices should be applied to ensure ecologically sustainable use of the reserve or zone.	Yes – addressed through the control measures identified in this EP (Sections 6 and 7)
	Management of the reserve or zone should contribute to regional and national development to the extent that this is consistent with these principles.	N/A - Covered by park management (DCCEEW)

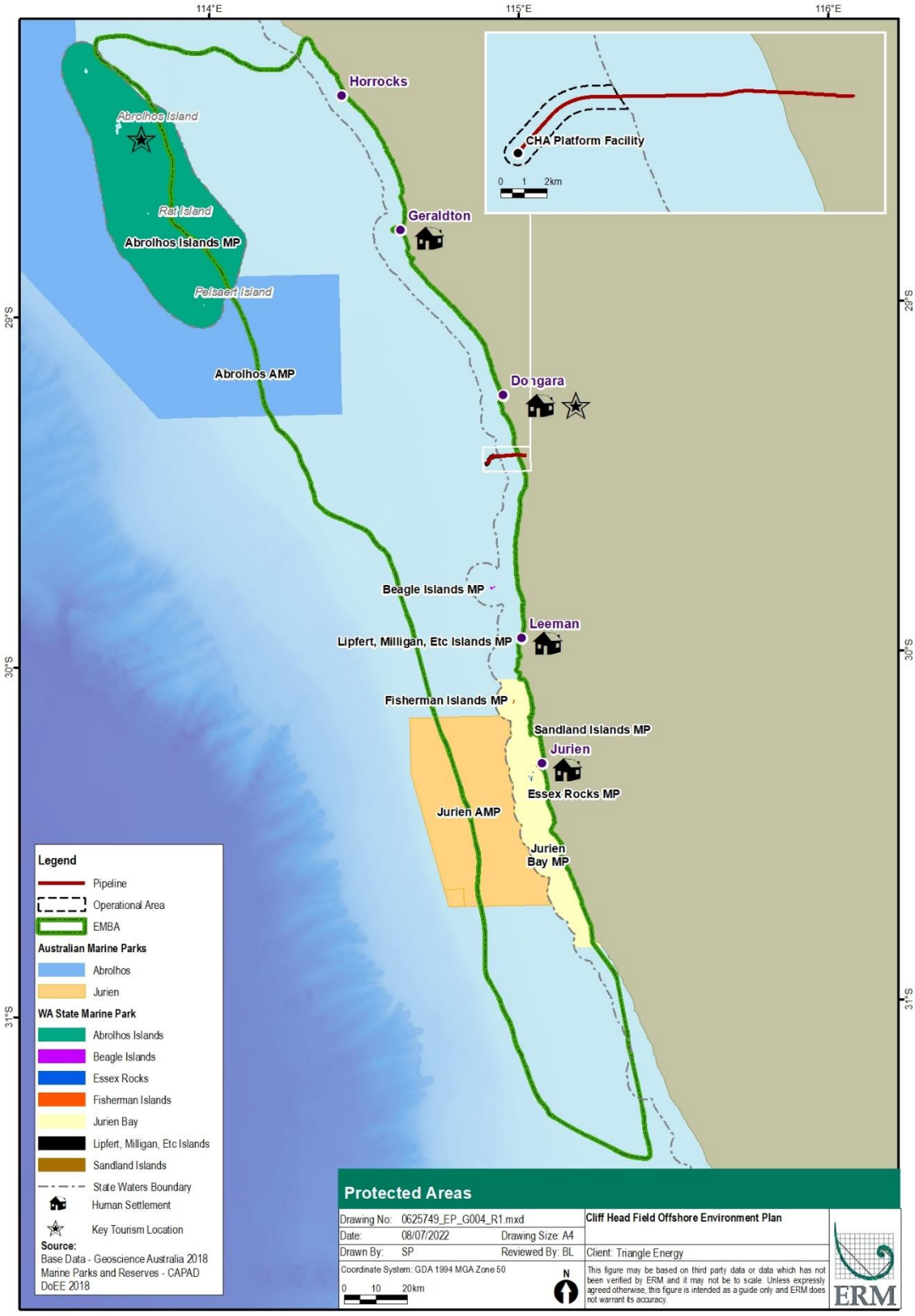


Figure 4.7: Protected areas overlapping the EMBA

4.4.3 Threatened ecological communities

No Threatened Ecological Communities (TECs) occur in the Operational Area. One TEC, Subtropical and Temperate Coastal Saltmarsh, was identified as being likely to occur within the EMBA by a search of the EPBC Act Protected Matters Search Tool (PMST). This search encompassed the entire area defined as the EMBA. In Western Australia, this community type is generally encountered on the south-western coastline, with only two locations on the central west coast (DSEWPC, 2013a). This vegetation type is restricted to relatively low energy estuaries. This vegetation type may occur in the Irwin River estuary (25 km north of Operational Area) near Dongara, and the Chapman River estuary (96 km north of Operational Area) near Geraldton. Both of these rivers have sand bars in place at the entrance to the sea, which are closed under most circumstances, although may breach during high river flow periods.

4.5 Habitats

4.5.1 Benthic habitats

4.5.1.1 Regional characterisation

The Operational Area lies within the 'Central West Coast' meso-scale region according to the Integrated Marine and Coastal Regionalisation of Australia (IMCRA) classification (IMCRA, 1997). The region is characterised by a relatively narrow continental shelf with diverse moderate energy coastal landforms (IMCRA, 1997). The area has a range of temperate species and is also at the southern limit of a suite of sub-tropical and tropical species.

The coast in the Operational Area is formed over the Perth sedimentary basin. The mainly sandy sediment of the Operational Area is relatively unproductive. Through the Pleistocene Epoch (10,000 to 2,000,000 years ago), the sea level rose across, and then receded back from, the coastal plain many times. As the sea level fell during each regression, it left behind a coastal dune field, the oldest of which have consolidated to form approximately north–south aligned ridges of aeolianite limestones. Those ridges that are now below sea level form sub-littoral reefs, often undercut and cavernous on the seaward side.

4.5.1.2 Operational Area characterisation

Benthic habitats in the Operational Area were first characterised by towed video surveys and, in the vicinity of the CHA platform, by diver (ROC, 2004). The offshore seabed environment generally consists of smooth calcarenite rock strata of varying thickness with a thin layer of sand overlaying. The thickness of sand cover varies although for most of the route corridor it is considered to be of a thickness of about 0.2 m to 1 m. Prior to construction, low-resolution aerial images of the operating area were acquired, to facilitate comparison of seagrass cover pre and post installation. The video survey locations and inferred extent of benthic habitats relative to the CHA platform and pipeline corridor, are illustrated in Figure 4.8 and Figure 4.9).

Surveys of the development area were conducted on three occasions during the construction phase, using divers and ROVs to observe any impacts caused by installation activities. Additional, high-resolution, aerial imagery was acquired in 2006 (post-construction) to establish a baseline mapping for subsequent monitoring of seagrass and the seabed (Coffey Natural Systems, 2007, 2008, 2009). Net seagrass recovery has been seen over the area impacted during pipeline construction, installation and operation between 2004 and 2006. In particular, significant seagrass recovery was recorded between 2008-09, 3 years post construction (Coffey, 2009). It is expected that seagrass will recolonise some areas impacted by the activities proposed in this EP – in particular IMR, although will not recolonise areas disturbed by rock placement as seagrass grows in sandy/muddy substrate.

Initial benthic habitat mapping as shown in Figure 4.10 and Figure 4.11 indicate that much of the area in the immediate vicinity of the pipeline is limestone pavement, with some low density seagrass in the vicinity of the platform. Much of the referenced surveys completed were conducted in State waters to meet Ministerial conditions related to State waters jurisdiction, and therefore less detail is available on the habitats in Commonwealth waters. Along the length of pipeline in Commonwealth waters the benthic habitat is sand veneers with sparse algae and seagrass, with some areas of minor to moderate seagrass coverage (Figure 4.10 and Figure 4.11).

During the pipeline surveys where a combination of ROV, diver and aerial surveys were conducted post construction (Enesar, 2007), seagrass in close proximity to the pipeline was observed to be healthy with no significant signs of breakage or stress and no difference was noted from seagrass in neighbouring areas, with no obvious difference in abundance, patchiness or epiphyte cover. During the survey, short spans were observed with Amphibolis seagrass growing beneath, however there were no signs of erosion or instability in the surrounding seabed. Halophila seagrasses were also identified during the surveys with large areas of bare impacted areas being recolonised by both species. *Posidonia* species were also observed, although they are slower to recolonise bare areas. Fauna were not noted in the Enesar (2007) report.

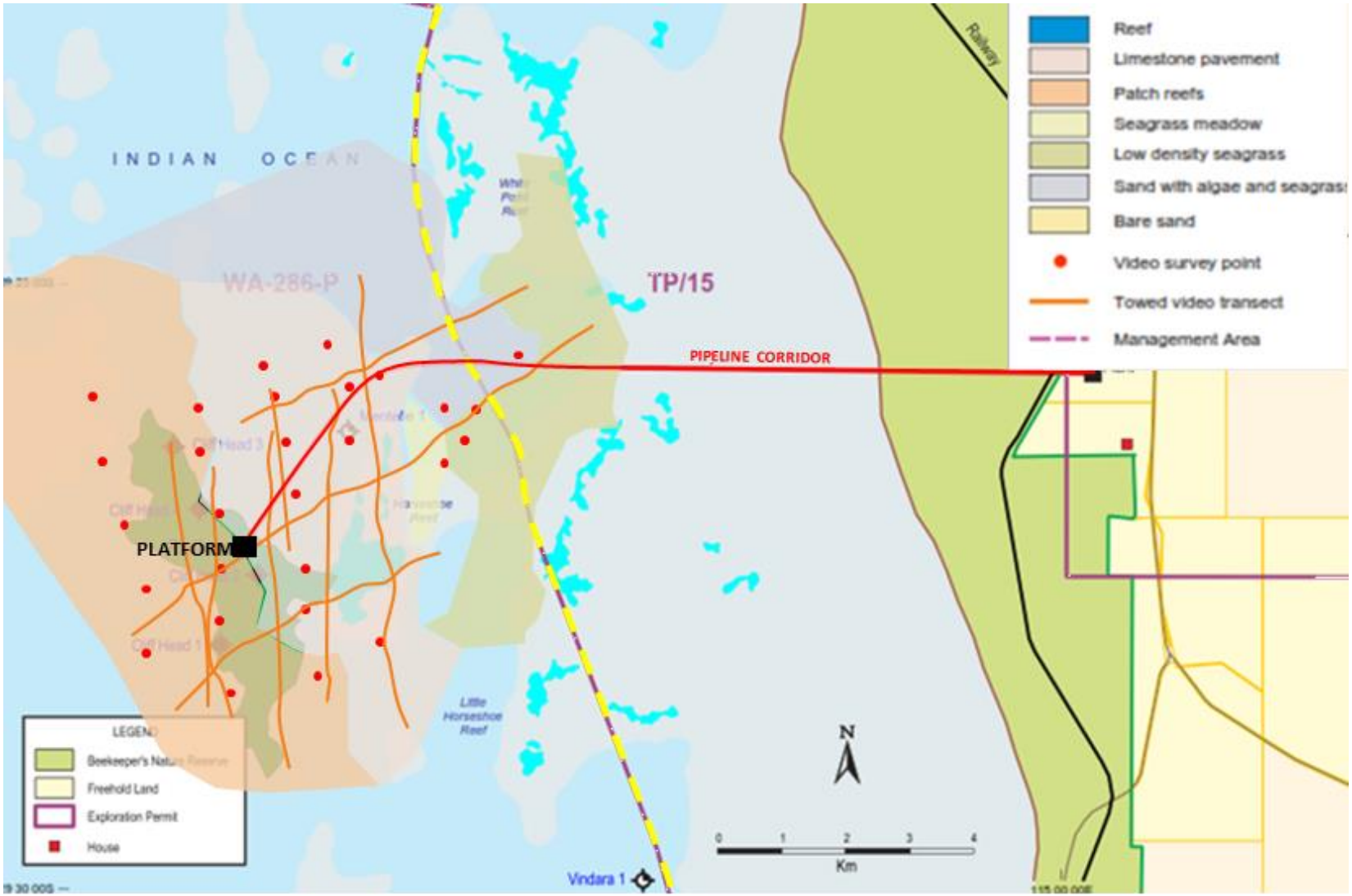


Figure 4.8: Survey locations and benthic habitats (Coffey Natural Systems, 2008)

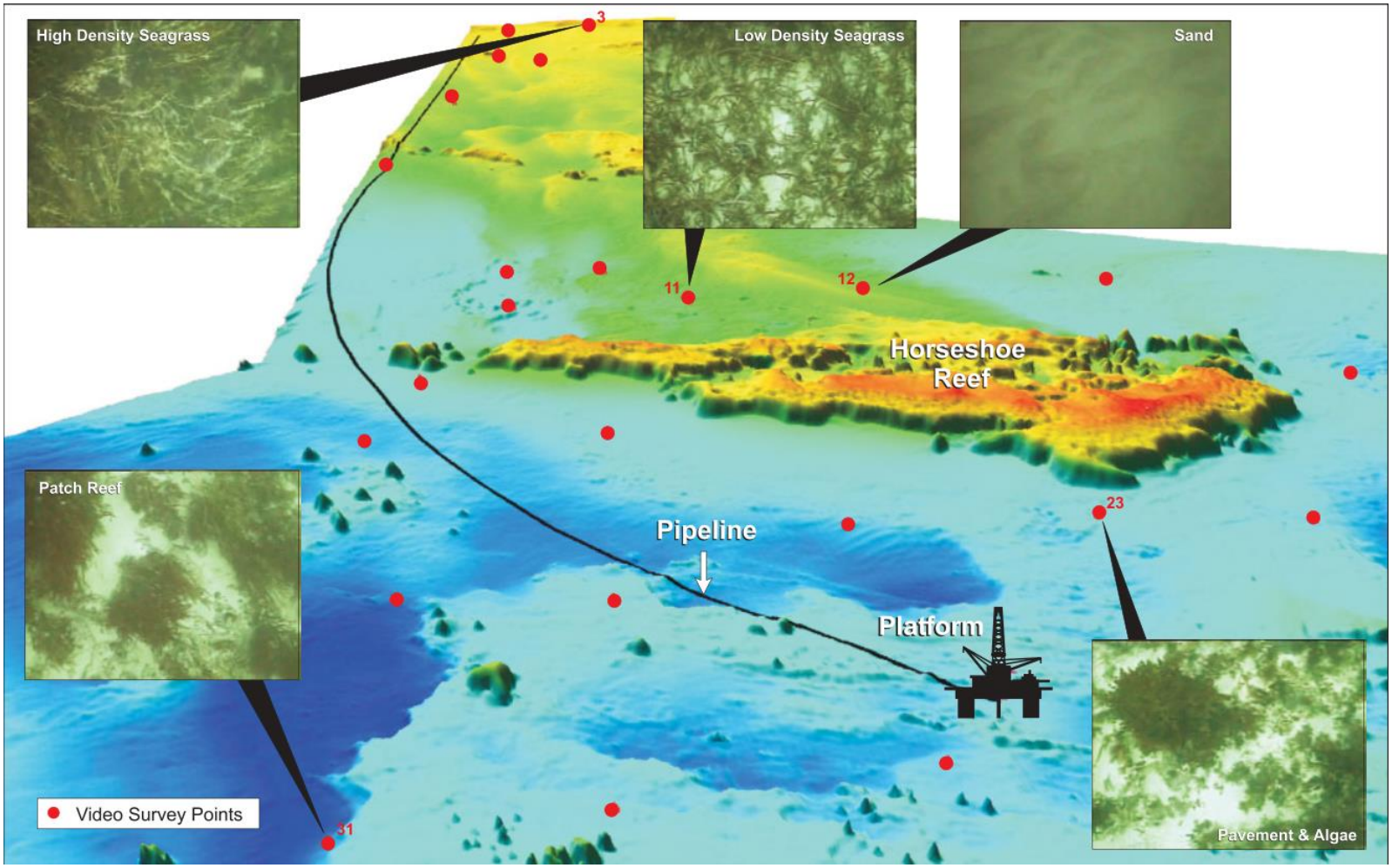


Figure 4.9: Digital bathymetry model and pipeline route (Coffey Natural Systems, 2008)

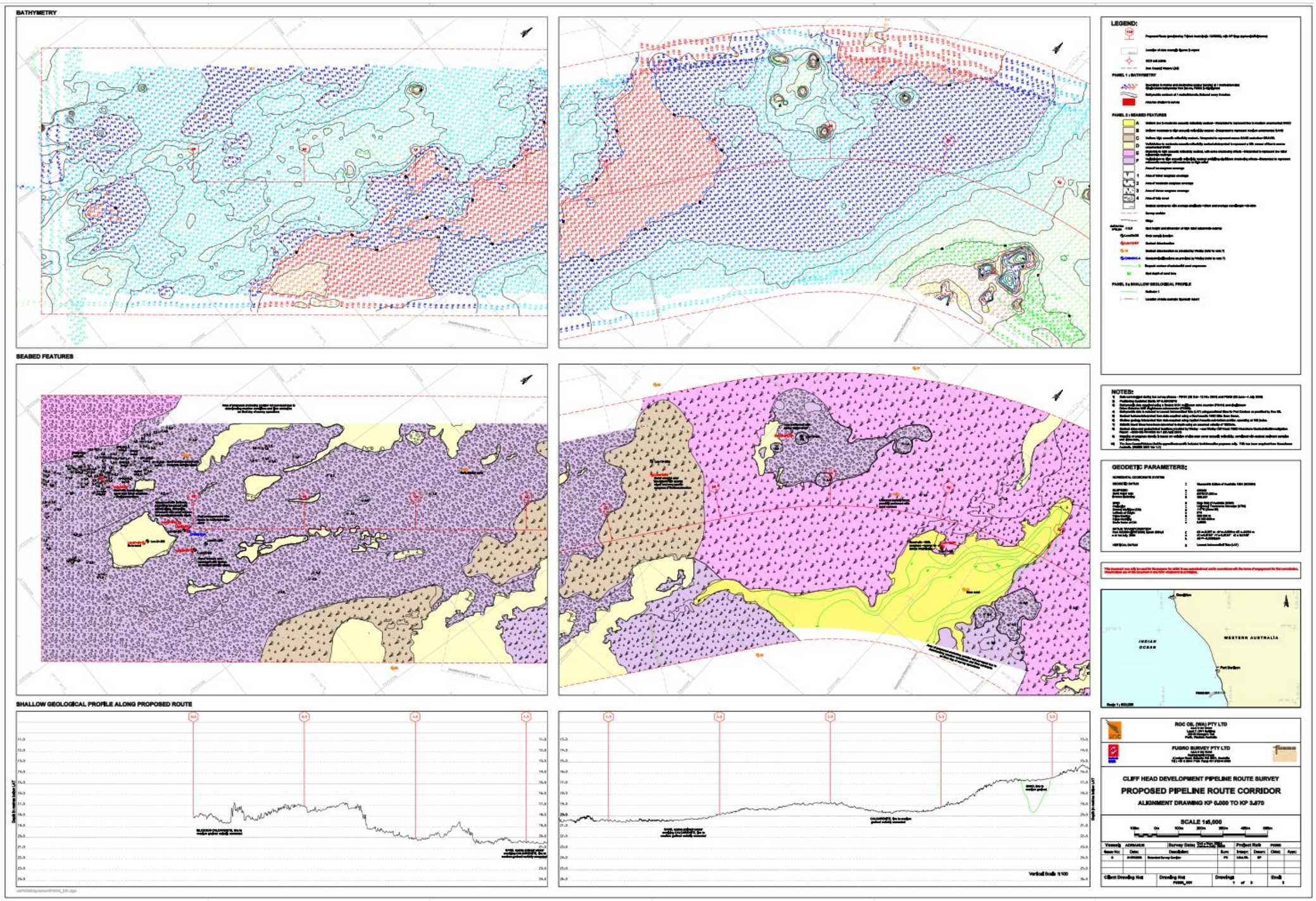


Figure 4.10: Pipeline Route benthic habitat map P0306-001 (Commonwealth waters)

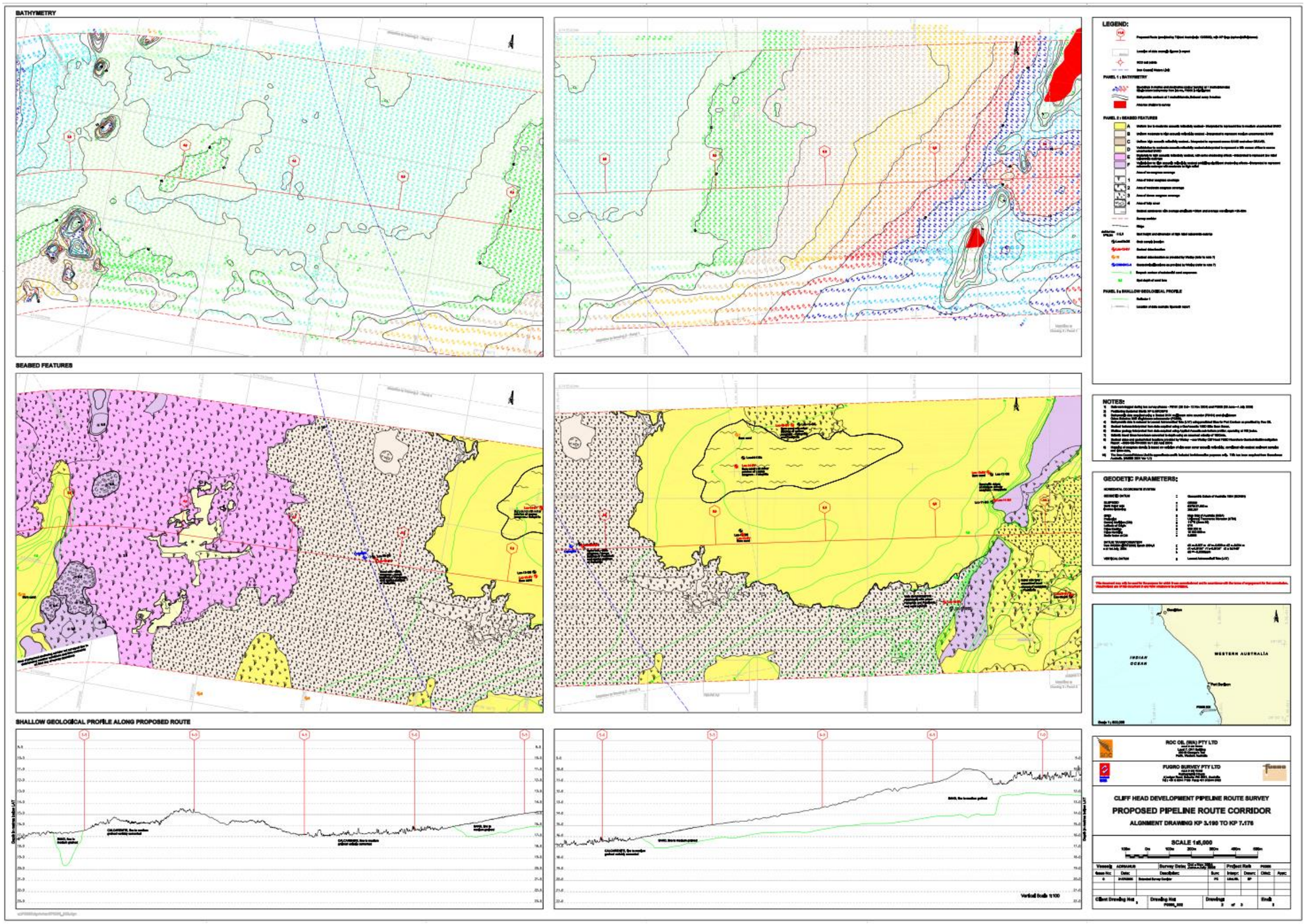


Figure 4.11: Pipeline Route benthic habitat map P0306-002 (Commonwealth waters)

4.5.2 Sandy seafloor habitat

Sandy seafloor habitat occurs in sub-tidal areas where the sand forms a thick layer over the underlying limestone pavement (Figure 4.8). The sands are often shifting, and as a consequence the density of epibiota is low. In deeper areas, small-scattered patches of seaweeds, mostly *Sargassum* and *Dictyales* species, and *Halophila* seagrasses, can be found.

4.5.3 Limestone pavement habitat

Limestone pavement habitat is widely distributed across the Operational Area, generally increasing in coverage around the 15 m isobath west of Horseshoe Reef (Figure 4.8). Red and brown macro-algae are the dominant vegetation with occasional green algae and seagrass species.

The extent of vegetation cover depends on the depth of cover of the pavement by sand. Plant growth decreases with increasing sand depth and is generally absent where the sand cover exceeds 0.3 m, as the plants attach to the underlying pavement. Occasionally, small patches of pavement occur, which are raised, usually by less than 1 m, above the general level of the seafloor. These areas of 'low relief reef' (also referred to as 'raised pavement') support a more diverse and luxuriant algal community and more abundant sessile fauna of filter feeders (sponges, ascidians, soft corals) and occasionally hard corals in places exposed to the Leeuwin current. Fish and rock lobster are also attracted to these areas for food and shelter.

Limestone pavement habitat has not been surveyed along the pipeline route, however it is a widely distributed habitat type throughout the region. Rock placement on the pipeline will result in a change in benthic habitat which is expected to be recolonised quickly. The installation of stabilisation material will not alter the structure or function of the coastal marine ecosystem, nor interrupt coastal processes such as sediment transport as described in Section 6.1.3.

4.5.4 Patch reef habitat

Major physical features in the western parts of the Operational Area are the numerous limestone patch reefs (Figure 4.8). These are high profile structures, with steep reef faces, typically rising 1 to 4 m above the surrounding seabed with extensive horizontal ledges.

4.5.5 Emergent reef habitat

Emergent reefs support an abundant attached invertebrate cover, particularly rich in sponges and ascidians. Horizontal surfaces are characterised by a dense cover of photosynthetic organisms, particularly macroalgae, with lesser *scleractinian* corals. The brown macroalgae species Ecklonia spp. (kelp) and *Sargassum* spp. Are generally the dominant macrophytes. The understorey is comprised of numerous species of smaller red, brown and green algae. Coralline algae are often present, in places becoming the dominant cover. Encrusting corals, such as *Montipora* and *Turbinaria*, are often present on shallow parts of the reefs, but are rarely dominant.

The Houtman Abrolhos Islands, located 112 km from the Cliff Head Platform, have a high diversity of hermatypic coral compared with other reefs at similar latitude. Approximated 37 genera of coral are represented, comprising of around 70 species, with *Acropora* and *Montipora* species being most abundant (Crossland et al., 1984). Other fauna groups are composed of mixed southern temperate, west-coast endemic and northern tropical species and includes ~400 species of demersal fish. Fleshy macroalgae form a major component of the benthic communities characterised by large brown algae and including kelp, mixed with fleshy red and green algae. Seasonally changing macroalgae communities dominate many protected reef areas within lagoons (Crossland et al., 2006).

4.5.6 Seagrass habitat

The region supports extensive and diverse seagrass communities with 14 species represented. Predominant species include Amphibolis spp., *Posidonia* spp., *Halophila* spp., *Thalassodendron pachyrhizum* and *Heterozostera tasmanica*. Seagrass communities are found across a range of substrate types, including limestone reef and sandy seafloor (BMT, 2015)

Thalassodendron pachyrhizum is common in the offshore reef areas, occurring mainly in association with other small macrophytes on limestone pavement at moderate depths. *Amphibolis* spp. is also associated with rocky substrates, becoming more prevalent with decreasing water depth. *Amphibolis antarctica* forms dense beds on or adjacent to the nearshore reefs of the area. Seagrasses from the genus *Posidonia* are very common in the region and range from sparse assemblages on sandy seafloor of moderate water depth (<15 m) and energy regime to dense meadows in protected areas of sand. Patch meadows of ephemeral species, such as *Syringodium* and *Halophila*, also occur on less stable sands.

Seagrasses occur in varying density throughout Operational Area, with two identifiably distinct habitat types (Coffey, 2008, 2009; Figure 4.8). The first type comprises areas of high-density seagrass meadows that are present in the eastern parts of the management area, containing a mixed assemblage of *Amphibolis, Posidonia* and *Heterozostera* species. These meadows extend from approximately the 3 to 5-m depth contour adjacent to the shoreline to the first line of reefs at about 3 km from the shore. The second seagrass habitat type has lower density meadows of ephemeral species, such as *Syringodium* and Halophila on less stable sands and scattered small patches of high density *Amphibolis*, mostly found in the lee of raised limestone pavement (Coffey, 2008, 2009). Refer to Section 4.5.1.2 for further detail on seagrass in the Operational Area.

Dugongs are known to be associated with seagrass meadows. In northwest Western Australia, populations are known at Shark Bay, Ningaloo Marine Park and Exmouth Gulf, all of which are nearshore and coastal marine habitats (Marsh et al., 2002). Dugong distribution indicates that preference for tropical and sub-tropical waters; there have been no known sightings of dugong in the Houtman Abrolhos Islands which is over 200 km from the known occurrence around Shark Bay. Furthermore, dugongs have not been highlighted in the EPBC protected matters search report as present in the area surrounding the Cliff Head platform (Table 4-5).

4.5.7 Intertidal habitats

The nearest intertidal habitats occur along the coastline. The main intertidal habitats on the coastline comprise long narrow sandy beaches separated by limestone platforms and exposed beach rock. The platforms and beach rock, support turf algae and molluscs with a range of small fish and crabs present in rock pools.

4.5.7.1 Sandy beaches

Sandy beaches are those areas within the intertidal zone where unconsolidated sediment has been deposited (and eroded) by wave and tidal action. Sandy beaches can vary from low to high energy zones; the energy experienced influences the beach profile due to varying rates of erosion and accretion.

They are found across the southwest of WA and vary in length, width and gradient. They are interspersed with smaller areas of hard substrate (e.g. sandstone) that form intertidal platforms and rocky outcrops. Such rocky outcrops are more common along beaches north of Geraldton than further south. The coastline closest to CHA (between Leeman and Geraldton) is almost entirely made up of sandy beaches. They are generally high energy zones with high rates of erosion although where intertidal platforms and reefs are present offshore, some wave energy is dissipated, reducing energy and erosion of the beach. This is most apparent between Geraldton and Leeman.

Sandy beaches provide habitat to a variety of burrowing invertebrates and subsequently provide foraging grounds for shorebirds. Sandy beaches are an important habitat for turtle nesting, although most nesting occurs in tropical regions. The closest significant breeding site of any of the four turtle species highlighted in the EPBC Act Protected Matters Database search (Table 4-5) are at Dirk Hartog, over 100 km north of the Cliff Head platform (see Section 4.6.6 for more details).

4.5.7.2 Subtropical and Temperate Coastal Saltmarsh

See Section 4.4.3.

4.5.8 Islands, Banks and Shoals

While there are no islands, banks or shoals within the Operational Area, there are a number of such features distributed more broadly throughout the EMBA (distance to Operational Area in brackets), including

- Big Horseshoe Reef (2 km south)
- Little Horseshoe Reef (6 km south)
- Leander Reef (7 km northwest)
- Cliff Head Break (11 km south)
- Beagle Island (39 km south)
- Clio Bank (64 km west)
- Fisherman Island (76 km south)
- Houtman Abrolhos Islands:
- Pelsaert Group (southern) (102 km northwest)
- Easter Group (middle) (129 km northwest)
- Wallabi Group (northern) (154 km northwest)

Shallow subtidal reefs are also broadly distributed throughout the inner continental shelf waters throughout the region, providing hard substrate for benthic assemblages (refer to Section 4.5.4).

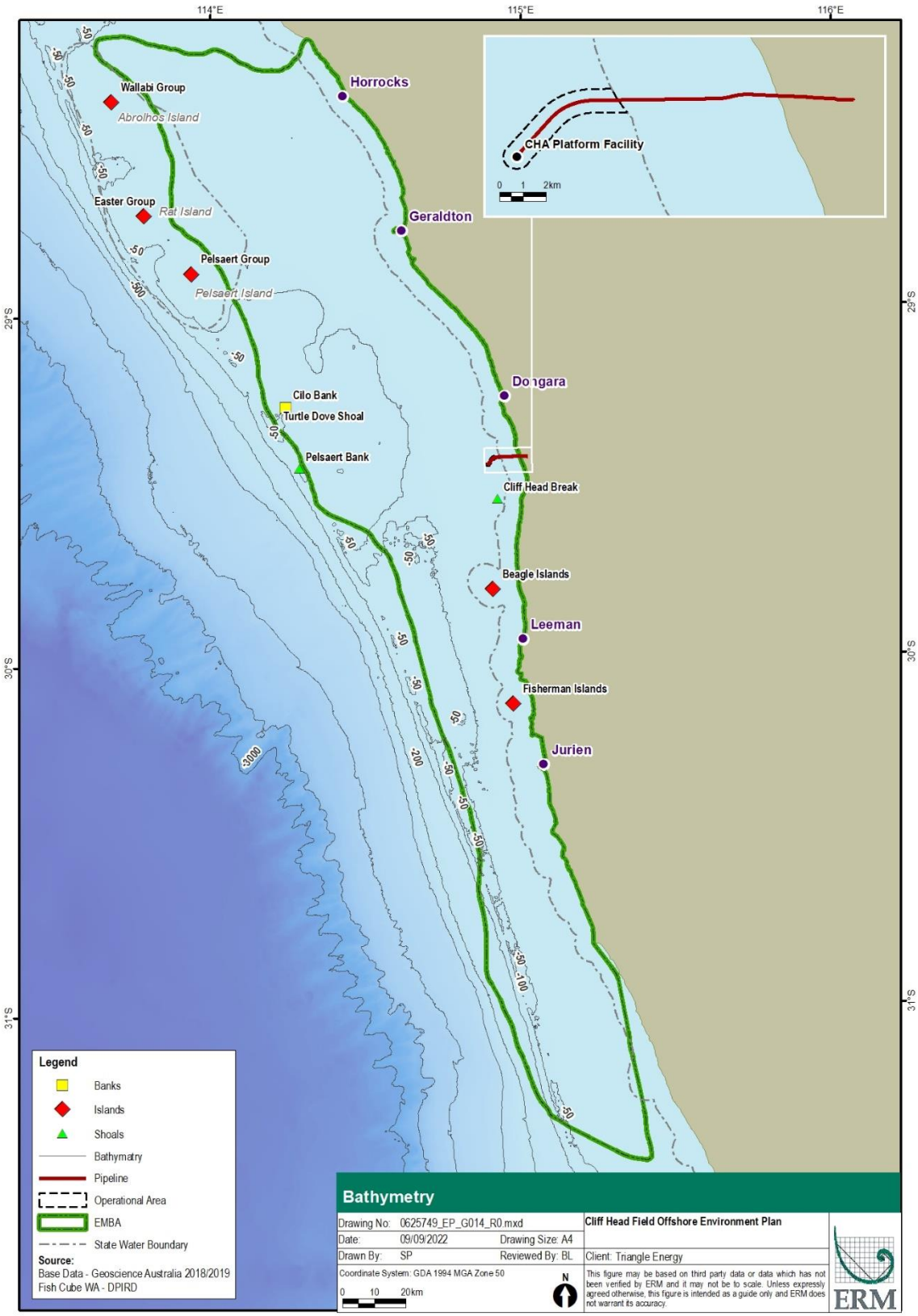


Figure 4.12: Bathymetry, islands and shoals in the vicinity of the Operational Area

4.6 Marine fauna

In order to protect, maintain and enhance recovery of certain threatened species and ecological communities the DCCEEW may prepare conservation management plans in the form of Conservation Advice or Recovery Plans. Conservation advice provides guidance on immediate recovery and threat abatement activities that can be undertaken to ensure the conservation of a newly listed species or ecological community. Recovery plans set out the research and management actions necessary to stop the decline of, and support the recovery of, listed threatened species or threatened ecological communities. The aim of a recovery plan is to maximise the long term survival in the wild of a threatened species or ecological community. Those species that may occur within the Operational Area or EMBA (Table 4-5) that have conservation advice or recovery plans are identified in Table 4-6. Note that only threats which are relevant to the activity are provided here, although others are identified in the recovery plan.

4.6.1 Marine Fauna of Conservation Significance

Under Part 13 of the EPBC Act, species can be listed as one, or a combination, of the following protection designations:

- threatened (further divided into categories; extinct, extinct in the wild, critically endangered, endangered, vulnerable, conservation-dependent)
- migratory
- whale or other cetaceans
- marine.

Details of listed fauna and their likely presence in the operational area or spill EMBA are provided in the following sections.

For the purpose of the EP, only species listed as threatened or migratory under the EPBC Act likely to occur in the Operational Area or spill EMBA are considered to have conservation significance warranting further discussion. An EPBC protected matters search was conducted on the 24 June 2022 (Appendix B) for the Operational Area and EMBA. A list of listed threatened and/or migratory marine fauna is given in Table 4-5. For each species identified, the extent of likely presence is provided, including any overlap with designated Biologically Important Areas (BIAs) shown in Section 4.6.2.

Table 4-5: Protected species in the Operational Area and EMBA (*CE = Critically Endangered, E = Endangered, V = Vulnerable, M = Migratory, CD = Conservation Dependent)

Value/Sensitivity		EPBC Act Status*	Operational Area presence	Particular values or sensitivities within Operational Area	EMBA presence	Particular values or sensitivities within EMBA	Relevant Events
Common Name	Scientific Name						
Fish and Sharks							
Grey nurse shark	*Carcharias taurus*	V	✓	Species or species habitat likely to occur within area	✓	Species or species habitat known to occur within area	Planned • Artificial Light (Section 6.1.2) • Acoustic emissions (Section 6.1.1) • Planned operational discharges (Section 6.2.1, Section 6.3.1). Unplanned events • CHA Hydrocarbon and chemical spills (Section 7.3) • Vessel spills (Section 7.4) • Vessel collision with marine fauna (Section 7.2)
White shark	*Carcharodon carcharias*	V, M	✓	Species or species habitat known to occur within area	✓	Foraging, feeding or related behaviour known to occur within area Overlap with foraging BIA	
Whale shark	*Rhincodon typus*	V, M	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Porbeagle	*Lamna nasus*	M	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Scalloped hammerhead	*Sphyrna lewini*	CD	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	
Oceanic whitetip shark	*Carcharhinus longimanus*	M	✓	Species or species habitat may occur within area	✓	Species or species habitat likely to occur within area	
Freshwater sawfish	*Pristis pristis*	V, M	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Southern bluefin tuna	*Thunnus maccoyii*	CD	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	
Reef manta ray	*Manta alfredi*	M	✓	Species or species habitat may occur within area	✓	Species or species habitat known to occur within area	
Giant manta ray	*Manta birostris*	M	✓	Species or species habitat may occur within area	✓	Species or species habitat likely to occur within area	

Value/Sensitivity		EPBC Act Status*	Operational Area presence	Particular values or sensitivities within Operational Area	EMBA presence	Particular values or sensitivities within EMBA	Relevant Events
Common Name	**Scientific Name**						
Shortfin mako	*Isurus oxyrinchus*	M	X	N/A	✓	Species or species habitat likely to occur within area	
Longfin mako	*Isurus paucus*	M	X	N/A	✓	Species or species habitat likely to occur within area	
Southern dogfish	*Centrophorus zeehaani*	CD	X	N/A	✓	Species or species habitat likely to occur within area	
Marine Mammals							
Blue whale	*Balaenoptera musculus*	E, M	✓	Species or species habitat likely to occur within area	✓	Foraging, feeding or related behaviour known to occur within area Overlap with foraging (on migration) BIA	<u>Planned</u> • Acoustic emissions (Section 6.1.1) • Planned operational discharges (Section 6.2.1, Section 6.3.1). <u>Unplanned</u> • CHA Hydrocarbon and chemical spills (Section 7.3) • Vessel spills (Section 7.4) • Vessel collision with marine
Southern right whale	*Eubalaena australis*	E, M	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	
Humpback whale	*Megaptera novaeangliae*	M	✓	Species or species habitat known to occur within area Overlap with migration BIA	✓	Species or species habitat known to occur within area Overlap with migration BIA	
Australian Sea Lion	*Neophoca cinerea*	E	✓	Species or species habitat likely to occur within area Overlap with foraging BIA	✓	Breeding known to occur within area Overlap with foraging BIA	
Bryde's whale	*Balaenoptera edeni*	M	✓	Species or species habitat may occur within area	✓	Species or species habitat likely to occur within area	
Orca	*Orcinus orca*	M	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Sperm whale	*Physeter macrocephalus*	M	X	N/A	✓	Species or species habitat may occur within area	

Value/Sensitivity		EPBC Act Status*	Operational Area presence	Particular values or sensitivities within Operational Area	EMBA presence	Particular values or sensitivities within EMBA	Relevant Events
Common Name	**Scientific Name**						
Sei whale	*Balaenoptera borealis*	V, M	X	N/A	✓	Foraging, feeding or related behaviour likely to occur within area	fauna (Section 7.2)
Antarctic minke whale	*Balaenoptera bonaerensis*	M	X	N/A	✓	Species or species habitat likely to occur within area	
Fin whale	*Balaenoptera physalus*	V, M	X	N/A	✓	Foraging, feeding or related behaviour likely to occur within area	
Marine Reptiles							
Loggerhead turtle	*Caretta caretta*	E, M	✓	Species or species habitat known to occur within area	✓	Foraging, feeding or related behaviour known to occur within area	Planned • Artificial Light (Section 6.1.2) • Acoustic emissions (Section 6.1.1) • Planned operational discharges (Section 6.2.1, Section 6.3.1). Unplanned • CHA Hydrocarbon and chemical spills (Section 7.3) • Vessel spills (Section 7.4)
Green turtle	*Chelonia mydas*	V, M	✓	Species or species habitat known to occur within area	✓	Foraging, feeding or related behaviour known to occur within area	
Leatherback turtle	*Dermochelys coriacea*	E, M	✓	Species or species habitat known to occur within area	✓	Foraging, feeding or related behaviour known to occur within area	
Flatback turtle	*Natator depressus*	V, M	✓	Species or species habitat known to occur within area	✓	Foraging, feeding or related behaviour known to occur within area	

Value/Sensitivity		EPBC Act Status*	Operational Area presence	Particular values or sensitivities within Operational Area	EMBA presence	Particular values or sensitivities within EMBA	Relevant Events
Common Name	**Scientific Name**						
							• Vessel collision with marine fauna (Section 7.2)
Marine Birds							
Australian lesser noddy	*Anous tenuirostris melanops*	V	✓	Species or species habitat may occur within area	✓	Foraging, feeding or related behaviour known to occur within area Overlap with foraging BIA	<u>Planned</u> • Artificial Light (Section 6.1.2) • Acoustic emissions (Section 6.1.1) • Atmospheric emissions (Section 6.1.6) • Planned operational discharges (Section 6.2.1, Section 6.3.1). <u>Unplanned</u> • CHA Hydrocarbon and chemical spills (Section 7.3)
Amsterdam albatross	*Diomedea amsterdamensis*	E, M	✓	Species or species habitat may occur within area	✓	Species or species habitat likely to occur within area	
Southern royal albatross	*Diomedea epomophora*	V, M	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Wandering albatross	*Diomedea exulans*	V, M	✓	Species or species habitat may occur within area	✓	Foraging, feeding or related behaviour likely to occur within area	
Southern giant petrel	*Macronectes giganteus*	E, M	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Northern giant petrel	*Macronectes halli*	V, M	✓	Species or species habitat may occur within area	✓	Foraging, feeding or related behaviour likely to occur within area	
Soft-plumaged petrel	*Pterodroma mollis*	V	✓	Species or species habitat may occur within area	✓	Foraging, feeding or related behaviour known to occur within area	

Value/Sensitivity		EPBC Act Status*	Operational Area presence	Particular values or sensitivities within Operational Area	EMBA presence	Particular values or sensitivities within EMBA	Relevant Events
Common Name	**Scientific Name**						
						Overlap with foraging BIA	• Vessel spills (Section 0) • Vessel collision with marine fauna (Section 7.2)
Australian fairy tern	*Sternula nereis nereis*	V	✓	Foraging, feeding or related behaviour known to occur within area Overlap with foraging BIA	✓	Foraging, feeding or related behaviour known to occur within area Overlap with foraging BIA	
Indian yellow-nosed albatross	*Thalassarche carteri*	V, M	✓	Species or species habitat may occur within area	✓	Species or species habitat likely to occur within area	
Shy albatross	*Thalassarche cauta*	E, M	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
White-capped albatross	*Thalassarche cauta steadi*	V, M	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Campbell albatross	*Thalassarche impavida*	V, M	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Black-browed albatross	*Thalassarche melanophris*	V, M	✓	Species or species habitat may occur within area	✓	Foraging, feeding or related behaviour likely to occur within area	
Red knot	*Calidris canutus*	E, M	✓	Species or species habitat may occur within area	✓	Species or species habitat known to occur within area	
Curlew sandpiper	*Calidrus ferruginea*	CE, M	✓	Species or species habitat may occur within area	✓	Species or species habitat known to occur within area	
Eastern curlew	*Numenius madagascariensis*	CE, M	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Fork-tailed swift	*Apus pacificus*	M	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	

Value/Sensitivity		EPBC Act Status*	Operational Area presence	Particular values or sensitivities within Operational Area	EMBA presence	Particular values or sensitivities within EMBA	Relevant Events
Common Name	**Scientific Name**						
Flesh-footed shearwater	*Ardenna carneipus*	M	✓	Species or species habitat likely to occur within area	✓	Foraging, feeding or related behaviour likely to occur within area	
Bridled tern	*Onychoprion anaethetus*	M	✓	Foraging, feeding or related behaviour likely to occur within area Overlap with foraging BIA	✓	Breeding known to occur within area Overlap with foraging BIA	
Caspian tern	*Hydroprogne caspia*	M	✓	Foraging, feeding or related behaviour likely to occur within area Overlap with foraging BIA	✓	Breeding known to occur within area Overlap with foraging BIA	
Wedge-tailed shearwater	*Ardenna pacifica*	M	✓	Overlap with foraging BIA[1]	✓	Breeding known to occur within area Overlap with foraging BIA	
Pacific gull	*Larus pacificus*	N/A	✓	Overlaps with foraging (in high numbers) BIA[2]	✓	Overlaps with foraging (in high numbers) BIA[2]	
Little shearwater	*Puffinus assimilis*	N/A	✓	Overlaps with foraging (in high numbers) BIA[3]	✓	Overlaps with foraging (in high numbers) BIA[3]	
Common noddy	*Anous stolidus*	M	✓	Species or species habitat may occur within area	✓	Species or species habitat likely to occur within area Overlap with foraging BIA	
Roseate tern	*Sterna dougallii*	M	X	N/A	✓	Breeding known to occur within area Overlap with foraging BIA	
Sooty tern	*Onychoprion fuscatus* as *Sterna fuscata*	N/A	X	N/A[4]	✓	Overlap with foraging BIA[4]	

Value/Sensitivity		EPBC Act Status*	Operational Area presence	Particular values or sensitivities within Operational Area	EMBA presence	Particular values or sensitivities within EMBA	Relevant Events
Common Name	**Scientific Name**						
Northern Siberian bar-tailed godwit	*Limosa lapponica menzbieri*	CE,	X	N/A	✓	Species or species habitat known to occur within area	
Little tern	*Sternula albifrons*	M	X	N/A	✓	Species or species habitat may occur within area	
Australian painted snipe	*Rostratula australis*	E	X	N/A	✓	Species or species habitat likely to occur within area	
Osprey	*Pandion haliaetus*	M	X	N/A	✓	Breeding known to occur within area	
White-tailed tropicbird	*Phaethon lepturus*	M	X	N/A	✓	Species or species habitat may occur within area	
Bar-tailed godwit	*Limosa lapponica*	M	X	N/A	✓	Species or species habitat known to occur within area	
Common greenshank	*Tringa nebularia*	M	X	N/A	✓	Species or species habitat likely to occur within area.	
Sooty albatross	*Phoebetria fusca*	V, M	X	N/A	✓	Species or species habitat likely to occur within area	
Lesser frigatebird	*Fregata ariel*	M	X	N/A	✓	Species or species habitat likely to occur within area	
Blue petrel	*Halobaena caerulea*	V	X	N/A	✓	Species or species habitat may occur within area	
Fairy prion	*Pachyptila turtur subantarctica*	V	X	N/A	✓	Species or species habitat likely to occur within area	
Greater sand plover	*Charadrius leschenaultii*	V, M	X	N/A	✓	Species or species habitat likely to occur within area	

Value/Sensitivity		EPBC Act Status*	Operational Area presence	Particular values or sensitivities within Operational Area	EMBA presence	Particular values or sensitivities within EMBA	Relevant Events
Common Name	Scientific Name						
White-faced storm petrel	*Pelagodroma marina*	N/A	X	N/A	✓	Foraging known to occur within area [5]	

1. Wedge-tailed shearwater not detected in PMST search, but overlapping BIA would suggest breeding may occur within this area (Section 4.6.7)
2. Pacific gull not detected in PMST search, but overlapping BIA would suggest foraging may occur within this area (Section 4.6.7)
3. Little shearwater not detected in PMST search, but overlapping BIA would suggest foraging may occur within this area (Section 4.6.7)
4. Sooty tern not detected in PMST search, but overlapping BIA would suggest foraging may occur within this area (Section 4.6.7)
5. White-faced storm petrel not detected in PMST search, but overlapping BIA would suggest that foraging may occur within this area (Section 4.6.7)

Table 4-6: Relevant threats identified in Recovery Plans and Conservation Advice for species that may occur within the Operational Area and EMBA that may be impacted by the Activity

Taxa	Common Name	Recovery Plan / Conservation Advice	Threats identified as relevant to the activities
Mammals	Blue whale	Blue Whale Conservation Management Plan 2015-2025 (DoE, 2015a)	Noise Interference
			Habitat Modification
			Vessel Disturbance
	Southern right whale	Conservation Management Plan for the Southern Right Whale 2011-2021 (DSEWPAC, 2012b)	Vessel disturbance
			Habitat modification
	Australian Sea Lion	Recovery Plan for the Australian Sea Lion (*Neophoca cinerea*) (DSEWPAC, 2013b)	Oil spills
	Sei whale	Conservation Advice *Balaenoptera borealis* sei whale (TSSC, 2015a)	Noise disturbance
			Habitat degradation
			Pollution
	Fin whale	Conservation Advice *Balaenoptera physalus* fin whale (TSSC, 2015b)	Noise disturbance
			Habitat degradation
			Pollution
	Loggerhead turtle	Recovery plan for marine turtles in Australia 2017-2027 (DoEE, 2017)	Marine debris
	Green turtle	Recovery plan for marine turtles in Australia 2017-2027 (DoEE, 2017)	Deteriorating water quality
			Marine debris

Taxa	Common Name	Recovery Plan / Conservation Advice	Threats identified as relevant to the activities
	Leatherback turtle, Leathery turtle, Luth	Approved Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle) (DEWHA, 2008)	Boat strike
			Changes to breeding sites
			Degradation of foraging areas
		Recovery plan for marine turtles in Australia 2017-2027 (DoEE, 2017)	Deteriorating water quality
			Marine debris
			Loss of habitat
	Flatback turtle	Recovery plan for marine turtles in Australia 2017-2027 (TSSC, 2017)	Deteriorating water quality
			Marine debris
			Loss of habitat
Fish and Sharks	Grey nurse shark (west coast population)	Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014a)	Pollution and disease
	White shark	Recovery plan for the White Shark (*Carcharodon carcharias*) (DSEWPAC, 2013c)	Ecosystem effects as a result of habitat modification and climate change
	Whale shark	Approved Conservation Advice for *Rhincodon typus* (whale shark) (TSSC, 2015c)	Boat strike from large vessels
			Habitat disruption from mineral exploration, production and transportation
			Marine debris
	Freshwater sawfish	Approved Conservation Advice for *Pristis pristis* (largetooth sawfish). (DoE, 2014b)	Habitat degradation and modification
			Water quality
		Sawfish and River Sharks Multispecies Recovery Plan. (DoE, 2015b)	Habitat degradation and modification
Birds	Amsterdam albatross Black-browed albatross Blue petrel Campbell albatross, Campbell black-browed albatross Indian yellow-nosed albatross Northern giant petrel Northern royal albatross	Draft National recovery plan for threatened albatrosses and giant petrels 2021 (Commonwealth of Australia, 2021)	Marine pollution

Taxa	Common Name	Recovery Plan / Conservation Advice	Threats identified as relevant to the activities
	Shy albatross, Tasmanian shy albatross Soft-plumaged petrel Sooty albatross Southern giant-petrel, Southern giant petrel Southern royal albatross Wandering albatross White-capped albatross		Marine infrastructure interactions
	Soft-plumaged petrel	Conservation Advice *Pterodroma Mollis* soft-plumaged petrel 2015 (TSSC, 2015d)	No relevant threats identified
	Blue petrel	Conservation Advice *Halobaena caerulea* blue petrel (TSSC, 2015e)	No relevant threats identified
	Bar-tailed godwit (baueri), Western alaskan bar-tailed godwit	Approved Conservation Advice for *Limosa lapponica baueri* (Bar-tailed godwit (western Alaskan)) (TSSC, 2016a)	Habitat loss and habitat degradation
		Wildlife conservation plan for migratory shorebirds 2015 (Commonwealth of Australia, 2015)	Habitat loss
			Habitat modification
			Anthropogenic disturbances (industrial operations and artificial lighting)
	Northern siberian bar-tailed godwit	Conservation Advice *Limosa lapponica menzbieri* Bar-tailed godwit (northern Siberian) (TSSC, 2016b)	Habitat loss and habitat degradation
	Fairy prion	Conservation Advice *Pachyptila turtur subantarctica* fairy prion (southern) (TSCC, 2015f)	Habitat loss, disturbance and modification
	Greater sand plover	Conservation Advice *Charadrius l*eschenaultii Greater sand plover (TSSC, 2016c)	Habitat loss and habitat degradation
			Marine pollution
		Wildlife conservation plan for migratory shorebirds 2015 (Commonwealth of Australia, 2015)	Habitat loss
			Habitat modification
			Anthropogenic disturbances (industrial operations and artificial lighting)
	Australian fairy tern	Approved Conservation Advice for *Sternula nereis nereis* (Fairy Tern) (TSSC, 2011)	Oil spills

Taxa	Common Name	Recovery Plan / Conservation Advice	Threats identified as relevant to the activities
		National Recovery Plan for the Australian Fairy Tern (*Sternula nereis nereis*) (DAWE, 2020a)	Oil spills
	Australian lesser noddy	Approved Conservation Advice for *Anous tenuirostris melanops* (Australian lesser noddy) (TSSC, 2015g)	Marine pollution
			Oil spills
	Australian painted snipe	Approved Conservation Advice for *Rostratula australis* (Australian painted snipe) (DSEWPAC, 2013d)	Habitat loss, disturbance and modification
	Red knot	Conservation Advice *Calidris canutus* Red knot 2016 (TSSC, 2016d)	Marine pollution
			Oill spills
			Human disturbance
		Wildlife conservation plan for migratory shorebirds 2015 (Commonwealth of Australia, 2015)	Habitat loss
			Habitat modification
			Anthropogenic disturbances (industrial operations and artificial lighting)
	Curlew sandpiper	Conservation Advice *Calidris f*erruginea curlew sandpiper 2015 (DoE, 2015c)	Marine pollution
	Eastern curlew	Conservation Advice *Numenius madagascariensis* eastern curlew 2015 (DoE, 2015d)	Human disturbance
			Marine pollution
	Flesh-footed shearwater	Commonwealth Listing Advice on *Ardenna carneipes* (flesh-footed shearwater) (TSSC, 2014)	Habitat degradation
	Little shearwater	Wildlife Conservation Plan for Seabirds (DAWE, 2020b)	No relevant threats
	Pacific gull	Wildlife Conservation Plan for Seabirds (DAWE, 2020b)	Marine pollution
	Sooty tern	Wildlife Conservation Plan for Seabirds (DAWE, 2020b)	No relevant threats

4.6.2 Biologically Important Areas

Biologically Important areas (BIAs) are areas recognised under the Commonwealth EPBC Act where a particular species is known or likely to display important behaviours such as breeding, foraging, nesting or migration. BIAs have no legal status, however they provide information to help inform regulatory and management decisions under the EPBC Act.

Table 4-7 identifies the BIAs overlapping the Operational Area and the EMBA. These are considered further in Sections 4.6.4 to 4.6.7.

Table 4-7: BIAs Overlapping the EMBA

Species	BIA (category)	Direction and distance from Operational Area (km)
Humpback whale	Migration (north and south)	0 (overlaps)
Pygmy blue whale	Distribution	0 (overlaps)
	Known Foraging Area	37 (West)
	Migration	42 (West)
	Foraging (on migration)	149 (south)
Australian sea lion	Foraging (male and female)	0 (overlaps)
	Foraging (male)	14 (West)
Australian lesser noddy	Foraging	87 (Northwest)
Bridled tern	Foraging	0 (overlaps)
Caspian tern	Foraging	0 (overlaps)
Common noddy	Foraging	70 (Northwest and south)
Australian Fairy Tern	Foraging	0 (overlaps)
Little shearwater	Foraging (in high numbers)	0 (overlaps)
Pacific gull	Foraging (in high numbers)	0 (overlaps)
Roseate tern	Foraging	7 (South and northwest)
Soft-plumaged petrel	Foraging	63 (West)
Sooty tern	Foraging	57 (West)
Wedge-tailed shearwater	Foraging	0 (overlaps)
White-faced storm petrel	Foraging	27 (West)
White Shark	Foraging	9 (South)

4.6.3 Seasonal Sensitivities

The important behaviours that inform the development of BIAs often occur during select months of the year (e.g. mating season, northbound and southbound migrations). Table 4-8 details the seasonality associated with BIAs that overlap the Operational Area, identifying timeframes for when species may be present in the area and displaying important behaviours, including peak season.

Table 4-8: Seasonal sensitivities of BIAs that overlap the Operational Area.

Species	January	February	March	April	May	June	July	August	September	October	November	December
Fish, sharks and rays												
White shark[1] - foraging												
Marine mammals												
Pygmy blue whale – northern migration (Augusta to Derby)[2]												
Pygmy blue whale – southern migration (Exmouth, Montebello, Scott Reef)[2]												
Humpback whale – northern migration (Cape Leewin to Houtman Abrolhos)[2]												
Humpback whale – southern migration (Lancelin to Kalbarri)[2]												
Australian sea lion[3] – foraging												
Seabirds and shorebirds												
Wedge-tailed shearwater[4] – foraging												
Roseate tern[4] – foraging												
Australian fairy tern[4] - foraging												
Australian lesser noddy[4] - foraging												
Bridled tern[4] - foraging												
Caspian tern[4] - foraging												
Common noddy[4] - foraging												
Little shearwater[4] – foraging (in high numbers)												
Pacific gull[4] – foraging (in high numbers)												
Soft-plumaged petrel[4] - foraging												
Sooty tern[4] – foraging												
White-faced storm petrel[4] - foraging												

	Species may be present in the Operational Area
	Peak period. Presence of animals is reliable and predictable each year

Note [1](Commonwealth of Australia, 2012a)

[2](Commonwealth of Australia, 2012b)

[3](Commonwealth of Australia, 2012c)

[4](Commonwealth of Australia, 2012d)

4.6.4 Sharks, Fishes and Rays

The following sections further detail the behaviour, migrations and other habits of threatened or migratory species that may occur in the Operational Area and/or EMBA as highlighted in Table 4-5 and reported in the PMST search:

- White shark (threatened, migratory)
- Grey nurse shark (threatened, migratory)
- Whale shark (threatened, migratory)
- Porbeagle (migratory)
- Scalloped hammerhead (conservation dependent)
- Oceanic whitetip shark (migratory)
- Freshwater sawfish (threatened, migratory)
- Southern bluefin tuna (conservation dependent)
- Reef manta ray (migratory)
- Giant manta ray (migratory)
- Shortfin mako (migratory)
- Longfin mako (migratory)
- Southern dogfish (conservation dependent).

4.6.4.1 White shark

The White shark (*Carcharadon carcharias*) is a highly mobile migratory species listed as vulnerable under the EPBC Act. It is widely distributed throughout temperate and sub-tropical regions in the northern and southern hemispheres. White sharks can be found from close inshore around rocky reefs, surf beaches and shallow coastal bays to outer continental shelf and slope areas (Pogonoski et al., 2002). In Australia, white shark populations are divided into genetically distinct east coast and south-west coast populations, with minimal interactions between the two (Blower et al., 2012). They display diverse migration strategies, ranging between inshore coastal habitats, to offshore open ocean (Duffy et al., 2012; Bradford et al., 2020). White sharks are often found in regions with high prey density, such as pinniped colonies (Department of Water, Heritage and the Arts (DEWHA) 2009; Francis et al., 2015). As a result of their migratory nature and the presence of Australian sea lion colonies, great white sharks may be present in the vicinity of the Cliff Head platform. A BIA for foraging occurs in the EMBA and approximately 13 km south and 105 km northwest of Operational Area (Figure 4.13).

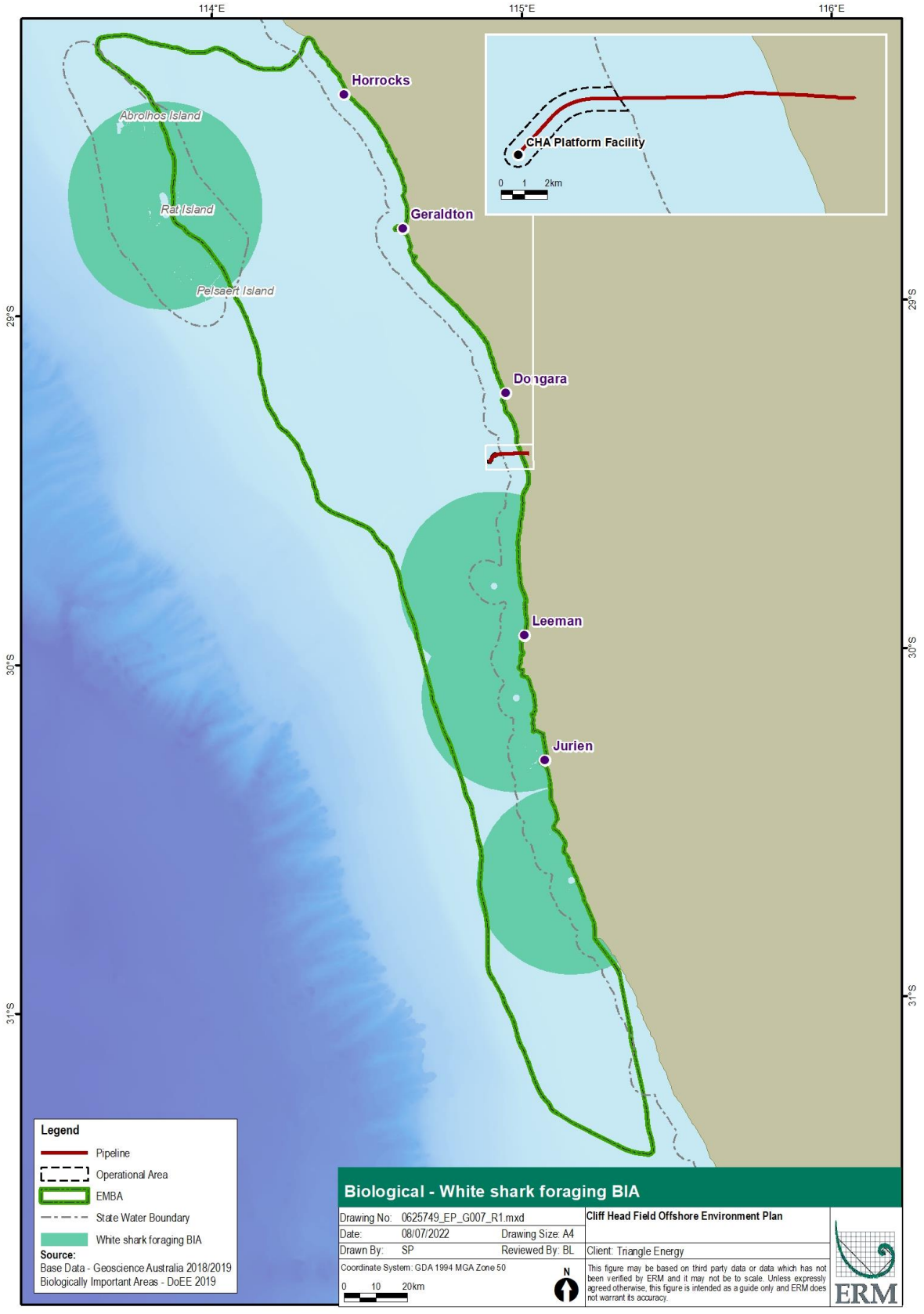


Figure 4.13: White Shark Foraging BIA near the Cliff Head facility

4.6.4.2 Grey nurse shark

The grey nurse shark (*Carcharias taurus*) (west coast population), listed as vulnerable under the EPBC Act, has a broad inshore distribution, primarily in sub-tropical to cool temperate waters (Last & Stevens, 2009). The west coast population of grey nurse shark is predominantly found in the south-west coastal waters of Western Australia (Environment Australia, 1997) and has been recorded as far north as the North West Shelf (Stevens 1999; Pogonoski et al., 2002).

Individuals may exhibit a high degree of site fidelity, although some studies have suggested that the species exhibits some migratory characteristics moving between different habitats and localities (McAuley, 2004). The high endemism ensures that grey nurse sharks are vulnerable to localised pressures in certain areas. The status of the west coast population is poorly understood although they are reported to remain widely distributed along the WA coast and are still regularly encountered, albeit with low and indeterminate frequency (Chidlow et al., 2006). A small aggregation of the vulnerable grey nurse sharks has been identified off Exmouth during a five-year (2007–2012) study (Hosche and Whisson 2016). Aggregation sites are important in the life cycle of the grey nurse shark for mating and pupping (Hosche and Whisson 2016).

Grey nurse sharks are often observed hovering motionless just above the seabed, in or near deep sandy-bottomed gutters or rocky caves, and in the vicinity of inshore rocky reefs and islands (Pollard et al., 1996). The species has been recorded at varying depths, but is generally found between 15–40 m (Otway & Parker, 2000). Grey nurse sharks have also been recorded in the surf zone, around coral reefs, and to depths of around 200 m on the continental shelf (Pollard et al., 1996). Grey nurse sharks may be present in the proximity of the Cliff Head platform as it contains suitable habitat, although their highly migratory nature and lack of sightings suggest that there will not be significant numbers.

4.6.4.3 Whale shark

The whale shark (*Rhincodon typus*), a migratory species listed as vulnerable under the EPBC Act, is a large filter feeder found in tropical and warm temperate seas mainly off northern Australia. Whale sharks, occurring in both tropical and temperate waters, are known to aggregate in the waters adjacent to North West Cape in late March to early May, with the largest numbers being recorded in April (Sequeira et al., 2013). The timing of this aggregation has been reported to coincide with the high levels of productivity associated with annual coral spawning, resulting in an increased planktonic biomass and a more active food chain. The season is; however, somewhat variable and whale sharks have been recorded between mid-March and the beginning of June. Recent satellite tracking of whale sharks tagged off the North West Cape showed that all four individuals tagged left the area by substantially different routes (Wilson et al., 2016). No critical habitat for whale sharks has been designated in the South West Marine Region. Due to their widespread distribution and highly migratory nature, whale sharks may occur, albeit in very low numbers, in the Operational Area. However, they are known to migrate long distances and have been observed further south than Dongara so their presence, although unlikely, cannot be discounted.

4.6.4.4 Porbeagle

Porbeagles (*Lamna nasus*) are listed as migratory under the EPBC Act and are a wide-ranging, coastal oceanic shark found in temperate and cold-temperate waters worldwide (1 to 18°C, 0 to 370 m). It is more common on continental shelves, although little information is available for Southern Ocean Porbeagles. No biologically significant areas (i.e. feeding, breeding or migratory pathways) for the Porbeagle are recorded at, or in proximity to, the Cliff Head platform, therefore, the species would, at most, transit through the area.

4.6.4.5 Scalloped hammerhead

Scalloped hammerheads (*Sphyrna lewini*) are listed as conservation dependent under the EPBC Act (DOE, 2022a). Scalloped hammerheads are amongst the most threatened of vertebrates globally, with estimated global declines of more than 80% in the last seven decades (Rigby et al., 2019; Pacoureau et al., 2021). The scalloped hammerhead has a circum-global distribution in tropical and sub-tropical waters (TSSC, 2018). It ranges widely over shallow coastal shelf waters. There is very little structuring from the eastern to western extents within Australia and it is likely to be a shared stock with Indonesia. Within Australian waters the scalloped hammerhead extends from New South Wales, around the north of the continent and then south into Western Australia to approximately Geographe Bay (TSSC, 2018). This species overlaps both the Operational Area and EMBA.

4.6.4.6 Oceanic whitetip shark

Oceanic whitetip sharks (*Carcharhinus longimanus*) are migratory, pelagic sharks found in tropical and subtropical oceans. (usually in waters above 20 °C) of all oceans - usually well offshore beyond the continental shelf between about 30°N and 35°S, or around oceanic islands (Fishes of Australia, 2022). The species occurs at depths from the surface to 150 m. Oceanic Whitetip Sharks rarely come close to land. They spend most of their time in the upper part of the water column near the surface.

In Australia, the species occurs mostly in oceanic areas off northern Australia (rare or absent in the Arafura Sea and Gulf of Carpentaria); recorded off South Australia but usually rare off the southern coast (Bray, 2017). This species overlaps both the Operational Area and EMBA.

4.6.4.7 Manta rays

The giant manta ray (*Manta birostris*), also known as giant chevron manta ray, Pacific manta ray, pelagic manta ray, oceanic manta ray, is the largest living ray. It is listed as a migratory marine species under the EPBC Act (DoE, 2022b), and has been listed as Vulnerable on the IUCN Red List of Threatened Species, primarily because of the lack of knowledge about population size, its slow reproductive rate (1 pup per litter) and the threats to population and ray's prey from fishing.

Rays like sharks and chimaeras are cartilaginous fishes belonging to the class Chondrichthyes. The most recent Australian review suggests that Australia is particularly rich in chondrichthyan diversity with at least 297 of an estimated worldwide total of 1025 species found within our territorial waters. Giant manta rays are migratory and have a circumtropical and semi-temperate distribution through the world's oceans. However, it is believed that within this broad range the populations are distributed sparsely and are fragmented (Marshall et al, 2011). Giant manta rays are filter feeders, using the large flaps on either side of the head to direct zooplankton and small fishes into their wide mouth. They are predominantly pelagic, found in the waters around offshore islands, and occasionally in coastal areas. No known aggregation areas are found within the Operational Area or EMBA. Combined with the sparse distribution of this species outside aggregation areas, encounters with large numbers of giant manta ray in the Operational Area are not considered likely.

The reef manta ray (*Manta alfredi*) has a widespread distribution in tropical and subtropical waters of Australia. The reef manta ray has a pelagic lifestyle and feeds by filtering sea water in order to catch his favourite food that represents zooplankton. They therefore have a relatively sedentary behaviour with precise areas for cleaning and feeding within close proximity of coasts, reefs or islands. No known aggregation areas occur within the Operational Area or EMBA and therefore, while individuals may be encountered, large aggregations are not expected.

4.6.4.8 Mako sharks

The shortfin mako (*Isurus oxyrinchus*) is known to occur in both tropical and temperate waters and is normally oceanic and cosmopolitan in its distribution. It is widespread in Australian waters and occurs from the surface to water depths of at least 650 m (Rigby et al., 2019b). In WA, there is little information available that describes population estimates or distributions. While the species may transit the Operational Area, no critical habitat for feeding, breeding and pupping is known to occur.

The longfin mako (*I. paucus*) is a more tropical species than the shortfin mako and rarely reported in Australian waters (Rigby et al., 2019c). Longfin makos are found in Australian waters north of Geraldton, WA, around the northern coast of the continent and to at least Port Stephens in New South Wales (Last and Stevens, 2009). In WA, there is little information available that describes population estimates or distributions. Longfin mako sharks may occur in the Operational Area, but given their widespread and highly dispersed distribution, are unlikely to be present in large numbers.

4.6.4.9 Southern dogfish

Southern dogfish are mainly demersal (bottom-dwelling) with a depth range of 180–900 m and a core range of 200–800 m (Fishes of Australia, 2022). They inhibit the continental slope of southern Australia from off Forster, New South Wales, to off Bunbury, Western Australia, including Tasmania, in depths of 208–701 m, but usually in depths below 400 m. Southern dogfish undertake day-night (diel) migrations across their depth range from relatively deep daytime residence depths (1000 m) to shallower night-time feeding depths (to 200 m) (Bray, 2019). This species overlaps both the Operational Area and EMBA.

Species in genus Centrophorus are vulnerable to over-exploitation (TSSC, 2013). They are long-lived, late to mature and have small litters.

4.6.4.10 Freshwater sawfish

Freshwater sawfish (*Pristis pristis*) are listed as vulnerable under the EPBC Act and have been recorded in river and estuarine environments, as well as up to 100 km offshore (DoE, 2014b). Fishing of elasmobranchs is a part of traditional fishing practices and historically makes up an important part of the diet of coastal indigenous communities. Indigenous Australians are allowed to take and eat sawfish for personal, domestic or non-commercial communal needs.

The generally accepted model of movement and migration of freshwater sawfish in Australian waters is that young are born at the mouths of rivers and in estuaries and then migrate up river where they spend the first several years of life. As they reach maturity they move out of the rivers and into marine and estuarine environments (Peverell 2005, Thorburn et al. 2007).

The Australian populations are likely to comprise a high proportion of the Indo-West Pacific population, and are a globally important population. Important regions for freshwater sawfish in Australia include: King Sound, and the Fitzroy, Durack, Robinson and Ord Rivers in Western Australia, as they contain significant nursery areas and individuals with unique haplotypes (DoE, 2014b). This species overlaps both the Operational Area and EMBA.

4.6.4.11 Southern bluefin tuna

The southern bluefin tuna (*Thunnus maccoyii*) is listed as conservation dependent (TSSC, 2010). SBT forms a single widely distributed population in the southern, temperate oceans, but with a single known spawning ground in the Indian Ocean, between Java and northern Western Australia. Spawning takes place from September to April in warm waters south of Java and juvenile SBT then migrate down the coast of Western Australia. Surface schooling juvenile SBT are found in coastal waters off southern Australia during the summer months (December to April) and spend winters in deeper, temperate oceanic waters. Young SBT are known to migrate seasonally between the south coast of Australia and the central Indian Ocean. After attaining five years of age, SBT are seldom found in nearshore surface areas, and their distribution extends over the southern circumpolar area throughout the Pacific, Indian and Atlantic Oceans (TSSC, 2010). This species overlaps both the Operational Area and EMBA.

4.6.4.12 Other fish species

The bony fish assemblages in the Operational Area and EMBA are characterised by temperate and subtropical species, including a number of species that are targeted by commercial and recreational fishers. Demersal fish species include highly sought commercial and recreational species such as blue groper (*Achoerodus gouldii*), baldchin groper (*Choerodon rubescens*), snapper (*Pagrus auratus*), goldband snapper (*Pristipomoides multidens*) and dhufish (*Glaucosoma hebraicum*). Some tropical species, such as goldband snapper, A range of other demeral fishes such as apogonids (family Apogonidae), leatherjackets (family Monacanthidae), flatheads (family Platycephalidae) occur in the region. The southern limit of the distribution of some tropical finfish species, such as goldband snapper, occurs in the Central West Coast bioregion. Some demersal fishes are largely dependent on a single habitat while others occupy a wide range, or live in several different habitats throughout the stages of the lifecycle. Many juvenile demersal fishes utilise inshore, seagrass-lined estuaries, or sandy/muddy bay habitats for feeding and protection, and then migrate offshore as adults, to reefs or other habitats.

Pelagic teleost fishes in the EMBA are typically highly mobile (although may be associated with particular habitats or oceanographic features) and include large predatory species such as tailor, Australian salmon, large carangids (e.g. *Seriola* spp.), mackerels and tunas (family Scombridae). Also present are smaller pelagic species such as pilchards (family Clupeidae), Australian herring (*Arripis georgianus*) and garfish (*Hyporhamphus melanochir*).

Spawning of sharks, finfish and crustacean species may occur year-round, although some species are known to have distinct seasonal spawning periods (Table 4-9). Most finfish species undergo a planktonic larval phase.

Table 4-9: Key fish species, spawning / aggregation times and key habitat

Fish species	Scientific name	Spawning / aggregation times	Key habitat and spawning habitat
Blacktip shark	*Carcharhinus tilstoni, C. limbatus*	Nov – Dec	Generally found in water less than 30 m deep over continental shelves, though they may dive to 64 m. Favoured habitats are muddy bays, island lagoons, and the drop-offs near coral reefs, estuaries and mangrove swamps
Goldband snapper	*Pristipomoides multidens*	Jan – Apr	Inhabits offshore reefs, hard-bottom areas at depths of 20 to 550 m
Rankin cod	*Epinephelus multiinotatus*	Aug – Oct	Juveniles are found in inshore coral reefs. Adults migrate to deeper offshore reefs and trawling grounds when mature.
Baldchin groper	*Choerodon rubescens*	Sep – Feb	Inshore, demersal habitats in depths of 20-250 m, but generally less than 100 m. Usually found close to the seabed.

Fish species	Scientific name	Spawning / aggregation times	Key habitat and spawning habitat
Champagne (spiny) crab	*Hypothalassai acerba*	Mar – May	Usually found in the ocean's benthic shelf and upper slope, in the sandy and muddy bottoms,
Crystal (snow) crab	*Chaceon spp*	All year	Snow crab are often found in the ocean's benthic shelf and upper slope, in the sandy and muddy bottoms, and in depths from 20 to 1200 m.
King George whiting	*Sillaginodes puncate*	Jun – Sep	Spawn in mainly offshore areas. The water currents then carry the fertilised eggs and larvae into sheltered bays of mangroves and seagrass areas. The juvenile fish tend to congregate in estuaries, inlets, bays, beaches and other sheltered coastal waters in close proximity to seagrass beds. Adults prefer the deeper water along channels, gutters and offshore with a less dependence on seagrass habitats. The larger fish are also found individually in deeper offshore areas near reefs.
Pink snapper	*Pagrus auratus*	Oct – Mar	Widespread within the Indian Ocean Including Australian Waters. The species is considered to be demersal; adults are found along the continental shelf to 300 m depth, whilst juveniles inhabit shallower, sheltered coastal waters. Eggs and larvae of the pink snapper are pelagic (Department of Fisheries (DoF) 2020).
Sandbar shark	*Carcharhinus plumbeus*	Oct – Jan	A bottom-dwelling, shallow coastal water species that is seldom seen at the water's surface. It tends to prefer waters on continental shelves, oceanic banks, and island terraces
Spangled emperor	*Lethrinus nebulosus*	Sep – Feb	Reef dwellers ranging from shallow coral reefs and seagrass beds to rocky reefs 200 m deep
Spanish mackerel	*Scomberomorus commerson*	Aug – Nov	A pelagic larval phase is followed by juveniles occupying shallow inshore waters, moving to coral and rocky reef habitat as they grow. Adult fish are epi-pelagic, usually associated with reefs, shoals or current lines, and rarely found in depths greater than 100 meters.
Western Australian dhufish	*Glaucosoma hebraicum*	Dec – Mar	Adults usually be found on reefs 20 to 50 m deep, occasionally found in depths of 3 m deep. Juveniles often occur in sandy habitats at similar depths to adults. Young fish of about 150-300 mm then move to low-lying reefs, while adults prefer reefs with large rocky outcrops and ledges. Spawning appears to take place over isolated reef outcrops and weed-covered sandy areas.
Western rock lobster	*Panulirus cygnus*	Aug – Feb	See Section 4.7.4

4.6.5 Marine mammals

The following sections further detail the behaviour, migrations and other habits of threatened or migratory species that may occur in the Operational Area and/or EMBA as highlighted in Table 4-5 and reported in the PMST search:

- Australian sealion (threatened)

- Blue whale (threatened and migratory)
- Southern right whale (threatened and migratory)
- Humpback whale (migratory)
- Antarctic minke whale (migratory)
- Bryde's whale (migratory)
- Dusky dolphin (migratory)
- Orca (migratory)
- Sperm whale (migratory)
- Fin whale (migratory).

4.6.5.1 Australian Sea Lion

Australian Sea Lions (*Neophoca cinere*a) are listed as vulnerable under the EPBC Act. There are currently 76 known pupping locations along the coast and offshore islands between the Houtman Abrolhos Islands in Western Australia to the Pages Islands in South Australia. The widespread distribution of small colonies may offer the advantage of minimising competition in areas for limited trophic resources (Shaughnessy, 1999). Australian sea lions use a wide variety of habitats (Gales et al.,1994) for breeding sites (called rookeries) and, during the non-breeding season, for haul-out sites (rest stops, which are also useful for predator avoidance, thermal regulation and social activity) (Campbell, 2005). Onshore habitats used include exposed islands and reefs, rocky terrain, sandy beaches and vegetated fore dunes and swales. They also use caves and deep cliff overhangs as haul-out sites or breeding habitat (Dennis & Shaughnessy 1996, 1999).

The species has an asynchronous 17.5 month breeding cycle across its known range (Campbell 2003). The pupping season can extend for between five and seven months (Gales et al., 1992; Shaughnessy et al., 2006). Dispersal of young appears to be self-limited in this species, as females show strong natal site fidelity to maximise breeding potential due to the asynchronous nature of their breeding cycles (Campbell et al., 2008). Females' movements appear to be no greater than 60 km from their natal site (Campbell et al., 2008). Males disperse approximately 200 km from natal sites (Campbell, 2003). Dispersal mode is reflected in the high levels of genetic differentiation found in colonies of Australian sea lions over relatively short distances (Campbell, 2003). Adult females have been recorded to move pups away from the natal area to other haul-out areas to continue nursing when pups, at approximately 2–3 months of age, can make short distance movements (Higgins & Gass, 1993). Migration of adult and juvenile males has been recorded on the west coast of WA between breeding colonies in the Jurien Bay area and non-breeding sites on islands near Perth (Gales et al., 1992). Timing for the birthing of pups is not the same at each breeding island. Young can be born at any time from January to June after a gestation period of 12 months. Australian sea lions are regularly observed feeding around the larger reefs in the area. The nearest breeding grounds are on the Beagle Islands some 39 km to the south and the Abrolhos Islands approximately 100 km northwest of the area, and therefore may be present in, or transiting through, the area close to the Cliff Head platform. A BIA for foraging (male and female) overlaps the Operational Area (Figure 4.14).

4.6.5.2 Blue whale

The blue whale is a migratory threatened species under the EPBC Act and is listed as 'endangered' by the IUCN (IUCN, 2013). The Conservation Management Plan for the Blue Whale (DoE, 2015a) outlines vessel disturbance and man-made noise as potential threats to the conservation status of this species. They are widespread in all Australian waters at various times of year and may be encountered in the vicinity of the Cliff Head platform. The species is oceanic and appears to undertake extensive migrations between low latitude (~20ºS), warm water breeding areas, to high latitude (60-70ºS), cooler feeding grounds (Bannister et al., 1996).

Although migration patterns remain poorly understood, it is thought that the species migrate to Antarctic waters in early summer, leaving for tropical waters in autumn and arrive at breeding

areas, in Indonesian and possibly SW Pacific waters, during winter. (DoE, 2013). Exact breeding grounds are also relatively unknown (Bannister et al., 1996).

There are two sub species of blue whale, the Antarctic blue whale (B. m. intermedia) and the pygmy blue whale (B. m. brevicauda). Antarctic blue whales feed predominantly in polar waters and are likely to occur infrequently in the region; the majority of blue whale sightings in Australian waters are pygmy blue whales (Branch et al., 2007). Pygmy blue whales feed in the Perth Canyon at depths of 200 to 300 m, from January to May, with peak feeding occurring between March and May. From April to August, they continue their northern migration, returning southwards between October and late December (DoE 2012). Satellite tracking of pygmy blue whales has identified the Perth Canyon/Naturalist Plateau Region (Perth to Geraldton) as an area of potentially higher occupancy (Double et al., 2014; Thums et al., 2022). Most recently, the continental shelf off of Geraldton is identified as an important biological area (feeding, resting or foraging) (Thums et al., 2022) and therefore it may be possible that pygmy blue whales may be present in the vicinity of the Operational Area. A blue and pygmy blue whale BIA for foraging on migration overlaps the EMBA, as does a known foraging area BIA for pygmy blue whales (Figure 4.14). A distribution BIA for pygmy blue's overlaps with the Operational Area.

4.6.5.3 Southern right whale

The migratory patterns of the southern right whale, a vulnerable listed EPBC Act species, are less well known than the humpback. The species is pelagic, in summer foraging in the open Southern Ocean (Bannister et al., 1996). It is thought that southern right whales migrate from sub-Antarctic feeding grounds to their breeding grounds close to Australia's south coast during winter and spring (Bannister, 1994). Marsh et al., (1995) indicate that the regular calving areas occur between Augusta in Western Australia and Port Lincoln in South Australia, with less regular calving occurring around the southwest coast up to Perth. During the winter and spring period, occasional sightings of southern right whales have been made as far north as Geraldton. No BIAs for this species are located in or near the Operational Area and therefore large numbers of individuals are unlikely to be encountered during activities.

4.6.5.4 Humpback whale

Humpback whales traverse waters off the west coast of Australia as they migrate annually from summer feeding grounds in Antarctica to the nearshore waters of the Kimberley region where they breed and calve during winter. The northbound migration occurs between June and September, peaking in July and August (Double et al., 2010). Whales appear to remain within the 200m isobath near the Montebello Islands before moving closer to shore as they head further north to calving grounds in the Kimberley (Jenner et al., 2001). The southbound migration begins in September through to November (Double et al., 2012), although actual timing may vary by up to three weeks. The Operational Area overlaps with the two BIA's; migration (north) and migration (north and south) (Figure 4.14) therefore individuals will likely be encountered, peaking in June/July and October/November (Table 4-8).

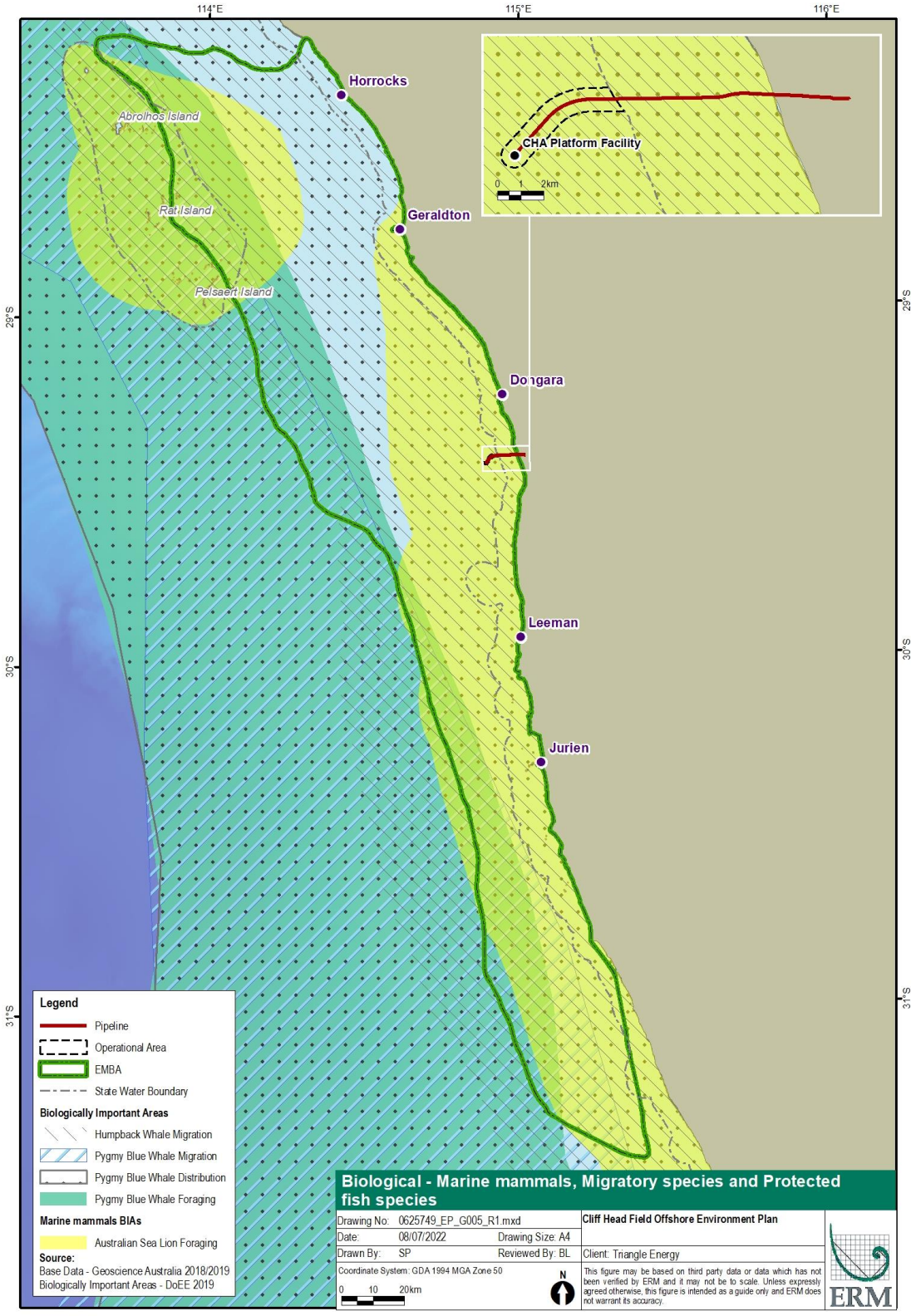


Figure 4.14: Marine mammal BIAs in the vicinity of Cliff Head.

4.6.5.5 Antarctic minke whale

The Antarctic minke whale (*Balaeno*ptera bonaerensis) is listed migratory under the EPBC Act and occupies primarily offshore and pelagic habitats (greater than 600 m in water depth) within cold temperate to Antarctic waters between 21°S and 65°S (Bannister et al., 1996; Thiele and Gill, 1999). In the Antarctic, minke whale density increases from November, peaks in January, and then declines in February with the majority of the mature population distributed south of 40°S in summer (DoE, 2022c).

Antarctic minke whales have been recorded offshore from all Australian states with the exception of the Northern Territory (Bannister et al., 1996). Their distribution north along the west coast of Australia is currently unknown. This species is known to undertake extensive annual migrations to feeding grounds in southern Australian and Antarctic waters during summer; and winter breeding grounds in open ocean areas throughout tropical and sub-tropic waters (DoE, 2022c). The Antarctic minke whale may occasionally pass through or near to the Cliff Head Operational Area.

4.6.5.6 Bryde's whale

Bryde's whales are the smallest of the baleen-type whales. They are found in oceanic and nearshore tropical and subtropical waters and considered a pelagic species. The smaller, coastal form of Bryde's whale is limited to waters shallower than 200 m and moves along the coast In response to suitable prey, while the larger, offshore form is found in deeper water (500 – 1000 m) (DoE, 2022d). Species inhabiting inshore locations (<20 miles from coast) are quite sedentary, with mating occurring in the autumn/winter timeframe. Insufficient information is available on specific Australian feeding or breeding grounds for the species. Inshore coastal forms appear to breed and give birth during the year while the offshore form breeds during winter (DoE, 2022d). Bannister et al., (1996) report that Bryde's whales have previously been recorded near the Abrolhos Islands. The Bryde's whale may occasionally pass through or near to the Cliff Head Operational Area.

4.6.5.7 Orca

The orca (*Orcinus orca)*, or killer whale, is a listed migratory species under the EPBC Act. While they are known to be migratory, following regular seasonal movements, exact routes and timings are poorly understood and little is known about orca in Australian waters. The preferred habitat of orca includes oceanic, pelagic and neritic (relatively shallow waters over the continental shelf) regions, in both warm and cold waters. They may be more common in cold, deep waters, but off Australia, orcas are most often seen along the continental slope and on the shelf, particularly near seal colonies. Given the shallow water depths of the Operational Area, large numbers of orca are unlikely to be encountered during operations and IMR activities, although transient individuals may be encountered in low numbers.

4.6.5.8 Sperm whale

Sperm whales (*Physeter macrocephalus*) are listed migratory under the EPBC Act and have been recorded off the coasts of all Australian states (Bannister et al., 1996), though their distribution and abundance is poorly understood. Females and young male sperm whales are restricted to warmer waters, moving broadly between the eastern Indian Oceans and Tasman Sea and down to 55°S, while older males travel seasonally between Antarctic waters and equatorial breeding grounds (Bannister 1969; Gaskin 1973; Best 1979). No population estimates are available for sperm whales in Australian waters. Lack of taxonomic resolution, and poor abundance and distribution data, prevent a definitive assessment of the likelihood for subpopulations within Australian populations of sperm whale (DoE, 2022e).

The major food for sperm whales comprises oceanic cephalopods, frequently taken at depth (Clarke 1980). While sperm whales feed primarily on large and medium sized squids, the list of documented food items is fairly long and diverse. Prey items include other cephalopods such as octopuses, and medium and large-sized demersal fishes, including rays, sharks and many teleosts (Bearzin 1972; Clarke 1977, 1980; Rice 1989). Sperm whales are deep and prolonged divers and can therefore feed throughout the entire water column, even in very deep areas.

Concentrations of sperm whales are found where the seabed rises steeply from great depth and are probably associated with concentrations of major food in areas of upwelling (Bannister et al., 1996). For example, sperm whales have been observed foraging in waters over the Perth Canyon and over the Albany canyons group (Evans and Hindell 2004) and therefore transient individuals may occur although given the shallow water of the Operational Area this is unlikely. No BIAs have been designated for foraging or other aggregations within the Operational Area or EMBA.

4.6.5.9 Sei whale

Sei whales are migratory and listed as vulnerable under the EPBC Act, occurring in subtropical, temperate, and subpolar waters around the world. Their distribution, abundance and latitudinal migrations are largely determined by seasonal feeding and breeding cycles (Department of Climate Change, Energy, the Environment and Water, 2022). They are the most 'northerly' of the Antarctic baleen whales.

These whales are thought to complete long annual seasonal migrations from subpolar summer feeding grounds to lower latitude winter breeding grounds but details of this migration, and whether it involves the entire population, are unknown (National Oceanic and Atmospheric Administration (NOAA), 2022a). Sei whales are often found to the north of the Polar Front in summer, as far as north Tasmania; but they are seen occasionally feeding in the southern most navigable waters of Antarctica (TSSC, 2015a). Sei whale winter breeding areas are unknown, but probably lie somewhere in deep tropical waters; however, some individuals have been seen around Tasmania in winter, possibly non-breeding whales (TSSC, 2015a). This species overlaps both the Operational Area and EMBA.

4.6.5.10 Fin whale

Fin whales are migratory whales listed as vulnerable under the EPBC Act. Fin whales are considered a cosmopolitan species and occur from polar to tropical waters, and rarely in inshore waters (TSSC, 2015b). The full extent of their distribution in Australian waters is uncertain, but they occur within Commonwealth waters and have been recorded in most State waters and from Australian Antarctic Territory waters (TSSC, 2015b).

These whales are generally thought to undertake long annual migrations from higher latitude summer feeding grounds to lower latitude winter breeding grounds (NOAA, 2022b). It is likely they migrate between Australian waters and the following external waters: Antarctic feeding areas (the Southern Ocean); subantarctic feeding areas (the Southern Subtropical Front); and tropical breeding areas (Indonesia, the northern Indian Ocean and south-west South Pacific Ocean waters) (NOAA, 2022b). This species overlaps both the Operational Area and EMBA.

4.6.6 Marine reptiles

The following sections further detail the behaviour, migrations and other habits of threatened or migratory species that may occur in the Operational Area and/or EMBA as highlighted in Table 4-5 and reported in the PMST search:

- Loggerhead turtle
- Green turtle
- Leatherback turtle
- Flatback turtle

4.6.6.1 Loggerhead turtle

Loggerhead turtles (*Caretta caretta)* are migratory and listed as Endangered under the EPBC Act and are found throughout tropical, subtropical and temperate waters, occurring in waters surrounding coral and rocky reefs, seagrass beds and muddy bays (DoE, 2022f). They feed primarily on benthic invertebrates in waters ranging in depth from the nearshore zone to 55 m. Loggerhead turtles undertake well-known reproductive migrations (over 2,600 km) between foraging and nesting areas (DoE, 2022f). Loggerhead turtles are one of the most commonly sighted turtles along the coast adjacent to the South-West Marine Region, with resident adult and large sub-adult turtles sometimes found in the Perth region between Rottnest Island and Geographe Bay. Nesting of loggerhead turtles is mainly concentrated on subtropical beaches, with major aggregations occurring to the north of the region, from Shark Bay to the Pilbara (DoE, 2022f). No BIAs for this species have been designated within the Operational Area or EMBA. However, loggerhead turtles are known to breed on Dirk Hartog Island over 100 km to the northeast of the Operational Area and foraging may occur, therefore they may be seen in the area surrounding the Cliff Head platform.

4.6.6.2 Green turtle

Green turtles (*Chelonia mydas*) are a migratory species and are listed as Vulnerable under the EPBC Act. They are the most widespread and abundant turtle species in WA waters nesting from the Ningaloo coast to the Kimberley Islands (Prince, 1994). These turtles nest, forage and migrate across tropical northern Australia usually between the 20°C isotherms although individuals may stray into temperate waters (DoE, 2022f). Green turtles forage on shallow benthic habitats containing seagrass and/or algae, including coral and rocky reefs, and inshore seagrass beds (DoE, 2022f). No BIAs have been designated for the green turtle in the Operational Area or EMBA, although foraging or transient individuals may be encountered in low numbers.

4.6.6.3 Leatherback turtle

Leatherback turtles (*Dermochelys coriacea*) are migratory species listed as Endangered under the EPBC Act. They are a pelagic feeder found in tropical and subtropical and temperate waters. Adult turtles are found in both the pelagic and coastal waters foraging throughout the water column from close to the surface to depths of more than 1200m (DoE, 2022f). The species has been recorded feeding in all Australian states and while no major nesting areas have been recorded in Australia, scattered isolated nesting occurs in southern Queensland and the Northern Territory (DoE, 2022f). It is thought that most leatherback turtles found in Australian waters have migrated from tropical nesting areas to feed in temperate waters (DoE, 2022f). Adult turtles feed on pelagic soft-bodied creatures such as jellyfish, which occur in greatest concentrations at the surface in areas of upwelling or convergence (DoE, 2022f). No BIAs have been designated for this species in the Operational Area or EMBA, and given the low density at which the leatherback turtle commonly resides, only very low numbers of transient individuals could be encountered.

4.6.6.4 Flatback turtle

Adult Flatback turtles (*Natator depressus)* inhabit soft bottom habitat over the continental shelf of northern Australia, extending into Papua New Guinea and Irian Jaya (Zangerl et al., 1988) although the extent of their range is not fully known (Zangerl et al., 1988). Capture locations from trawlers indicate that Flatback Turtles feed in turbid, shallow inshore waters north of latitude 25° S in depths from less than 10 m to depths of over 40 m (Robins 1995). Nesting habitat includes sandy beaches in the tropics and subtropics (Limpus 1995). Flatback Turtles make long reproductive migrations similar to other species of sea turtles, although these movements are restricted to the continental shelf (DoE 2022b). No BIAs for the flatback turtle are recorded at, or in proximity to, the Cliff Head platform, therefore, these species would, at most, transit through the area.

4.6.7 Marine birds

4.6.7.1 Procellariiformes

The following sections further detail the behaviour, migrations and other habits of threatened or migratory albatross, petrel and shearwater species that may occur in the Operational Area and/or EMBA as highlighted in Table 4-5 and reported in the PMST search:

- Amsterdam albatross (threatened and migratory)
- Southern royal albatross (threatened and migratory)
- Wandering albatross (threatened and migratory)
- Northern royal albatross (threatened and migratory)
- Black-browed albatross (threatened and migratory)
- Indian yellow-nosed albatross (threatened and migratory)
- Shy albatross (threatened and migratory)
- White-capped albatross (threatened and migratory)
- Campbell albatross (threatened and migratory)
- Sooty albatross (threatened and migratory)
- Southern giant petrel (threatened and migratory)
- Northern giant petrel (threatened and migratory)
- White-faced storm petrel
- Blue petrel (threatened)
- Fairy prion (threatened)
- Soft-plumaged petrel (threatened)
- Flesh-footed shearwater (migratory)
- Wedge-tailed shearwater (migratory)
- Little shearwater.

Breeding colonies of albatross species are found at six localities within Australian waters, all of which are sub-Antarctic islands located in the Southern Ocean, several thousand kilometres from the Operational Area. All species of albatross forage widely at sea and are generally found at their most northern extents between May and September, with many species occurring at relatively low densities waters along the southern Australian coast during this time (DSEWPAC, 2011).

There are no critical habitats for any species of albatross listed under the EPBC Act within the EMBA; the nearest BIA for the identified albatross species lies over 500 km south of the EMBA. Given the oceanic foraging strategies of these species, foraging individuals may occur within the EMBA but are not expected in large numbers.

Petrels share many similar characteristics with albatrosses; they forage widely at sea, breeding is concentrated at a number of sub-Antarctic island in the Southern Ocean, and they may be found in waters off the southern Australian coastline during winter months (DSEWPAC, 2011). The southern and northern giant petrels may occur in the Operational Area and EMBA though not in large numbers. A foraging BIA for the soft-plumage petrel and white-faced storm petrel overlaps with the EMBA and therefore foraging individuals of this species may occur, though large numbers of individuals are not expected in the Operational Area.

Fairy prions have a circumpolar distribution, and probably frequent subtropical waters during the non-breeding period. The distribution of this species is not known to overlap with any EPBC Act-listed threatened ecological community (TSSC, 2015c). Fairy prions and their habitats are likely to occur within the EMBA, although do not overlap with the Operational Area.

Flesh-footed shearwater, little shearwater and wedge-tailed shearwater may occur in the EMBA and the Operational Area. Species of shearwater are widely distributed across the southern Indian and Pacific oceans, and breed on offshore islands, including the Houtman Abrolhos islands. The breeding season in Australia begins in as early as September, with fledgling occurring as late as June. During breeding season shearwaters typically aggregate in flocks and are rarely found as single animals. Outside the breeding season, individuals may forage widely away from breeding colonies. A foraging (in high numbers) BIA for the wedge tailed shearwater and little shearwater overlaps the Operational Area and therefore foraging individuals may occur in this area.

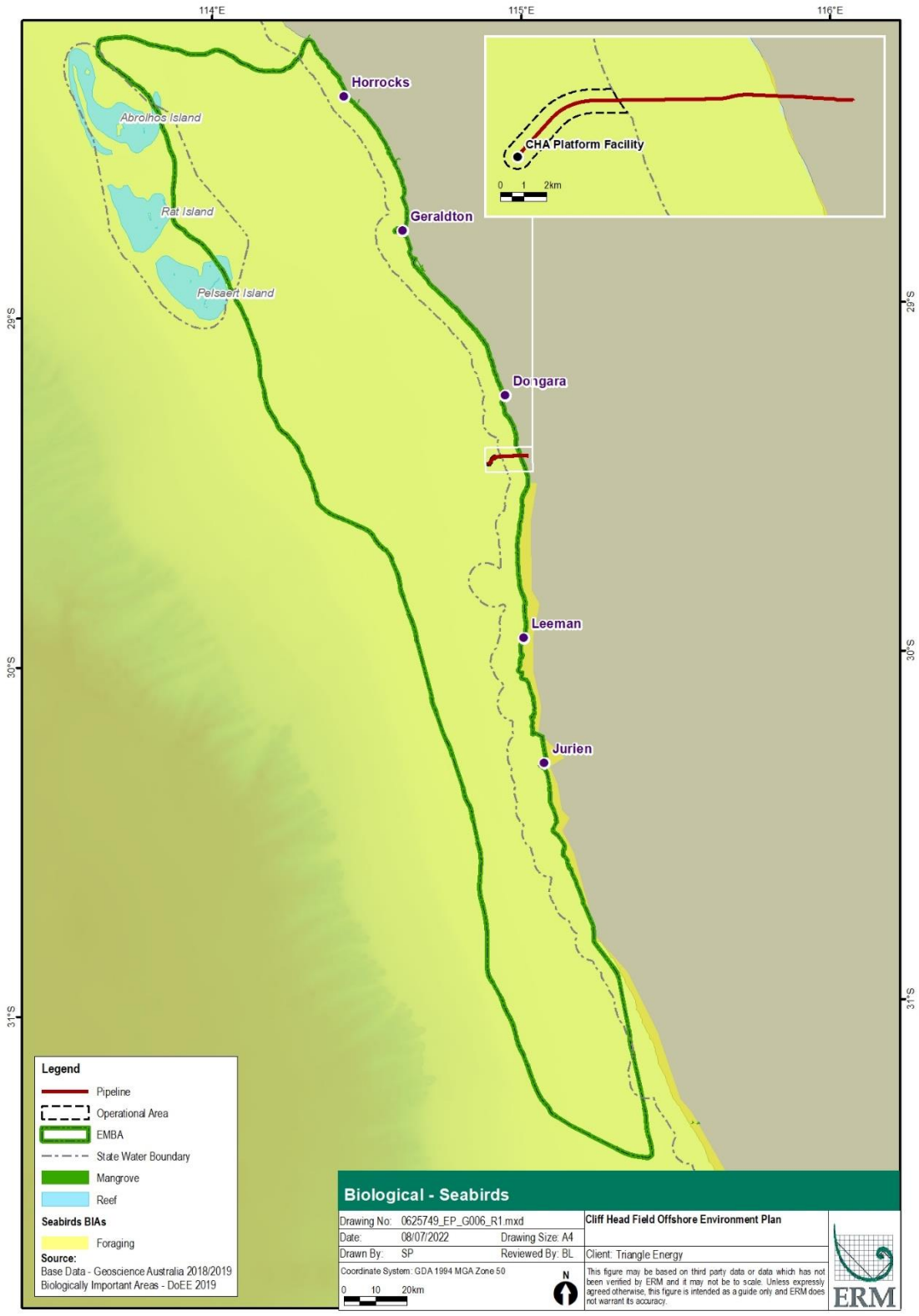


Figure 4.15: Seabird BIAs in the vicinity of Cliff Head

4.6.7.2 Sternidae

The following sections further detail the behaviour, migrations and other habits of threatened or migratory tern and noddy species that may occur in the Operational Area and/or EMBA as highlighted in Table 4-5 and reported in the PMST search:

- Australian lesser noddy (threatened)
- Common noddy (migratory)
- Australian fairy tern (threatened)
- Bridled tern (migratory)
- Caspian tern (migratory)
- Roseate tern (migratory)
- Little tern (migratory)
- Greater sand plover
- Sooty tern.

The Australian lesser noddy is known to breed on the Houtman Abrolhos islands, with approximately between 50,000 and 80,000 breeding pairs on the islands and may breed on Ashmore Reef and Cartier Island (TSSC, 2015d). The breeding season is protracted; hatching of chicks may occur between August to December and fledging of chick may occur between January and April (TSSC, 2015d). The species is considered to be resident around breeding islands year-round, although long-distance movements do occur. Outside the breeding season the species may forage widely and move away from breeding islands (TSSC, 2015d). A foraging (provisioning young) BIA overlaps the EMBA.

Given the known concentration of the species at the Houtman Abrolhos islands, along with the foraging range of the species, the Australian lesser noddy may occur within the Operational Area and is expected to forage within the EMBA.

In Australia, the common noddy occurs mainly in ocean off the Queensland coast, but the species also occurs off the north-west and central Western Australia coast. During the breeding season, the common noddy usually occurs on or near islands, on rocky islets and stacks with precipitous cliffs, or on shoals or cays of coral or sand. When not at the nest, individuals will remain close, foraging in the surrounding waters. Birds may nest in bushes, saltbush, or other low vegetation. During the non-breeding period, the species occurs in groups throughout the pelagic zone (DoE, 2022g). Two BIA's overlap the EMBA, foraging and foraging (provisioning young).

The seasonality of breeding varies greatly between sites and within a colony, breeding is not synchronized (DoE, 2022g). Clutch size is usually restricted to a single egg (DoE, 2022g), but sometimes two eggs occur (DoE, 2022g). The common noddy feeds mainly on fish, although they are known to also take squid, pelagic molluscs, and aquatic insects. The common noddy will often forage farther from shore than other species of the same genus, such as the Australian lesser noddy. A common noddy foraging BIA overlaps the EMBA, but individuals are unlikely to be encountered in the Operational Area.

In Australia, terns are widespread throughout coastal environments and commonly observed in near-coastal waters, both on ocean beaches, platforms and headlands and in sheltered waters (11 – 55 km from shore). In particular terns appear to move south along the coast (Reid et al., 2002). Terns are recorded in Queensland from September, and usually arrive in NSW from late September to October. In Victoria, reporting rates increase during September-October (DOE 2022). Birds may transit over the Operational Area from August – October during their southward migration. A bridled, caspian and Australian fairy tern foraging BIA overlaps with the Operational Area. A foraging BIA for sooty and roseate terns overlaps with the EMBA.

The greater sand plover breeds in the northern hemisphere and undertakes annual migrations to and from southern feeding grounds for the austral summer (TSSC, 2016). The greater sand plover distribution in Australia during the non-breeding season is widespread, although the most are found in northern Australia. In Western Australia they are especially widespread between North West Cape and Roebuck Bay and also occasionally recorded along the coast of southern Western Australia (TSSC, 2016).

4.6.7.3 Charadriiformes

The following sections further detail the behaviour, migrations and other habits of threatened or migratory gull species may occur in the Operational Area and/or EMBA as highlighted in Table 4-5 and reported in the PMST search:

- Pacific Gull

Pacific Gulls (*Larus pacificus*) are endemic to Australia (DAWE, 2020b). The subspecies georgii is found on the coasts of south-western Western Australia and western South Australia. Its range has expanded in recent years northwards along the Western Australian coast. Breeding occurs between September and January, either in small and open colonies or solitary. As with other coastal species, Pacific Gulls are prone to disturbance while breeding and feeding. Some populations have begun contracting (DAWE, 2020b). A Pacific gull foraging BIA overlaps with the Operational Area.

4.6.7.4 Other migratory marine birds

The following sections further detail the behaviour, migrations and other habits of threatened or migratory marine avifauna species, not identified in the families above, that may occur in the Operational Area and/or EMBA as highlighted in Table 4-5 and reported in the PMST search:

- Osprey
- Great egret
- Cattle egret
- Bar-tailed godwit
- Common greenshank
- Red-tailed tropicbird
- Fork tailed swift
- Red knot
- Curlew sandpiper
- Eastern curlew
- Australian painted snipe.

Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia. The breeding range of the osprey extends around the northern coast of Australia (including many offshore islands) from Albany in Western Australia to Lake Macquarie in NSW. The breeding population can be quite fragmented with nests which can spaced up to 69 km from one another due to the territoriality of breeding pairs. As such, high numbers of individuals are unlikely to occur in the Operational Areas or EMBA.

The great egret, cattle egret, bar tailed godwit, red knot, curlew sandpiper, eastern curlew, Australian painted snipe and common greenshank are wetland species and unlikely to occur on open water. They occur within the EMBA where this overlaps with the coastal areas. As such, individuals may be locally abundant in small areas within the EMBA, but are unlikely to occur in large numbers across the EMBA.

The fork-tailed swift is a non-breeding visitor to Australia, listed as Migratory under the EPBC Act. The species generally arrives in Australia during October and departs in April (DoE, 2022h). The species is considered to be exclusively aerial; the species may transit within the EMBA in low numbers, with its presence restricted to birds in flight.

4.6.8 Invertebrates

A number of invertebrates (crustaceans, infaunal annelids, filter feeders etc.) may occur in the Operational Area, as highlighted in Sections 4.4 and 4.5, including commercially important species the western rock lobster. Invertebrates in the Operational Area are representative of the wider region, and due to the relatively small area that the Operational Area covers, compared to the homogenous habitat available, numbers of invertebrates are not considered to affected by the

operation of CHA or any supporting activities. However, given the commercial value in the western rock lobster, and the importance of the area for breeding (as shown by the designation of the KEF, Section 4.4.1), a more detailed discussion of the western rock lobster is provided below.

4.6.8.1 Western rock lobster

The western edge of the Operational Area is an area of lobster breeding. Rock lobsters are found all around the Australian coast sheltering in caves and crevices during the day and moving out at night to forage in surrounding areas. The western rock lobster (*Panulirus cygnus*) supports the most valuable single species fishery in Australia.

The life cycle of the western rock lobster has been well studied. Breeding occurs in spring and early summer in waters near the edge of the continental shelf of 35 to 90 m depth. (DoFWA, 2011).

Fertilised eggs are carried on the underside of the female for 9 to 12 weeks before hatching. Hatched larvae, called phyllosoma, rise to the sea surface and drift long distances offshore (generally 400 to 1,000 km offshore) growing to about 35 mm over 9 to 11 months before metamorphosing into the peurulus stage. The peurulus then swims back across the continental shelf to settle in the holes and crevices of the shallow coastal reefs, such as occurs in the central and eastern parts of the Operational Area. After settlement, the peurulus undergoes a moult and assumes the form of a juvenile rock lobster (Phillips, 2002).

Juvenile rock lobsters are cryptic and the numbers seen are very small compared to the total numbers that may be present in the reef system. An intensive study carried out at Seven Mile Beach (approximately 10 km north of the Operational Area) estimated the density of juvenile lobster in the reef system to be approximately 40,000 per hectare (Phillips, 2002).

Miller (2019) investigated the relationship between the spatial extent of *P. cygnus* and the decreasing catch rates observed by local fishers. The study expanded from Cliff Head to Dongara and found ‘Low’ catch rates in the shallow waters around Cliff Head with catch rates increasing towards Dongara. Using the coordinates of the CHA platform it was stipulated that the Operational Area is located in the ‘Mid’ catch rate area, the third highest catch rate identified in the study (scale: Low, Boundary, Mid, High) (Miller, 2019: Fig. 1). The study determined that the combination of Sea Surface Temperate, Swell Height and Swell Period assists in predicting the catch rates in this region (Miller, 2019).

4.6.9 Planktonic communities

Components of the pelagic community in the Operational Area and EMBA area include plankton (both meroplankton such as larval phases and holoplantkon such as dinoflagellates, diatoms and copepods) and larger organisms such as pelagic fishes, cetaceans, pinnipeds and birds. Phytoplankton abundance and production in the region is considered to be relatively low due to nutrient limitation (Twomey et al*.,* 2007) and is expected to vary seasonally in response to irradiance levels, temperature and nutrient availability. The Capes Current transports cooler, saline water together with the larvae of temperate species northward along the inner shelf, bringing higher concentrations of nitrate and promoting phytoplankton productivity, which appears to increase the relative proportion of diatoms (Hanson et al., 2005).

Many marine fishes and invertebrates undergo a planktonic larval phase which is important for species distribution. The regional oceanography is an important determinant of the fate of planktonic larvae, with the Leeuwin Current and its eddies advecting larvae offshore or southwards. The influence of the Leeuwin Current on the fate of larvae is demonstrated by the strong correlations between current strength and recruitment of species such as western rock lobster and finfish (Caputi et al*.,* 1996, Hutchins and Pearce 1994, Pearce and Phillips 1988).

4.7 Socio economic environment

The Operational Area is located adjacent to the Shire of Irwin, in the Mid-West region of Western Australia. The twin towns of Dongara and Port Denison are the nearest townships to the development (approximately 20 km north-northeast).

4.7.1 Petroleum Exploration and Production

The region has supported petroleum exploration since the 1950s with oil and gas production beginning soon after. The Perth Basin has become a prominent oil and gas production province supporting a number of onshore operators.

Permit WA-31-L, in which the Cliff Head platform is located, abuts and is partially surrounded by the exploration permit WA-481-P. Eleven wells have been drilled within Permit area WA-481-P, including nine new field wildcat wells (South Turtle Dove 1B, Geelvink 1A, Batavia 1, Leander Reef 1, Vindara 1, Frankland 1, Perseverance 1, Dunsborough 1 and Lilac 1), three exploratory wells (Koel, Munia and Cisticola) and two appraisal wells (Frankland 2 and Dunsborough 2). Production License WA-31-L, directly adjacent to Release Permit area WA-481-P, includes two exploration wells (Cliff Head 1 and Mentelle 1) and 12 extension/appraisal and development wells in the Cliff Head oil field. Three exploration wells (Twin Lions 1, Moondah 1 and Xanadu 1) have been drilled in State Waters directly adjacent to the permit area (DoRET, 2011).

4.7.2 Ports and Shipping

The majority of commercial shipping is located in the west of the Operational Area (Figure 4.16). The main shipping traffic in the region is west of the Operational Area, between Fremantle and Asia and other international ports. No commercial freight traffic is expected in the Operational Area, with vessel movements expected to consist of low levels of commercial fishers transiting the area and recreational boating.

Port Denison and Geraldton Port (approximately 77 km north) are all located to the north of the Operational Area. Geraldton Port is located in the heart of the City of Geraldton and handles iron ore, grains, fuels, metals, mineral sands, talc, garnet and fertilisers. Oakajee Port is a deepwater port proposed to be built 24 km north of Geraldton and will cater for the world's largest ore carriers. The harbour in Port Denison is home to one of the state's largest rock lobster fishing fleets, in addition to recreational boating and fishing.

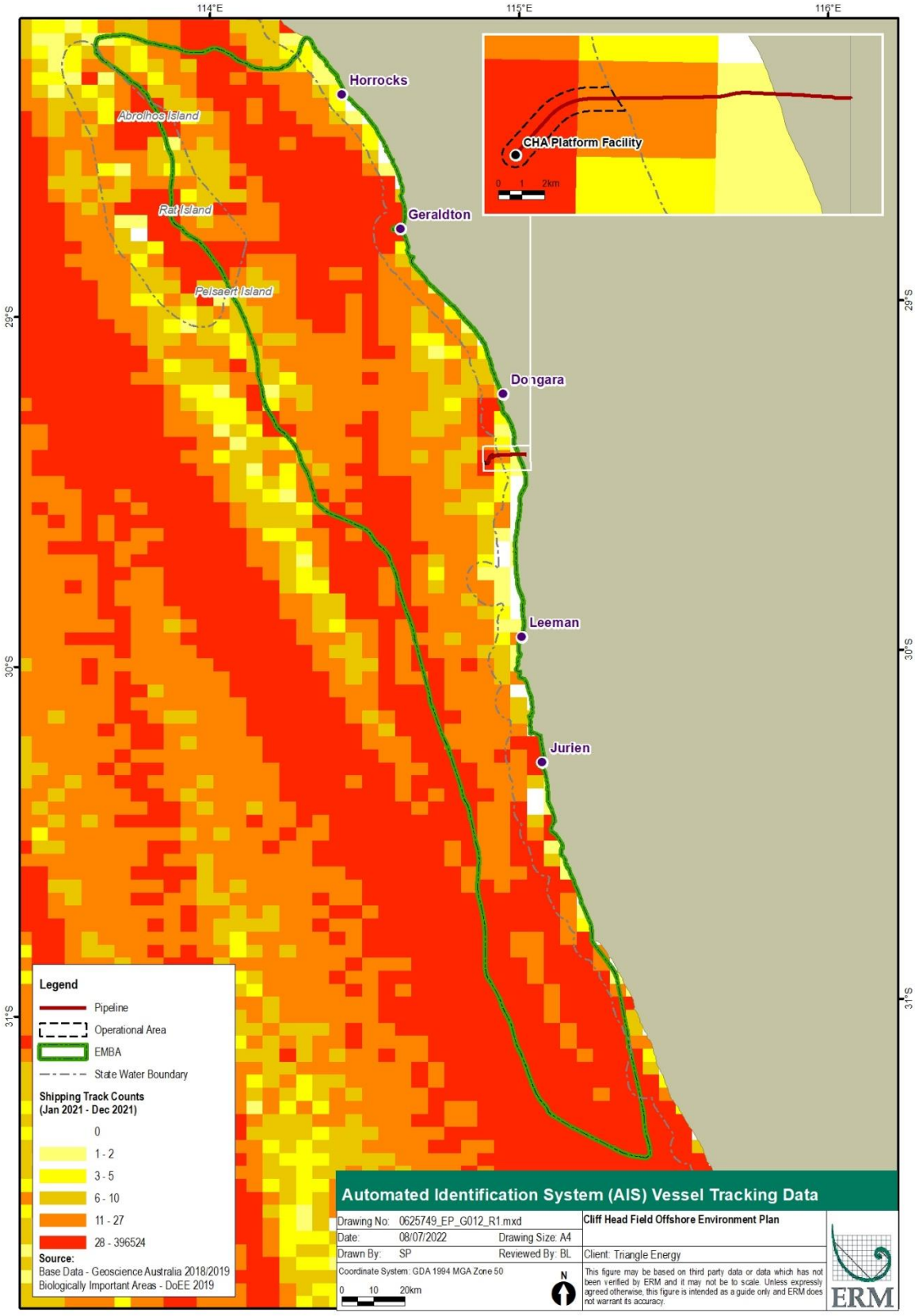


Figure 4.16: Shipping traffic plot for 2021 at the Cliff Head platform and WA-31-L as provided by AMSA

4.7.3 Tourism and recreation

Tourism operations occur in the Abrolhos Islands and Jurien Bay Marine Park. The Houtman Abrolhos Islands are an A-Class Reserve managed by the Department of Fisheries for the conservation of flora and fauna, for tourism and for purposes associated with fishing and aquaculture industries. The waters around the islands have special status as a Fish Habitat Protection Area for the conservation of fish, fish breeding areas and associated aquatic ecosystem and are popular for aquatic tourism and recreational activities. Tourism at the Abrolhos Islands includes scuba diving, fishing and sightseeing activities. Similar activities also occur in the Jurien Bay Marine Park which is a multiple use reserve that caters for a wide range of activities.

Major population centres in the region include (Australian Bureau of Statistics, 2021):

- Dongara (20 km north): ~1,393 residents
- Leeman (45 km south): ~ 351 residents
- Geraldton (77 km north): ~ 38,940 residents
- Jurien Bay (97 km south): ~1,985 residents.

Each of these population centres contain anchorages and boat ramps and are nodes of maritime activity, such as commercial and recreational fishing. The coastline is dominated by sandy beaches, which can be accessed by recreational anglers using 4WD vehicles.

4.7.4 Commercial fisheries & aquaculture

There are a number of Commonwealth and State administered fisheries that are known to have, or may have, fishing permit areas/zones that overlap the location of the CHA platform. The fisheries have differing levels of fishing effort and areas of operations over the year, as is outlined in Table 4-10 below. Fisheries identified as having a potential for interaction within the Operational Area are presented in Figure 4.17 to Figure 4.21.

Table 4-10: Details of fisheries overlapped by the Operational Area or EMBA

Fishery	Operational Area	EMBA	Target Species	Potential for Interaction	
Commonwealth Fisheries					
Western skipjack fishery	✓	✓	Skipjack tuna (*Katsuwonus pelamis*)	X	The combined western and eastern skipjack tuna (*Katsuwonus pelamis*) fisheries encompass the entire Australian exclusive economic zone, including the Operational Area. Historically, most fishing effort has used purse-seine gear (about 98% of the catch) (Patterson et al., 2021) Fishing effort in the fishery is confined to temperate waters off southern Australia (Patterson et al., 2021). The catch was historically supplied almost exclusively to the cannery in Port Lincoln. However, the cannery closed in 2010, and there has been no catch since the 2008-09 fishing season. (Patterson et al., 2021). Therefore, there is no potential for interaction with this fishery within the Operational Area.

Fishery	Operational Area	EMBA	Target Species	Potential for Interaction	
Western Tuna and Billfish Fishery	✓	✓	Broadbill swordfish (*Xiphias gladius*) Bigeye tuna (*Thunnus obesus*) Yellowfin tuna (*T. albacares*) Albacore tuna (*T. alalunga*)	✓	The fishery extends to the Australian exclusive economic zone boundary in the Indian Ocean and targets four pelagic species, which are all highly migratory. The main fishing gear is pelagic longline, with low levels of minor-line fishing (Patterson et al., 2021). Since 2005, fewer than 5 vessels have been active in the fishery each year (Patterson et al., 2021). Total catch was 161 tonnes for the 2020 fishing season, with the maximum area fished overlapping the Operational Area. Therefore, there is potential for interaction with this fishery within the Operational Area.
Southern Bluefin tuna fishery	✓	✓	Southern Bluefin tuna (T. *maccoyii*)	X	The southern bluefin tuna fishery encompasses the entire Australian exclusive economic zone, including the Operational Area. Fishing effort for southern bluefin tuna is concentrated in temperate Australian waters, with over 95% of the annual catch of the species taken in the Great Australian Bight (Patterson et al., 2021). No fishing effort has been reported within or near the EMBA in recent years, therefore there is no potential for interaction with this fishery within the Operational Area.
Small Pelagic Fishery	X	✓	Blue mackerel (*Scomber australasicus*) Jack mackerel (*Trachurus declivis*) Redbait (*Emmelichthys nitidus*) Australian sardine (*Sardinopssagax*)	X	The small pelagic fishery extends from southern Queensland to southern Western Australia and overlaps the EMBA. Most historical catch has occurred off the east coast of Tasmania (Patterson et al., 2021). The main fishing methods are midwater trawling and pure-seine vessels. The fishery management area does not overlap the Operational Area therefore there is no potential for interaction with this fishery within the Operational Area.
Western Deepwater Trawl Fishery	X	X	Deepwater bugs Orange roughy (*Hoplostethus atlanticus*) Ruby snapper (*Etelis carbunculus*)	X	The Western Deepwater Trawl Fishery management area lies in waters depths >200 m. A review of ABARES fishing effort data indicates that recent fishing effort occurs in waters off Carnarvon, north of the EMBA. In previous years, some fishing effort has occurred in waters further south and within approximately 5 km from the EMBA. The fishery management area does not overlap the Operational Area therefore there is no potential for interaction with this fishery within the Operational Area. The fishery management area (water depths >200 m) is located adjacent to, but does not overlap the EMBA. Given there is no overlap, there is no potential for impact. However, given proximity to the EMBA, information about this fishery is included for context.

Fishery	Operational Area	EMBA	Target Species	Potential for Interaction	
State Fisheries					
Abalone Managed Fishery	✓	✓	*Haliotis roei* (Management Area 8)	X	The Western Australian Abalone Managed Fishery targets several species of abalone. The fishery is divided into eight management areas, of which one (Area 8) overlaps the Operational Area. The fishery is a dive and wade fishery operating in shallow coastal waters along WA's western and southern coasts (Strain et al., 2021). No commercial fishing for abalone has been recorded in this zone since 2011 (Strain et al., 2021). Therefore there is no potential for interaction with this fishery within the Operational Area.
Abrolhos Islands and Mid West Trawl Managed Fishery	X	✓	Saucer scallops (*Amusium balloti*)	X	The Abrolhos Islands and Mid West Trawl Managed Fishery encompasses all the waters of the Indian Ocean adjacent to WA between Latitude 27°51´ and Longitude 29°03´ in water depths up to 200 m, including the EMBA (Kangas et al., 2021). The fishery management area does not overlap the Operational Area. Therefore there is no potential for interaction with this fishery within the Operational Area.
Octopus Interim Managed Fishery	✓	✓	Octopus (*Octopus djinda*)	✓	The Operational Area overlaps with Zone 1 of the Octopus Interim Managed Fishery. The primary harvest method is a 'trigger trap' (Hart et al., 2021). The total catch for the 2020 season was 245 tonnes with 25 active vessels (Hart et al., 2021). Fishing effort of up to four vessels has been reported within the 10 nm CAES block (292145) overlapping the Operational Area within the last 10 years (2011 to 2020, inclusive). Therefore, there is a potential for interaction with this fishery within the Operational Area.
Mackerel Managed Fishery	✓	✓	Spanish mackerel (*Scomberomorus commerson*), grey mackerel (S. *semifasciatus*) and other species from the genera *Scomberomorus, Grammatorcynus* and *Acanthocybium*	X	The Mackerel Fishery extends from Augusta to the WA/NT border with most effort and catches recorded north of Geraldton. The Operational Area overlaps with Area 3 of the fishery. The fishery uses near-surface trolling gear from vessels in coastal areas around reefs, shoals and headlands as well as jig fishing. Total catch for the 2020 season was 288 tonnes of spanish mackerel and 11 tonnes of grey mackerel (Lewis et al., 2021) The commercial fishery takes place over approximately 6 months, when Spanish mackerel are abundant in coastal areas (Lewis et al., 2021). Sixteen boats operated in the commercial fishery during the 2020 season, primarily from May - November.

Fishery	Operational Area	EMBA	Target Species	Potential for Interaction	
					There has been no fishing effort reported within the 60 nm CAES block (29142) overlapping the Operational Area within the last ten years (2011 to 2020, inclusive) (Department of Primary Industries and Regional Development (DPIRD), 2021). Therefore there is no potential for interaction with this fishery within the Operational Area.
Marine Aquarium Managed Fishery	✓	✓	1,500+ fish species	X	The Marine Aquarium Managed Fishery operates within all WA state waters, including the Operational Area. The fishery is primarily a dive-based fishery that uses hand-held nets to capture the desired target species. The fishery is typically more active in waters south of Broome with higher levels of effort around the Capes region, Perth, Geraldton, Exmouth, Dampier and Broome (Newman et al., 2021). Operators in the fishery are also permitted to take coral, live rock, algae, seagrass and invertebrates (Newman et al., 2021). There has been no fishing effort reported in the 10 nm CAES block (292145) overlapping the Operational Area over the last 10 years (2011 to 2020, inclusive) (DPIRD, 2021). Therefore there is no potential for interaction with this fishery within the Operational Area.
Specimen Shell Managed Fishery	✓	✓	Approximately 200 shell specimens	X	The Specimen Shell Managed Fishery operates within WA state waters, including the Operational Area. Effort is concentrated in the areas adjacent to the largest population centres, such as Broome, Exmouth, Shark Bay, Geraldton, Perth, Mandurah, the Capes area, Albany and Esperance (Hart et al., 2021). This fishery targets the collection of specimen shells for display, collection, cataloguing and sale. Collection is predominantly by hand when diving or wading in shallow coastal waters however, deeper water collection has recently commenced with the employment of ROVs at water depths up to 300 m. Total catch for the 2020 season was 4,258 shells (Hart et al., 2021). No fishing effort has been reported withint he 10 nm CAES block (292145) overlapping the Operational Area within the last 10 years (2011 to 2020, inclusive) (DPIRD, 2021). Therefore there is no potential for interaction with this fishery within the Operational Area.
West Coast Deep Sea Crustacean Management Fishery	✓	✓	Crystal (snow) crab (*Chaceon albus*) Giant (king) crab (*Pseudocarcinus gigas*) Champagne (spiny) crab (*Hypothalassia acerba*)	X	The West Coast Deep Sea Crustacean Managed Fishery extends north from Cape Leeuwin to the WA/NT border in water depths great than 150 m within the Australian Fishing Zone, including the Operational Area. The fishery is a pot fishery using baited pots operated in a long-line formation in shelf edge waters (>150 m) (How et al., 2021).

Fishery	Operational Area	EMBA	Target Species	Potential for Interaction	
					Total catch for the 2020 season was 153 tonnes with five vessels operating (How et al., 2021). No fishing effort has been reported within the 10 nm CAES block (292145) overlapping the Operational Area over the last ten years (2011 to 2020, inclusive) (DPIRD, 2021). Given the preferred deep water depths of the targeted fishing operations, interactions with participants in the fishery within the Operational Area is not expected to occur.
West Coast Demersal Gillnet and Demersal Longline (Interim) Management Fishery	✓	✓	Gummy shark (*Mustelus antarcticus*) Dusky shark (*Carcharhinus obscurus*) Whiskery shark (*Furgaleus macki*) Sandbar shark (*Carcharhinus plumbeus*)	✓	The West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery extends from northwards from latitude 33° S to 26° S, including the Operational Area. Most fishers employ demersal gillnets to target mainly sharks with scalefish being a byproduct (Braccini & Watt 2021). Demersal longline is also permitted but is not widely used. Total catch for the 2019-2020 season was 774 tonnes of sharks and rays and 117 tonnes of scalefish (Braccini & Watt, 2021). The total fished area overlaps with the Operational Area (Braccii & Watt 2021). Fishing effort of up to six vessels has been reported within the 10 nm CAES block (292145) overlapping the Operational Area within the last ten years (2011 to 2020, inclusive) (DPIRD, 2021). Therefore there is a potential for interaction with this fishery within the Operational Area.
West Coast Demersal Scalefish (Interim) Managed Fishery	✓	✓	Approximately 100 species. Key target species: West Australian dhufish (*Glaucosoma hebraicum*) Pink Snapper (*Chrysophrysauratus*)	✓	The west coast demersal scalefish fishery comprises inshore and offshore suites of demersal scalefish species that are exploited by different commercies fisheries operating in the west coast bioregion (WAFIC, 2022a) Access to the fishery is restricted to 59 interim managed fishery permit holders (WAFIC, 2022a). There are five management areas and the Operational Area overlaps with the Mid-West Area. Total catch in the Mid-west Area was 100 tonnes in the 2020 fishing season over approximately 5,260 hours of effort (Fairclough & Walters 2021). Fishing effort of up to five vessels has been reported within the 10 nm CAES block (292145) overlapping the Operational Area within the last ten years (2011 to 2020, inclusive) (DPIRD, 2021). Therefore there is a potential for interaction with this fishery within the Operational Area.
South West Coast Salmon Managed Fishery	✓	✓	Australian Salmon (*Arripis truttaceaus*)	X	The west coast nearshore estuarine finfish resource encompasses 10 commercial fisheries, including the South west coast salmon managed fishery (Duffy et al 2021).

Fishery	Operational Area	EMBA	Target Species	Potential for Interaction	
					The south west coast salmon managed fishery operates on various beaches south of the metropolitan area, using seine nets (WAFIC, 2022b) No fishing effort has been reported in the 60 nm CAES blocks overlapping the Operational Area (29142) within the last 10 years (2011 to 2020, inclusive) (DPIRD, 2021). Therefore, there is no potential for interaction with this fishery within the Operational Area.
West Coast Rock Lobster Managed Fishery	✓	✓	Western rock lobster (*Panulirus cygnus*)	✓	The West Coast Rock Lobster Fishery extends from Shark Bay south to Cape Leeuwin, including the Operational Area. The fishing method is baited traps (pots). The commercial fishing season begins on 15 January each year and runs for 12 months (De Lestang at al., 2021). Total catch for the 2020 season was 9,132 tonnes from 239 vessels (De Lestang et al., 2021). Fishing effort of up to 41 vessels has been reported within the 10 nm CAES block (292145) overlapping the Operational Are within the last ten years (2011 to 2020, inclusive) (DPIRD, 2021). Therefore there is a potential for interaction with this fishery within the Operational Area.
Open Access in the North Coast, Gascoyne Coast and West Coast Bioregions	✓	✓	Various Species	✓	It is unclear of the extent of the management area for Open Access Fishing on the Gascoyne Coast as there is no publicly available information for the Open Access Fishery. Fishing effort of up to 3 vessels has been reported within the 60 nm CAES block overlapping the Operational Area (29142) within the last ten years (2011 to 2020, inclusive) (DPIRD, 2021). Fishing effort is not reported to the 10 nm scale therefore it is assumed there is a potential for interaction with this fishery within the Operational Area.
West Coast Pure Seine Managed Fishery	✓	✓	Scaly mackerel (*Sardinella lemuru*) Australian sardine (*Sardinops sagax*) Australian anchovy (*Engraulis australis*) Yellowtail scad (*Trachurus novaezelandiae*) Maray (*Etrumeus jacksoniensis*)	X	The west coast pure seine managed fishery, together with fishery developmental zone licence holders, use pure seine gear in waters between Geraldton and Cape Leeuwin (Norriss & Blazeski, 2021). This region is split into three Zones - Northern Development Zone (all WA waters north of 31° 00'S, predominantly off Geraldton), Perth Metropolitan (31° 00'S to 33° 00'S, predominantly Cockburn Sound) and Southern Development Zone (33° 00'S to Cape Leeuwin, predominantly Geographe Bay) (Norris & Blazeski 2021). The Operational Area overlaps the Northern Development Zone. However, no fishing effort has been reported in the 60 nm CAES blocks overlapping the Operational Area (29142) within the last 10 years (2011 to 2020, inclusive) (DPIRD, 2021). Therefore,

Fishery	Operational Area	EMBA	Target Species	Potential for Interaction	
					there is no potential for interaction with this fishery within the Operational Area. Therefore, there is no potential for interaction with this fishery within the Operational Area.
Shark Bay Crab Managed Fishery	X	✓	Blue swimmer crab (*Portunus armatus*)	X	The shark bay crab managed fishery consist of the shark bay crab trap, shark bay prawn trawl and shark bay scallop trawl operators (Kangas et al., 2021) This fishery management area does not overlap the Operational Area, however the EMBA overlaps with a shark bay crab approved landing area in Geraldton. No fishing effort has been reported in the 60 nm CAES blocks overlapping the Operational Area (29142) within the last 10 years (2011 to 2020, inclusive) (DPIRD, 2021). Therefore, there is no potential for interaction with this fishery within the Operational Area. Therefore, there is no potential for interaction with this fishery within the Operational Area.
West Coast (Beach Bait Fish Net) Managed Fishery	X	✓	Various nearshore schooling species, such as: Tailor (Pomatomus saltatrix) Australian salmon (Arripis truttaceus) Mullet (Mugil spp.) Herring (Arripis georgianus)	X	The west coast nearshore estuarine finfish resource encompasses 10 commercial fisheries, including the West Coast (Beach Bait Fish Net) Managed Fishery (Duffy et al., 2021). The west coast beach bait managed fishery operates on various beaches from Moore River (north of Perth) to Tim's Thicket (south of Mandurah) (WAFIC, 2022b). The fishery management area overlaps the EMBA, but does not overlap the Operational Area. No fishing effort has been reported in the 60 nm CAES blocks overlapping the Operational Area (29142) within the last 10 years (2011 to 2020, inclusive) (DPIRD, 2021). Therefore, there is no potential for interaction with this fishery within the Operational Area.

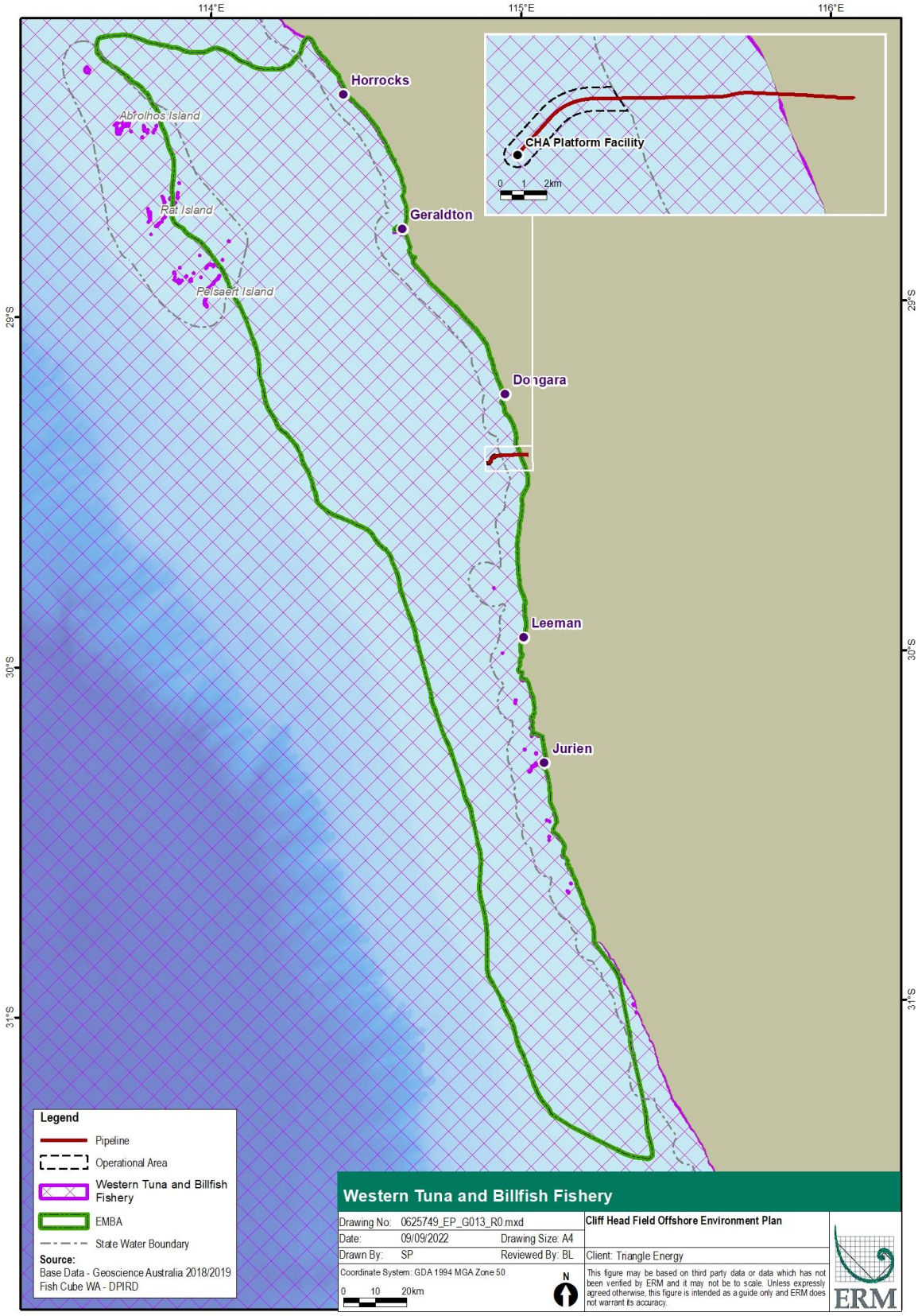


Figure 4.17: Western Tuna and Billfish Fishery management area overlap with Operational Area and EMBA

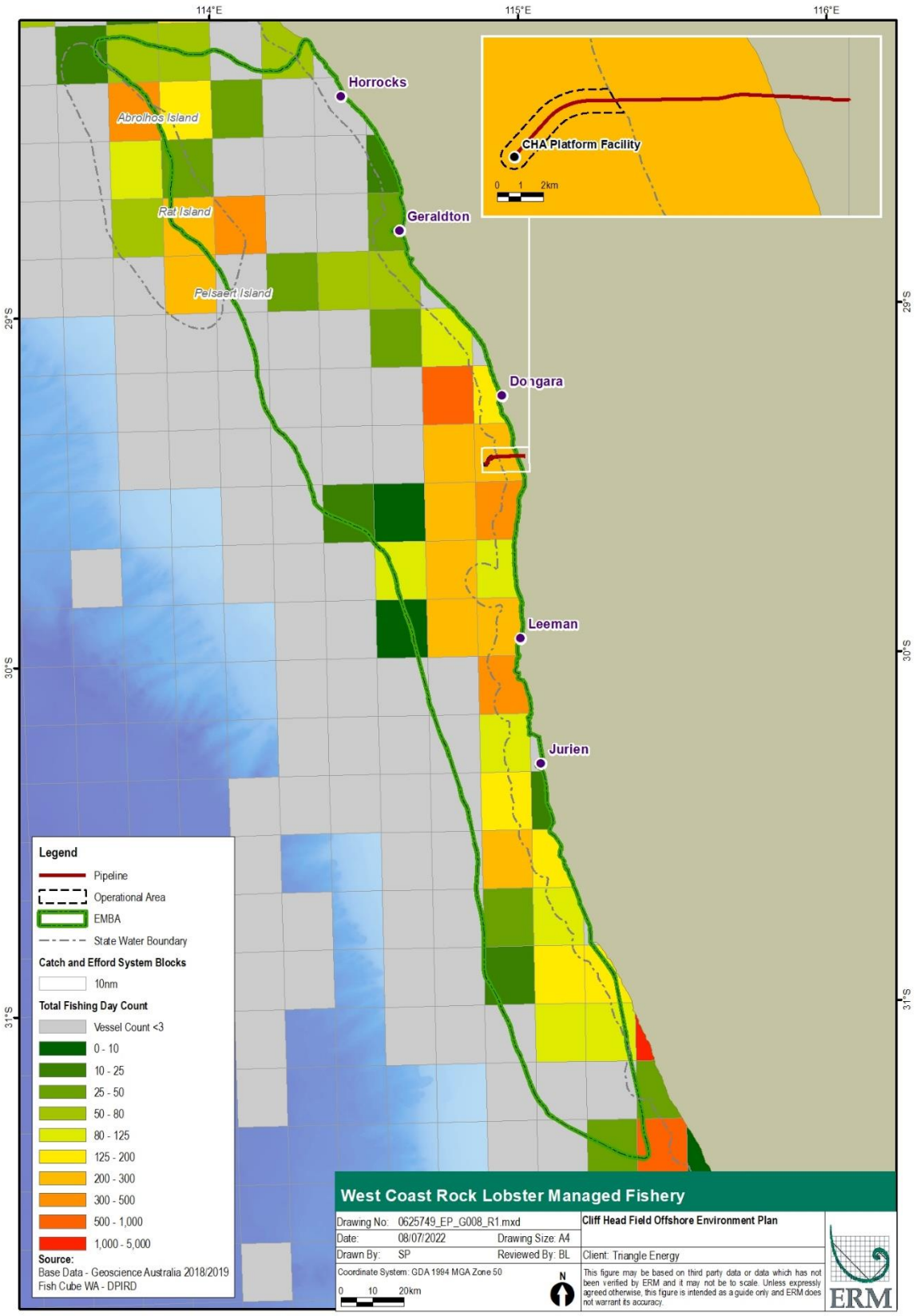


Figure 4.18: West Coast Rock Lobster Managed Fishery

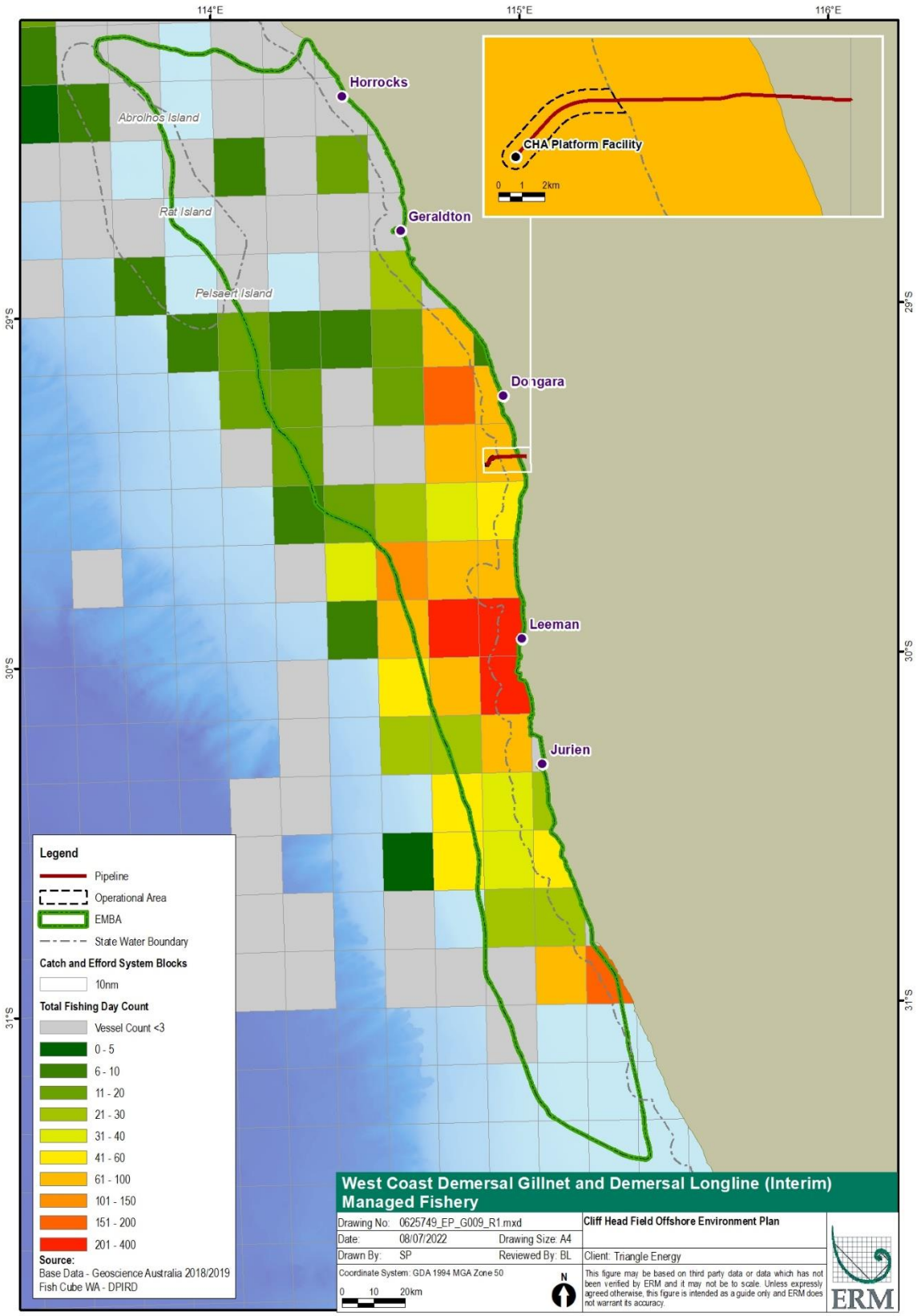


Figure 4.19: West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery

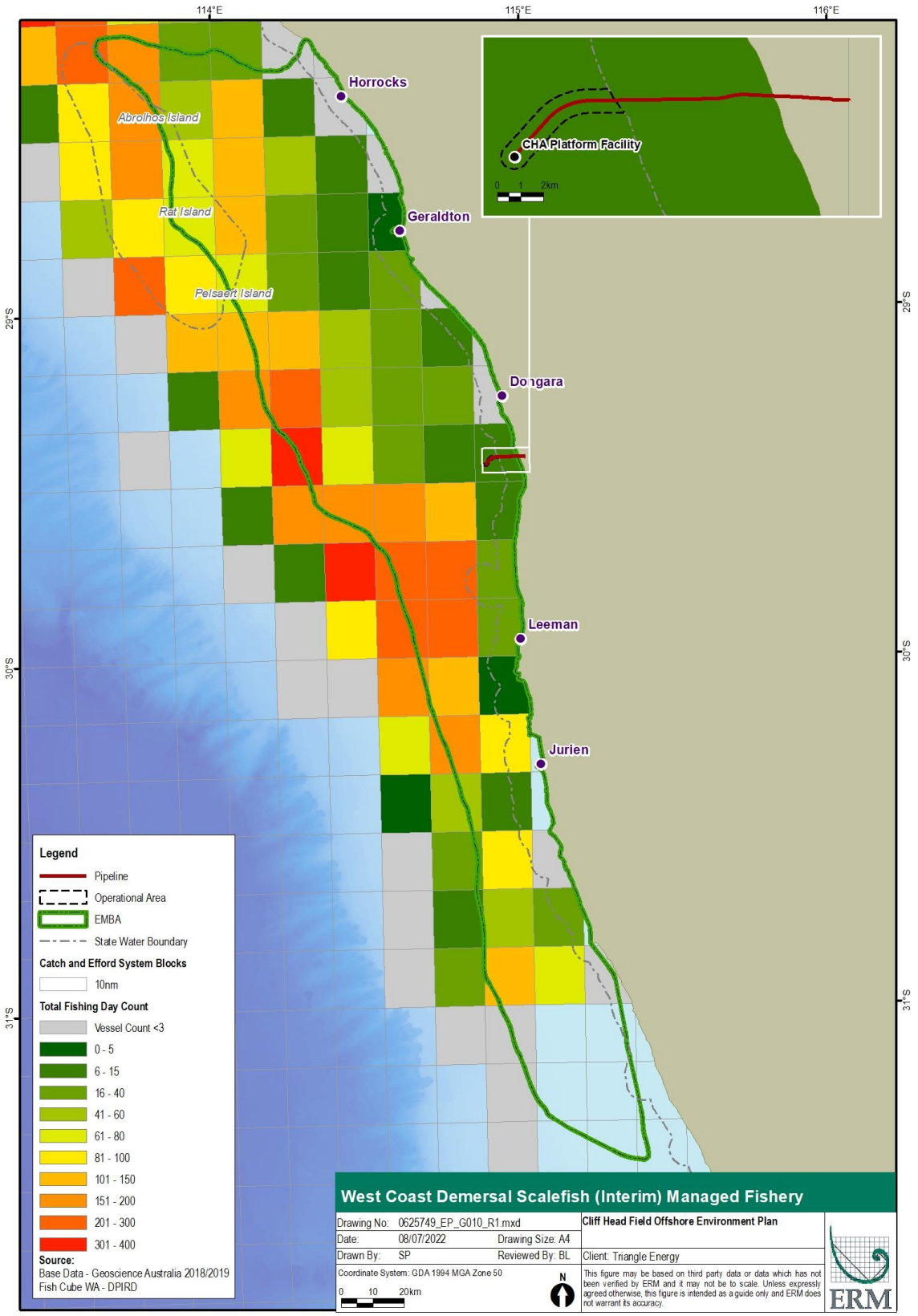


Figure 4.20: West Coast Demersal Scalefish (Interim) Managed Fishery

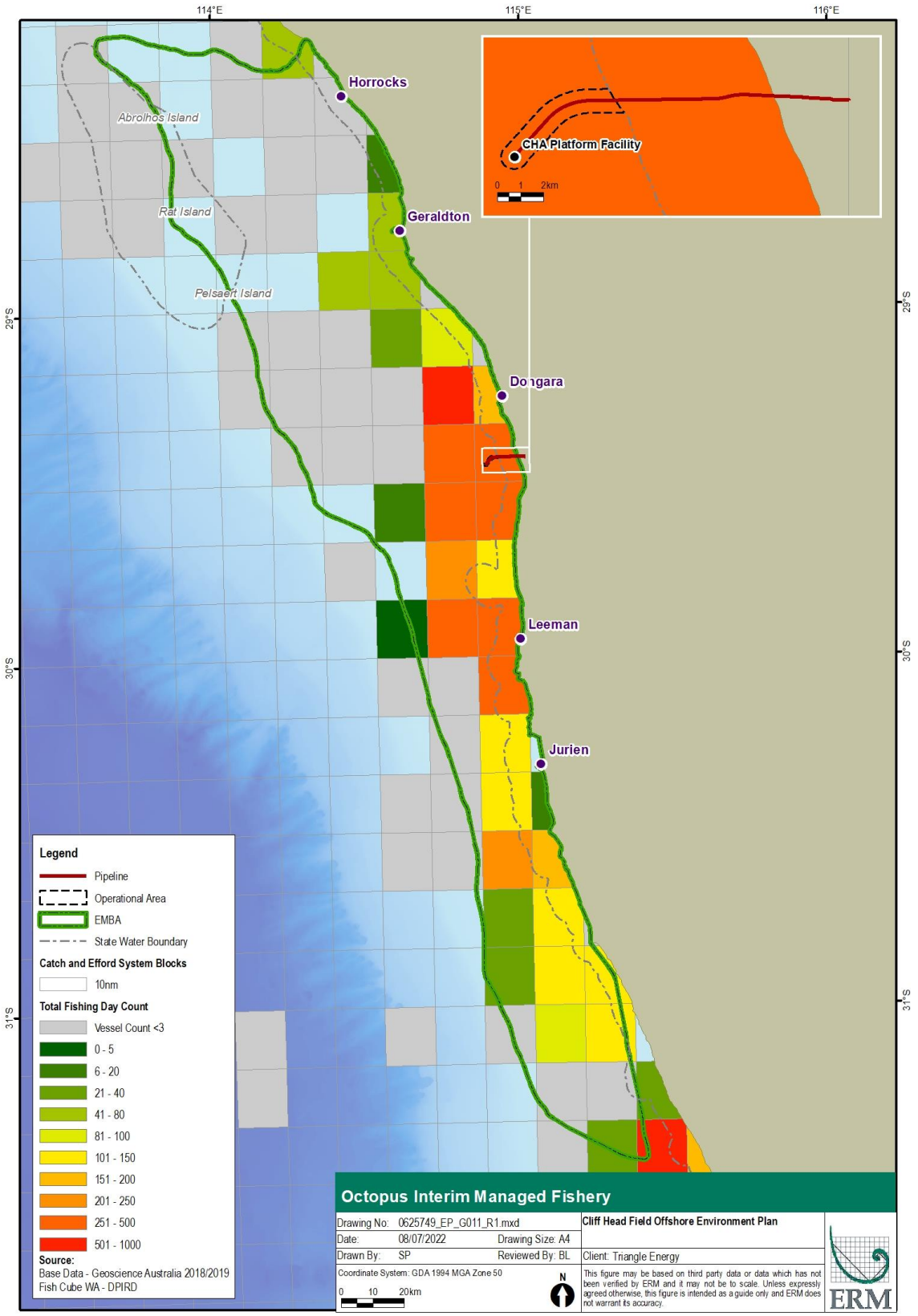


Figure 4.21: Octopus Interim Managed Fishery

4.7.5 Recreational fishing

Recreational fishing in the region consists of both shore- and boat-based angling, with recreational fishing concentrated around access nodes such as the boat ramps at Dongara and Geraldton, from which recreational vessels may launch. These locations are also departure points for charter fishing vessels. Previous consultation with Recfishwest confirmed that the beaches and coastal waters in proximity to the Operational Area are frequented by both beach and boat-based anglers.

Within the wider EMBA, the Jurien Bay Marine Park is zoned so that in some areas fishing activities are partially or totally restricted. In the areas where fishing can occur, major forms of recreational fishing include line fishing, rock lobster, abalone, crabbing, spearfishing and octopus, all of which can be collected from the shore or a vessel in particular zones. Netting is also permitted in certain areas from the shore but not from vessels. The Operational Area is approximately 79 km north of the Jurien Bay Marine Park and its proximity to the coastline and high usage may result in recreational fishing vessels traversing the wider EMBA.

Recreational fishing is also a key activity around the Abrolhos Islands, mostly within the islands State waters and charter fishing is a growing activity in the area. A number of fishing regulations apply to the Abrolhos Islands including bag limits for finfish, fishery closures for baldchin groper (*Choerodon rubescens*) and Western rock lobster (*Panulirus Cygnus*), restrictions for certain species including Samson fish (*Seriola hippos*) and yellowtail kingfish (*Seriola lalandi*) and netting is not permitted. The Abrolhos Islands are approximately 109 km north west of the Operational Area.

4.7.6 Defence activities

The Cliff Head platform overlaps with restricted airspace R131G which is described as ‘non-controlled’ airspace. While it is unlikely that the activities at Cliff Head platform could interfere with defence activities, the use of helicopters to service the platform has potential to disrupt activities and therefore defence stakeholders were consulted by TEO.

4.7.7 Heritage

There are no national or world heritage sites overlapping the Operational Area or EMBA. The Operational Area is approximately 149 km to the south east of one National Heritage Place, the Batavia Shipwreck Site and Survivor Camps Area 1629 – Houtman Abrolhos, Wallabi Group via Houtman Abrolhos. The nearest World Heritage property is the Shark Bay World Heritage property located 260 km north west of the Operational Area

4.7.8 Indigenous heritage

Indigenous Australian people have occupied the Australian continent for at least 65,000 years and in many places maintain a strong continuing connection with Country. Indigenous communities of the South-west Marine Region continue to have a strong cultural and spiritual connection to the ocean, and to use ocean resources for food, traditional purposes and income. Indigenous peoples’ connections with ‘Sea Country’ are as elemental as connections with the land (CoA 2007).

Sea country is valued for Indigenous cultural identity, health and wellbeing. Indigenous people across Australia have been sustainably using and managing their sea country, for tens of thousands of years, in some cases since before rising sea levels created these marine environments (DNP, 2018). Sea country refers to the areas of the sea that Aboriginal people are particularly affiliated with through their traditional lore and customs. It is recognised that spiritual corridors extend from terrestrial areas into nearshore and offshore waters, that a number of marine animals are totems for Indigenous people, and that songlines pass through the EMBA (DNP, 2018).

The Department of Aboriginal Affairs (DAA) Heritage Inquiry System was searched for the EMBA, which indicated 23 Registered Aboriginal Sites and 24 other heritage places within the EMBA (Appendix C).

There are no registered Aboriginal sites protected under the Aboriginal Heritage Act 1972 located within the Operational Area. The closest registered site on the boundary of the EMBA, Irwin River (18907), is located approximately 19 km north of the Operational Area. The site is registered for its historical, mythological, camp, natural and water source features.

The area of Eneabba West (15297), located on the coast 13 km south of the Operational Area is classified as an 'Other Heritage Place' under the Act (information has been received by the Heritage Council in relation to the place, but an assessment has not been completed to determine if it meets criteria for registration under the Act).

The Yamatji People are the traditional owners within the Operational Area. The Operational Area overlaps with the Yamatji National Native Title area and the Yamatji Indigenous Land Use Agreement Area. The Yamatji Nation claim is made up of five claimant groups – Hutt River, Southern Yamtji, Yamatji Nation, Mullewa Wadjari and Widi Mob. The Yamatji People are represented by the Yamatji Southern Regional Corporation and the Yamatji Marlpa Aboriginal Corporation. A Yamatji Proponent Standard Heritage Agreement is in place between TEO and Yamatji Southern Regional Corporation as of February 2021.

The southern portion of the EMBA overlaps with the South West Settlement NNT area. The Noongar People are the traditional owners of the southern area of the EMBA. The Noongar people are divided into six dialectal groups. The EMBA overlaps with the Yued region and the Yued ILUA area. The South West Aboriginal Land and Sea Council represents the Noongar Traditional Owners within the EMBA.

4.7.9 Non-indigenous heritage

No non-indigenous heritage values have been identified at or close to the Cliff Head platform. Some of the rock lobster fisherman's huts in the Abrolhos may have heritage interest. There are some sites in the Abrolhos that are associated with the remnants from the period (mid 1840s – 1920s), when guano mining occurred on several of the Abrolhos Islands, predominantly in the Southern and Easter Groups (DOFWA, 2007).

4.7.10 Maritime Archaeology

A number of historic shipwrecks protected under the Commonwealth *Underwater Cultural Heritage Act 2018* and recorded in the Australasian Underwater Cultural Heritage Database are found in the EMBA, however none occur within the Operational Area. There are also no sunken aircraft, relics or other underwater heritage protected under the Act within the Operational Area. Within the EMBA, the nearest potential historic shipwreck is the *Leander*. The wreck itself has never been found, but it is presumed to have come to rest somewhere between White Point and Leander Reef, just south of the Irwin River, approximately 7 km north of the Operational Area.

Other historic ships and maritime archaeological sites that are also scheduled under the WA *Maritime Archaeology Act 1973* include the wrecks of the *Batavia*, *Zeewyk* and the *Ben Ledi* located within the Abrolhos Islands on the edge of the EMBA. A search of the WA Museum's Maritime Archaeology Shipwreck Database also indicates that a number of other shipwrecks are present within the EMBA, although they are not scheduled under the *Maritime Archaeology Act 1973*.

5 Assessment of environmental impacts and risks

5.1 Potential environmental effects identification

This section outlines the environmental risk assessment methodology that is used to identify, evaluate and manage impacts and risks to meet ALARP and acceptability requirements and to develop environmental performance outcomes (EPOs) and environmental performance standards (EPSs). Regulation 13(5) of the OPGGS(E) Regulations requires environmental impacts and risks of petroleum activities to be detailed and evaluated appropriate to their nature and scale.

Environmental impacts and risks include those directly and indirectly associated with the petroleum activities and include potential emergency and accidental events:

- Planned activities have the potential for inherent environmental impacts.
- Environmental risks are unplanned events with the potential for impacts.

Herein, potential impact from planned activities are termed ‘impacts’, and ‘risks’ are associated with unplanned events with the potential for impact (should the risk be realised).

Environmental aspects/activities with the potential for impacts and risks from the Cliff Head Operations are outlined in Table 5-1. These activities and events have the potential to result in adverse effects on the physical, socio-economic and biological environment.

Table 5-1: Project Activities with the Potential for Impact

Event / Aspect	Activities / unplanned event details
Planned	
Routine Acoustic Emissions	• Project vessels and helicopters • Wellheads, pipelines and subsea infrastructure • Production platform • IMR activities • Workover/sidetrack activities
Routine Light Emissions	• External light emissions on the CHA and project vessels.
Physical Presence: Seabed Disturbance	• Dropped objects. • IMR activities. • High pressure water jetting. • Stabilisation materials • Temporary and permanent moorings. • Vessel anchoring in an emergency.
Interaction with Other Users	• Presence of pipelines. • Project vessels.
Physical Presence	• Presence of vessels, helicopters and CHA platform facilities.
Routine Atmospheric Emissions	• Internal combustion engines during combustion equipment engaged during workovers, normal CHA operations and vessel-based activities.
Vessel based activities - Routine Discharges	• Routine discharge of sewage, grey water and putrescible wastes to the marine environment from project vessels. • Deck and bilge water to the marine environment from project vessels.

Event / Aspect	Activities / unplanned event details
	• Equipment / machine space drainage. • Cooling water or brine to the marine environment from project vessels.
Cliff Head Platform activities	• Contaminated drainage water and waste oils. • Waste management. • Workover and sidetrack activity emissions. • Sidetrack drill cuttings and fluids.
Unplanned	
Physical Presence: Accidental Introduction and Establishment of IMS	• Accidental introduction of IMS.
Physical Presence: Vessel Collision with Marine Fauna	• Accidental collision between project vessels and protected marine fauna.
CHA spills	• Pipeline and Topside Process leaks • Chemical/hydrocarbon spills/leaks
Workover chemical spills	• Chemicals, such as wash chemicals, cleaning chemicals, maintenance and solvents
PFW spills	• Accidental release of PFW
Unauthorised access	• Unauthorised access to CHA poses a risk to platform infrastructure from damage due to sabotage by activists/terrorists.
Vessel spills	• Vessel tank rupture • Refuelling spill • On-board leakage or spillage.
Hydrocarbon spill response	• Response activities can exacerbate or cause further environmental harm.

5.2 Key Definitions

Term	Definition
Accident Event	An event capable of causing critical, major, moderate, minor damage to the environment, or negligible damage with no significant environmental effect.
Consequence	The consequence of an environmental impact is the potential outcome of the event on affected receptors (particular values and sensitivities).
Mitigation Measures (Controls to Reduce Likelihood)	A system, an item of equipment, a person or a procedure, that is used as a basis for managing environmental impacts and risks.
Environmental aspect	An element or characteristic of an operation, product, or service that interacts or can interact with the environment. Are categorised as resulting from planned activities, or from unplanned events. Environmental aspects can cause environmental impacts.
Environmental impact	Any change to the environment, whether adverse or beneficial, that wholly or partially results from an activity.
Environmental risk	Risk is a function of the likelihood of an environmental consequence occurring and the severity the consequence that arises from an activity or event.
Inherent risk	The risk prior to the implementation of mitigation measures.
Likelihood	The chance of an environmental consequence occurring.
Measurement criteria	A verifiable mechanism for determining mitigation measures are performing as required.
Residual risk	The risk remaining after mitigation measures have been applied (i.e. after risk treatment).

5.3 Risk assessment overview

TEO implements an environmental risk assessment methodology (Figure 5.1) consistent with the approach described in the following documents:

- AN/NZS ISO 31000: Risk management - Principles and guidelines
- AN/NZS ISO 14001: Environmental management systems - Requirements with guidance for use
- HB 203:2012: Managing environment-related risk.

An environmental risk assessment was undertaken in relation to Cliff Head production activities which included a number of environmental risk workshops, during which TEO and environmental risk management experts identified, analysed, evaluated and treated the credible sources of environmental risk that may arise during operational activities.

An initial environmental risk assessment was made in 2006 when the Cliff Head field was being developed and the EP prepared. Since then, the risk assessment has been periodically revisited as circumstance changed and revisions to the EP were made. The most recent review of the risk assessment was conducted in June 2022 to inform the five-yearly update of the EP. Ongoing operational activities and new activities (e.g. sidetrack drilling, non-productive phase) were reviewed and assessed to ensure all credible sources of environmental risk are being managed to ALARP and acceptable levels.

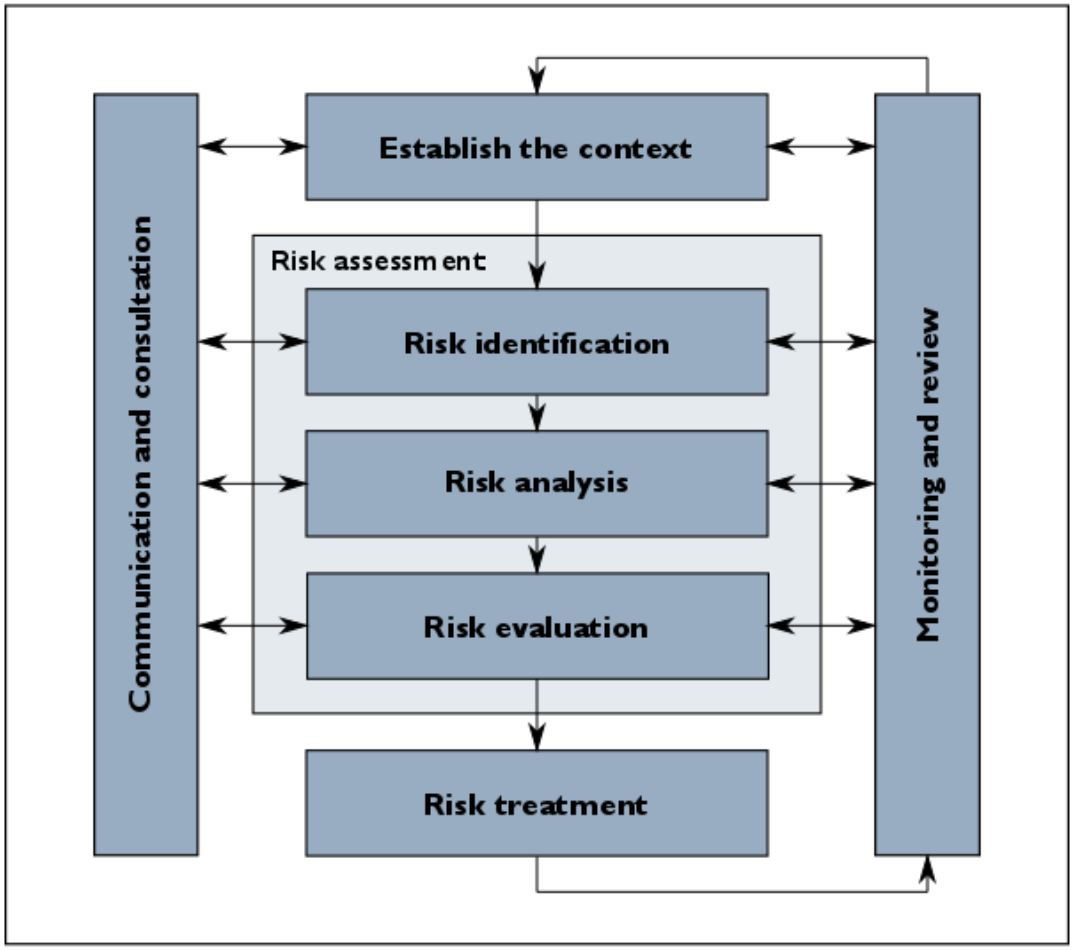


Figure 5.1: Risk Management Process

The environmental risk assessment tools used for this risk assessment are the TEO Risk Assessment Matrix, Consequence Definitions and Likelihood Definitions (refer Appendix D). An extreme environmental risk is considered to lie in the Risk Level 1 (18-36), a high environmental risk lies in Risk Level 2 (12-16), etc. Also, as defined in Appendix D, a significant environmental impact is defined as lying within consequence levels 3 to 6.

5.3.1 Communication and consultation

Communication and consultation with internal and external stakeholders is used to inform the risk management process. The OPGGS(E) Regulations require that TEO undertake effective consultation. TEO is committed to consulting with those stakeholders whose functions, interests and activities may be affected by Cliff Head production activities, in order to identify and respond to any concerns, claims or objections raised. The process of stakeholder engagement described in Section 10 outlines the consultation undertaken to date, along with the methods by which ongoing consultation will be undertaken.

5.3.2 Establishing the context

In order to conduct the environmental risk management process effectively, TEO established the context within which the environmental risk assessment was undertaken. This effectively framed the scope of the risk assessment, and considered a range of elements including:

- A description of the activities that TEO may carry out within the scope of this EP (Section 2)
- The physical, biological and socio-economic environment that may be affected (Section 3.2)
- The legislative requirements, conventions, and guidance applicable to the activity (Section 3)
- The environmental impacts and risks that could credibly be realised during the activities (Sections 6 and 7)
- The internal context by which TEO manage environmental risk, including the values, policies (Section 1), organisational structure and strategies (Section 8)
- The considerations of external stakeholders that may be affected by the activity (Section 10).

5.4 Risk assessment methodology

5.4.1 Impact and Risk identification

Impact and risk identification involves identifying the sources of impact and risk (i.e. those aspects or events that could result in an environmental consequence). A risk assessment workshop was held to identify impacts and risks as a result of proposed project activities as described in Section 5.3.

The impact and risk identification process considered all the potential environmental consequences that may credibly arise from the identified aspects/events. Potential flow on effects from an aspect/event were also considered, including any additional environmental aspects that may arise as a consequence of an aspect/event occurring and the response TEO may implement. Each of the aspects/events identified during the risk identification process were examined to ensure that they were a credible source of impact or risk.

5.4.2 Risk analysis

Risk analysis determines the credible worst case environmental consequence for impacts and risks, and the likelihood of the consequence occurring. The Risk Matrix found in the TEO Risk Management Procedure [10HSEQGENPC27], given in Appendix D, was used to assess the consequence and likelihood of impacts and risks from identified aspects/events.

For planned and unplanned events presented in Sections 6 and 7, impacts and risks are assessed qualitatively and/or quantitatively in terms of both likelihood and credible worst case environmental consequence in accordance with TEO's Consequence and Likelihood Definitions and Risk Assessment Matrix outlined in Appendix D.

To assist in decision making regarding the management of the hazards identified, TEO used the risk related decision support framework developed by the United Kingdom Offshore Operators Association (UKOOA 1999). This decision support framework (Figure 5.2) was used to assist in determining the relative importance of the methods used to assess risk and determine which methods are best suited to determining whether risks are managed to a level that is acceptable to TEO and ALARP.

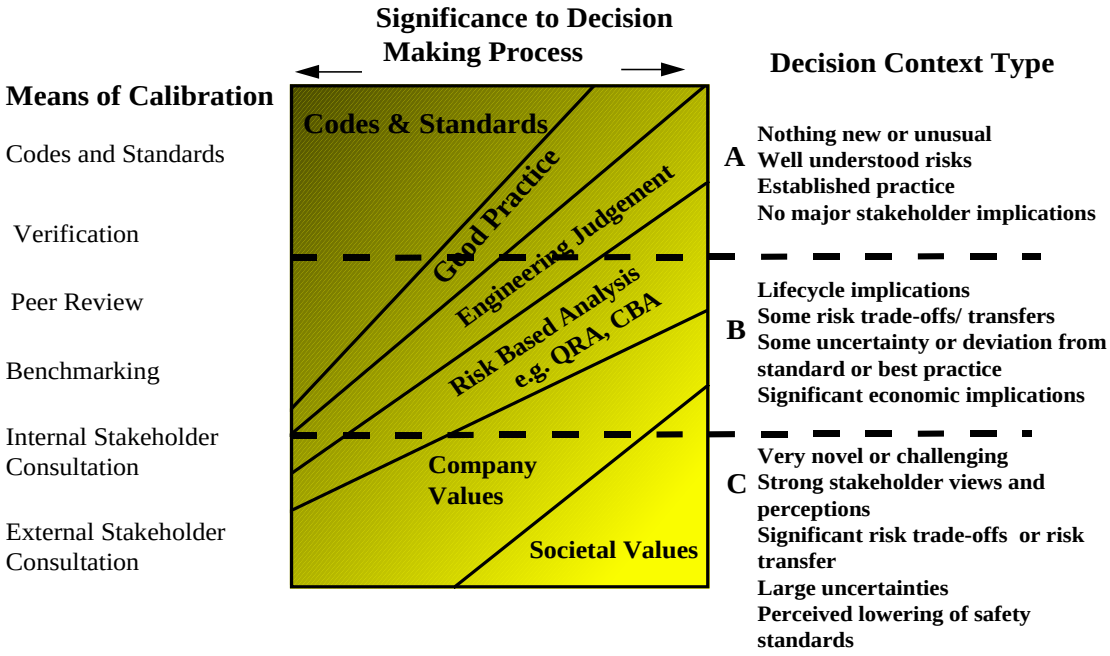


Figure 5.2: UKOOA Decision Support Framework

5.4.3 Risk treatment and evaluation

For planned and unplanned activities, once the consequence and likelihood has been assigned through risk analysis (Section 5.4.2), risks are evaluated to determine the risk rating.

The rating of environmental impacts and risks includes both ‘inherent’ and ‘residual’ risk levels. Inherent ratings are determined assuming only mitigation measures that are a legislative requirement are implemented. Residual risks are determined taking into account the implementation of additional mitigation measures that are considered industry good practice, and any additional measures that are adopted through the ALARP evaluation (refer to Section 5.5 below).

The TEO Environmental Risk Matrix (Appendix D) was applied following the detailed evaluation of potential impacts and risks from activities. This matrix uses consequence and likelihood rankings, which when combined, result in a risk level between Extreme and Low. Risk assessment outcomes are based solely on risk assessment to the environment.

Based on the UKOOA decision support framework described in Section 5.4.2, the activities considered in this EP are considered to be routine; broadly undertaken in the offshore petroleum industry, with well understood methods / procedures and little impacts upon stakeholders. As such, all impacts and risks assessed in this EP are classified as decision context type “A” (Figure 5.2). Assessment of the risks associated with these impact and risks and the controls that may be applied therefore include (in order of decreasing importance):

(1) Codes and standards: applicable codes and standards were identified and means of compliance with such codes and standards assessed.

(2) Good practice: Good practice considered industry standard practices, the systems TEO has in place to manage environmental risk, inputs from operational staff and lessons learned or opportunities for improvement from audits, hazard reports and incident reports.

(3) Engineering judgement: sound engineering judgement from the TEO's engineers was considered when assessing impacts and risks and control measures. This included consideration of current and emerging engineering methods, the application of sound engineering principles and the evidence based scientific method.

5.5 Risk acceptance criteria and ALARP considerations

The objective of the risk assessment is to ensure that the potential impacts and risks associated with the described activities are reduced to ALARP and are of an acceptable level in accordance with the requirements of Regulation 10A(a), 10A(b), 10A(c) and 13(5)(b) of the OPGGS (Environment) Regulations. For the risk assessment undertaken for this EP, the environmental impact and risk of an activity was determined to be ALARP and acceptable if the criteria defined in Sections 5.5.1 and 5.5.2 were met.

5.5.1 Determination of ALARP

All potential risks identified during the risk assessment process are required to be reduced to ALARP. The ALARP principle recognises that no industrial activity is entirely risk free. However, to ensure that the risks and impacts associated with the described activities are reduced to ALARP, further risk reduction measures are considered. These include elimination, substitution or isolation of the source of risk, or consideration of additional controls (e.g. engineering or administrative or procedural controls), which may be implemented to further reduce the impact and risk. Where it can be demonstrated that the 'cost' of further risk reduction is disproportionate to the benefit gained, the risk is considered ALARP. For this criterion, 'cost' is considered to include financial cost, time or duration, effort, occupational health and safety risks, or environmental impacts associated with alternatives.

ALARP will be considered to be achieved when the following criteria are met:

- There are no reasonably practicable alternatives to the Activity, or
- There are no additional reasonably practicable measures available to further reduce the impact or risk, or
- The cost of implementing further measures is disproportionate to the reduction in impact or risk.

The level of detail included within the ALARP assessment is based upon the nature and scale of the potential impact and risks.

5.5.2 Determination of Acceptability

The determination that impacts and risks associated with the Activity are of an acceptable level requires operators to set limits where the impacts and risks associated with activities are not considered to be acceptable. These limits are based on potential consequence and risk ratings:

- Risks that are inherently deemed to be "Low" are intrinsically considered to be in the acceptable region, providing the mitigation measures adopted meet legislative requirements, industry codes and standards and industry good practice.
- Risks that are inherently Medium or High may only be considered acceptable once a structured review of the risk-reduction measures has been carried out through the ALARP process and all other acceptability criteria are met. Impacts and risks are only deemed acceptable once all reasonably practicable alternatives and additional measures have been taken to reduce the potential consequence and likelihood to

ALARP. A residual high risk following the ALARP evaluation process requires TEO management approval.

- Risks that are determined to be Very High or Extreme (18-36) are too significant to proceed with the Activity without the implementation of additional safeguards to reduce the likelihood of the consequence occurring, and consequently reduce the risk ranking.

The environmental impacts and risks associated with the Activity were determined to be acceptable if the following criteria are met:

- Residual risk of impact from an unplanned event is ranked low to high.

Note: Medium and high risk are tolerable and only acceptable once a structured review of the risk-reduction measures has been carried out and all other acceptability criteria are met.

- An assessment has been made to determine if further information/studies are required to support or validate the consequence assessment.
- Performance standards are consistent with industry standards, legal and regulatory requirements.
- Performance standards are consistent with stakeholder expectations.
- The activity complies with Legal Requirements/Laws/Standards.
- The activity is in accordance with the TEO HSE Policy.
- The activity being conducted, including assessment of risks, is consistent with the principles of Ecological Sustainable Development (ESD):

(1) Integration of Economic, Social and Environmental Considerations

The principle of integration recognises that economic development without regard to the cost to the environment can have long-term detrimental impacts.

The potential impacts and the avoidance, mitigation and management measures identified by TEO, give regard to the cost to the environment.

(2) Precautionary Principle

The precautionary principle states that scientific uncertainty should not be used as a reason for postponing measures to prevent environmental degradation.

Where potential for harm to the environment has been identified, TEO has identified measures which may be implemented, where practicable, to manage and minimise this potential harm.

(3) Inter-generational Equity

The principle of inter-generational equity means that future generations have equal rights to the same standard of quality of life and environment as the present generation.

Proposed avoidance, mitigation and management measures identified by TEO seek to address the identified potential impacts.

(4) Conservation of Biological Diversity and Ecological Integrity

The maintenance of ecologically sustainable development requires that the preservation of biological diversity and ecological integrity be considered in the decision-making process of any project.

Site-specific mitigation measures identified by TEO will aim to ensure ecological values and species diversity are conserved.

(5) Improved Valuation, Pricing and Incentive Mechanisms

This principle reflects the idea if the real value of natural resources is incorporated into the cost of using those resources, it is more likely that those resources will be used in a sustainable manner, adequately managed, and not wasted.

By identifying and adopting appropriate strategies and measures to minimise the potential for damage to the environment, the cost of those measures forms part of the total operating cost, thereby enabling the value and price of environmental resources, and their protection, to be more accurately reflected.

- Performance standards are such that the impact or risk is considered to be ALARP.

5.6 Environmental Performance Objectives, Standards and Measurement Criteria

Regulation 13(7) of the Environment Regulations requires that an EP includes environmental performance objectives, environmental performance standards and measurement criteria that address legislative and other controls to manage the environmental impacts and risks of the activity to ALARP and Acceptable levels.

These terms are defined as follows:

- Environmental Performance Objective (EPO) – a measurable level of performance required for the management of the environmental aspects of the activity to ensure the environmental impacts or risks will be of an acceptable level;
- Environmental Performance Standard (EPS) – a statement of performance required of an adopted mitigation/control measure to manage impacts and risks to ALARP and acceptable levels; and
- Measurement Criteria (MC) – defines the measure by which environmental performance will be measured to determine whether the EPO has been met.
- The environmental performance objectives, standards and measurement criteria specified are consistent with legislative requirements and TEO's standards and procedures. They have been developed based on legislation, codes and standards and good industry practices, as part of the acceptability and ALARP justification process.

The environmental performance objectives, environmental performance standards and measurement criteria are presented throughout Section 6 and 7.

6 Potential environmental impacts and mitigation measures: planned activities

6.1 All Operational Activities

6.1.1 Acoustic Emissions

6.1.1.1 Description of hazard

During operation, the CHA platform, vessels and helicopters will generate noise both underwater and in the air as a result of machinery, propeller and rotor movement etc. The CHA platform is typically unmanned and production activities typically occurs above sea level. These noises contribute to and can exceed ambient noise levels, which can range from ~90 dB re 1µPa (root square mean sound pressure level [rms SPL]), under very calm conditions, to 120 dB re 1µPa (rms SPL) under windy conditions (McCauley, 2005).

Ongoing routine sources

Production platform

Machinery at the CHA platform is generally mounted on deck above the sea, therefore the majority of noise is transmitted to the marine environment via the air. Machinery noise may be radiated into the underwater environment via the jacket legs and risers acting as transducers. Monitoring programs at other facilities indicate that underwater noise generated by platforms is typically very low or not detectable (McCauley, 2002), and therefore the CHA platform is likely to generate minimal underwater acoustic emissions.

Wellheads, Pipelines and Subsea Infrastructure

The CHA facility consists of five production wells, and three water injection wells, as well as the subsea pipelines, manifold and flowlines.

The noise produced by an operational wellhead is likely to be approximately 113 dB re 1 µPa (McCauley, 2002), which is only marginally above rough sea condition ambient noise. For a number of nearby wellheads, the sources would have to be in very close proximity (< 50 m apart) before their signals summed to increase the total noise field (with two adjacent sources only increasing the total noise field by three dB). Hence for multiple wellheads in an area, the broadband noise level in the vicinity of the wellheads would be expected to be of the order of 113 dB re 1 µPa and this would drop very quickly to ambient conditions on moving away from the wellhead, falling to background levels within 200 m from the wellhead.

Based on the measurements of wellhead noise discussed in McCauley (2002), which included flow noise in pipelines, noise produced along a pipeline may be expected to be similar to that described for wellheads, with the radiated noise field falling to ambient levels within a hundred meters of the pipeline.

Periodic routine sources

Vessels

Project vessels are likely to consist of a smaller support vessel for short periods of time holding station using dynamic positioning (DP) or moored depending on the IMR activity. A larger vessel may be required to transfer the HWU/cargo operations (short term) and will use DP. Vessel activity is estimated at approximately 20% of the total workover duration. During workover activities, standby vessels (DP) will attend CHA and may operate on a 24 hours/day basis; as well as daily support vessels which may be required to perform supply runs to the mainland.

Vessel operational noise consists of machinery noise (e.g., engine noise) and hydrodynamic noise (e.g., water flowing past the hull and propeller singing). All machinery on a ship radiates sound through the hull into the water. Thruster noise (from cavitation

caused by propellers) is typically the most significant noise source for vessels holding station, with other noise sources typically relatively minor (McCauley, 1998).

For support vessels, the noisiest anticipated activity is when the vessel uses thrusters to maintain its position. McCauley (1998) measured underwater sound pressure levels equivalent to approximately 182 dB re 1 µPa @ 1 m with a frequency range of 20 Hz to 10 kHz from a support vessel holding station in the Timor Sea. McCauley (1998) also recorded the noise of a support vessel underway audible up to 10 km away, with the intensity dropping below 120 dB re 1 µPa at around 0.5 to 1 km away from the vessel. Jimenez-Arranz et al., (2020) reviewed underwater sound produced by a variety of small to medium offshore support vessels and found sounds produced ranged from 150.5 dB re 1 µPa @ 1 m (40.5 m survey vessel *Alpha Helix*) to 203.6 dB re 1 µPa @ 1 m (41.2 m landing craft *Arctic Wolf*). A rig tender ship (64 m *Pacific Ariki*) measured 165.5 dB re 1 µPa @ 1 m ((McCauley, 1998; Jimenez-Arranz et al., 2020). It is estimated that noise levels up to 182 dB re 1 µPa @ 1 m may be generated by a standby vessel on DP; other activities will require the vessel to be idle or moving slowly (e.g. pipeline inspection).

Helicopter Transfers

Helicopter activities occur in the Operational Area, including landing and take-off on the platform or vessel helidecks. Routine maintenance visits to the platform are required every fortnight (two trips per day), as well as routine pipeline inspection every 21 days. During workover/ sidetrack drilling activity, helicopter transfers will be up to six trips a day. For shift changes, flying time is approximately seven minutes each way to and from the Dongara airport.

Noise emitted from helicopter operations is typically below 500Hz. The peak received level diminishes with increasing helicopter altitude, however, duration of audibility often increases with increasing altitude. Richardson et al., (1995) reported that helicopter sound is audible in air for four minutes before it passed over underwater hydrophones, but detectable underwater only for short durations (38 seconds at 3 m depth and 11 seconds at 18 m depth). Noise levels reported for a Bell 212 helicopter during fly-over was reported at 162 dB re 1 µPa and for Sikorsky-61 is 108 dB re 1 µPa at 305 m (Simmonds et al., 2004). Water has a very high acoustic impedance contrast compared to air, and the sea surface is a strong reflector of noise energy (i.e. very little noise energy generated above the sea surface crosses into and propagates below the sea surface (and vice versa) – the majority of the noise energy is reflected). The angle at which the sound path meets the surface influences the transmission of noise energy from the atmosphere through the sea surface, angles >13° from vertical being almost entirely reflected (Richardson et al., 1995). Given helicopter transfers to CHA may occur multiple times per day, the predicted level of potential exposure to marine mammals (if in the vicinity of CHA at the time of take-off and landing and within surface waters of approximately 20 m depth) is approximately 1 minute per helicopter landing and / or take-off.

IMR activities

IMR activities such as rock dumping, high pressure water jetting, abrasive marine growth removal and pipeline repair may generate underwater noise. Newell and Edwards (2004), found that, when comparing sound levels produced during rock placement and normal operations of a pipelay vessels, there was no discernible increase in noise, suggesting that sound levels are dominated by vessels. Furthermore, IMR activities in the Operational Area are short term in nature. Therefore, the assessment of vessel noise is considered to encompass the risk associated with other sources of underwater noise.

Workover/Sidetrack Activities

Major equipment noise sources during workover/sidetrack activities will stem predominantly from vessel and helicopter activity with lesser noise sources from on board CHA equipment operation (mechanical plant, pumping systems). During a CTU or HWU workover/ sidetrack, activity may be conducted 24 hours a day.

Non Production Phase

During the Non Production Phase, IMR activities as described above may be undertaken intermittently (as described in Section 2.6). Given such activities will become less frequent during the Non Production Phase and no new noise sources will be introduced, impacts from underwater noise during this phase are expected to be reduced compared to the Operations Phase.

6.1.1.2 Potential impact

Receptors

Fauna associated with the Operational Area are likely to consist of pelagic species of fish, marine avifauna and pinnipeds, with migratory species (cetaceans, whale sharks, white sharks, turtles) potentially seasonally present in the area (Section 4.6). Noise interference is a key threat identified to a number of migratory and threatened species identified as occurring.

The Operational Area also overlaps a number of foraging BIAs, including the Australian sea lion, and migration BIAs (pygmy blue whale, humpback whale) (Table 4-7). Humpback whales are likely to be present in June/July and October/November and pygmy blue whales between April to August and October to December (Section 4.6). Seabirds, migratory shorebirds, white sharks and Australian sea lions are likely to occur year round in the foraging BIAs that overlap the Operational Area. The Commonwealth marine environment within and adjacent to the west coast inshore lagoons KEF overlaps the Operational Area and is associated with complex habitats. This environment, coupled with the subsea infrastructure is likely to be associated with demersal fish, and mobile epifauna (e.g. western rock lobster) (McLean et al., 2017).

6.1.1.3 Potential Impacts of Noise

Elevated underwater noise can affect marine fauna by causing direct physical effects on hearing or other organs; by masking or interfering with biologically important sounds (e.g. echolocation, signals and sounds produced by predators, vocal communication), and through disturbance leading to behavioural changes or displacement from important areas (e.g. BIAs). Hearing loss may be temporary (temporary threshold shift (TTS) or auditory fatigue) or permanent threshold shift (PTS; injury).

Cetaceans

Marine mammals, and especially cetaceans, rely on sound for important life functions including individual recognition, socialising, detecting predators and prey, navigation and reproduction (Weilgart, 2007; Erbe et al., 2015; Erbe et al., 2018). Underwater noise can affect marine mammals in various ways including interfering with communication (masking), behavioural changes, a shift in the hearing threshold (PTS and TTS), physical damage and stress (Erbe, 2012; Rolland et al., 2012). There is little information available regarding call masking in whales (Richardson et al., 1995), although it has been suggested that an observed lengthening of calls in response to low frequency noise in humpback whales and orcas may be a response to auditory masking (Fristrup et al., 2003; Foote et al., 2004). Exposure to intense impulsive noise may be more hazardous to hearing than continuous noise. However, it is noted that there are no impulsive noise sources associated with the operational activities covered by this EP.

The thresholds that could result in a behavioural response, temporary threshold shift (TTS) and permanent threshold shift (PTS) for cetaceans as a result of continuous noise sources are presented in Table 6-1. These thresholds have been adopted by the United States National Oceanic and Atmospheric Administration (NOAA) (National Marine Fisheries Service [NMFS], 2018; Southall et al., 2019).

Table 6-1: Thresholds for PTS, TTS and behavioural response onset in marine mammals for continuous noise.

Hearing group	PTS onset thresholds: SEL_{24h} (dB re 1 µPa².s)	TTS onset thresholds: SEL_{24h} (dB re 1 µPa².s)	Behavioural response (dB re 1 µPa)
LF cetaceans	183	168	120
HF cetaceans	185	170	
Pinnipeds	203	188	N.A

Source: NMFS (2018); Southall et al., (2019); NOAA (2019).

Continuous noise generated by support vessels is not likely to exceed cetacean PTS thresholds, however may exceed TTS thresholds in close proximity if exposed for prolonged periods. It is reasonable to expect that cetaceans may demonstrate changes in behaviour in response to noise generated by support vessels. For example, humpback whales migrating through the area may deviate slightly from their route but continue on their migration pathway, however only transitory small groups and individuals are expected. The Operational Area is surrounded by open water with no restrictions to a cetacean's ability to avoid the activity. Furthermore, IMR activities are short term in nature, and vessels are likely to be moored for the duration of the activity. Thus, predicted noise levels are not expected to be ecologically significant at a population level.

Reactions of cetaceans to circling aircraft (fixed wing or helicopter) are sometimes conspicuous if the aircraft is below an altitude of 300 m, uncommon at 460 m and generally undetectable at 600 m (NMFS, 2001). Baleen whales sometimes dive or turn away during overflights, but sensitivity seems to vary depending on the activity of the animals. The effects on cetaceans seem transient, and occasional overflights, such as those conducted for pipeline inspections and/or crew transfers probably have no long term consequences on cetaceans.

No breeding, resting or feeding areas are known to occur in the area potentially impacted by noise emissions, although a BIA for migrating humpback whales overlaps the Operational Area so individuals are expected to pass through the area during peak migration periods. Given the potential noise levels potentially emitted during CHA operations, and the temporary and short duration of peak noise emissions (e.g. during discrete workover or pipeline IMR activities, or during maintenance visits), the activity is not expected to lead to long term changes in individual behaviour (e.g. migration) or lead to changes at the population level.

Pinnipeds

A number of recent studies have examined hearing data of a range of pinnipeds, however there is little information regarding the Australian sea lion (reviewed in Southall et al., 2019). Ootarid pinnipeds (sea lions and fur seals) have a generalised hearing range of 60 Hz to 39 Hz (NOAA, 2018). Underwater communication includes barks, whinnies and buzzing associated with social interactions (Charrier, 2021). Otarrid seals (sea lions and fur seals) are known to shown to use a broad range of mid frequencies (Southall et al., 2019), and it is likely that pinnipeds may display changes in behaviour, such as avoidance of the immediate area (Houser, 2013). A foraging BIA for sea lions overlaps the Operational Area, and therefore individuals may be expected in the vicinity of the Operational Area. However, continuous noise generated by a support vessel or helicopters, is not likely to exceed pinniped PTS or TTS threshold levels, and impacts are not considered to be significant at a population level.

Marine Turtles

The Recovery Plan for Marine Turtles (Commonwealth of Australia, 2017) notes there is limited information available on the impact of noise on marine turtles and that the impact of noise on turtle stocks may vary depending on whether exposure is short (acute) or long-term (chronic). Turtles have been shown to respond to low frequency sound, with indications that they have the highest hearing sensitivity in the frequency range 100–700

Hz (Bartol and Musick, 2003). No numerical thresholds have been developed for impacts of continuous sources (e.g. vessel noise) on marine turtles. However, given the thresholds outlined in Table 6-2, it is reasonable to expect that marine turtles may demonstrate avoidance or attraction behaviour to the noise generated by the Petroleum Activities Program. There are no biologically important areas, or Habitat Critical to the Survival of the species for marine turtles. Individuals present in the area are likely to be transitory in nature, and any effects as a result of elevated ambient sound are not expected to have a significant effect at population level. Potential impacts from predicted noise levels from the project vessels, helicopters or IMR are not considered to be ecologically significant at a population level.

There are no biologically important areas, or Habitat Critical to the Survival of the species for marine turtles. Individuals present in the area are likely to be transitory in nature, and any effects as a result of elevated ambient sound are not expected to have a significant effect at population level.

Table 6-2: Thresholds for PTS, TTS and behavioural response onset in marine turtles for continuous noise

Hearing group	Continuous		
	PTS onset thresholds: SEL_{24h} (dB re 1 µPa².s)	TTS onset thresholds: SEL_{24h} (dB re 1 µPa².s)	Behavioural response (dB re 1 µPa)
Marine turtles	220	200	(N) High (I) Moderate (F) Low

*Source: PTS and TTS thresholds (Finneran et al., 2017), * behavioural response threshold (NSF 2011), + behavioural disturbance threshold (McCauley et al., 200).*

Note Note: The sound units provided in the table above for continuous noise include: relative risk (high, medium and low) is given for marine turtles at three distances from the source defined in relative terms as near (N – tens of metres), intermediate (I – hundreds of metres) and far (F – thousands of metres) (after Popper et al., 2014).

Fish and Sharks

Fish sensitivity and resilience to underwater noise varies greatly depending on the species, hearing capability, habits, proximity to the activity, and if the noise occurs during a critical part of the fish lifecycle (McCauley and Salgado-Kent, 2008). Most marine fish are hearing generalists (Amoser and Ladich, 2005) with relatively poor hearing. Hearing generalists are not as sensitive to noise and vibration as hearing specialists, which have developed hearing specialisations and can be particularly vulnerable to intense sound vibrations because many possess an air-filled swim bladder (Gordon et al., 2004). Elasmobranchs (rays, skates, sharks) do not have swim bladders and are not typical hearing specialists (Baldridge, 1970). Studies indicate that fish (including sharks) may begin to show behavioural responses (e.g., increased swimming) to received sound levels of approximately 156 dB re 1 µPa and active avoidance at around 168 dB re 1 µPa (McCauley et al., 2000). Thus, it is likely that noise levels generated by support vessels on DP or transiting, or helicopters may result in limited behavioural disturbances, however there are no overlapping BIAs, and impacts are unlikely to be significant at a population level.

Crustaceans

The effects of anthropogenic noise on crustaceans are poorly understood (Hawkins et al., 2015). Limited field studies have indicated that whilst seismic signals have had little to no effect on egg development (Day et al., 2016), adult spiny lobsters demonstrate a physiological response (Fitzgibbon et al., 2017). However, continuous operational noise is significantly difference to the seismic activities and as such, no such response is expected. The western rock lobster is a commercially valuable species that may occur throughout the Operational Area. Elevated ambient sound may result in behavioural changes,

however vessel noise is temporary in nature, and effects are unlikely to significant at a population level.

6.1.1.4 Environmental performance

Environmental outcomes, performance standards and measurement criteria for underwater noise are provided in the table below:

Environmental Risk	Disturbance to marine fauna due to noise emissions
Environmental Performance Outcomes	Procedures implemented to minimise potential harmful impacts to marine fauna from noise

Hierarchy	Control Measures	Performance Standards	Measurement Criteria
Administration	Machinery maintained in accordance with planned maintenance system to ensure noise emissions are ALARP	Vessels, helicopters, IMR equipment (e.g. ROVs) and platform machinery are maintained in accordance with vendor recommendations through auditable planned maintenance systems to ensure no unplanned noise.	Equipment maintenance records demonstrate that equipment vessels, helicopters, IMR and platform equipment (e.g. ROVs) were maintained in accordance with vendor recommendations
Administration	Marine fauna sightings are recorded to ensure marine fauna are actively sighted and subsequently avoided to reduce potentially harmful noise impacts to cetaceans prior to mobilisation	Marine Fauna Sighting Datasheets submitted to DCCEEW.	Cetacean Sighting Records maintained; records of transmittal to DCCEEW
Administration	Contractor procedures reviewed to ensure vessels adhere to EPBC Regulations (Part 8) during activity to reduce potentially harmful noise impacts to cetaceans prior to mobilisation	In accordance with Part 8 of EPBC Regulations (Vessels), all vessels must travel at less than 6 knots within the caution zone of a cetacean (150 m radius for dolphins, 300 m for whales) known to be in the area, in accordance with EPBC Regulations (Part 8).	TEO vessel audit or third party inspection document demonstrate that contractor procedures are reviewed to ensure compliance with EPBC regulations prior to mobilisation. TEO vessel audit or third party inspection document confirm contractors complied with the requirements of EPBC Regulations (Part 8). All incidences of non-compliance with EPBC Regulations 2000 - Part 8 Division 8.1 (interacting with cetaceans) were recorded. Incident report in MyOsh and written notification as per reporting requirements.
Administration	Contractor procedures reviewed to ensure helicopters adhere to EPBC Regulations (Part 8) during activity to reduce potential for impact to cetaceans prior to mobilisation	Helicopter complies with Part 8 of EPBC Regulations for interacting with cetaceans, unless taking off or landing because they are taking reasonable actions necessary to reduce safety risk to humans.	
Administration	CHA Site inductions completed by all personnel to ensure understanding of reporting requirements and EPBC regulations	CHA Site Induction (10SPTRNTM18) carried out for all personnel which includes requirements of EPBC Regulations (Part 8).	Training records show all personnel travelling offshore have received the CHA Site Induction including environmental requirements of EPBC Regulations (Part 8).

Hierarchy	Control Measures	Performance Standards	Measurement Criteria
Administration	Pipeline inspections to utilise existing CP and TOFD inspection locations for inspections used to establish corrosion loss trends to minimise requirement to undertake high pressure water jetting to reduce potential for noise impacts	Pipeline inspections will utilise existing CP and TOFD inspection locations when used for establishment of corrosion loss trends (note that the safety and structural integrity of the pipeline is the prime consideration when undertaking inspections and maintenance)	Pipeline inspection documentation verifies the CP and TOFD inspection location status (i.e. whether previously cleared of insulation).

6.1.1.5 ALARP

The use of vessels and helicopters is unavoidable to ensure safe and efficient operation of the Cliff Head facilities. Equipment maintenance will keep the vessel and platform machinery noise levels to within normal operating limits, which will also aid in reducing the likelihood of impacts to sensitive receptors. The use of helicopters to transfer personnel to and from the Operational Area during the activity is necessary to allow the operation to occur safely and effectively, with the need for a rapid method of transferring to and from the activity area in the case of an emergency situation. IMR activities are required to maintain the platform and pipeline integrity and some activities will create underwater noise (e.g. water jetting). Wherever possible, this will be avoided by using the same areas of pipeline cleared previously, however the safety and structural integrity of the pipeline is the prime consideration when undertaking inspections and maintenance.

The proposed management controls for underwater noise emissions are considered appropriate to manage the risk to ALARP. Additional controls considered but not adopted are detailed below.

Additional controls considered but not adopted	Hierarchy	Practicable	Cost effective	Evaluation
Shut down zones for marine fauna	Administration	×	×	Would result in downtime leading to longer activities increasing costs and increasing the presence of additional vessels and activity. Given the low level of noise and minimal impacts to fauna expected, benefits do not outweigh costs
No vessel operations within whale migration period	Eliminate	×	×	Negligible benefit in terms of reduced risk to whales, given low frequency of vessel's operations and also the low numbers of whale individuals expected to be encountered within the Operational Area. Would result in extended periods of time where no activities could occur, may lead to delays in work increasing costs
No high pressure water jetting	Eliminate	×	×	Failure to remove marine growth introduces unacceptable risk to the safe operation of the pipeline. Removal of marine growth is considered necessary to reduce the drag the pipeline is subjected to in order to maintain the structural integrity of the pipeline
Have a dedicated experienced and trained Marine Fauna Observer (MFO) onboard vessels to undertake	Administration	✓	×	Use of an MFO may detect fauna in the area, however control provides limited benefit when managing impacts associated with vessel noise alone.

Additional controls considered but not adopted	Hierarchy	Practicable	Cost effective	Evaluation
marine fauna observations.				

6.1.1.6 Residual Risk

Aspect	Consequence	Likelihood	Residual risk
Underwater noise	Moderate (2) – Moderate or slight environmental impact, negligible remedial/recovery work	B – very unlikely	Low (4)

6.1.1.7 Acceptability

A summary of the factors considered in the acceptability assessment, and a summary acceptability statement is provided in the table below.

Receptor	Consequence
Threatened / Migratory / Protected Fauna	Cetaceans are considered most at risk of change in behaviour from underwater noise. A number of cetacean species may be found in the Operational Area as described in Section 4, most significantly the humpback and pygmy blue whales which migrate through the area each year. No significant aggregating areas for these species are likely to receive elevated noise levels due to the activities. Marine turtles may be present in the area, but no foraging, breeding or other aggregating areas have been identified. The Australian sea lion may occur in the vicinity of vessels or activities; and may display some behavioural changes however underwater acoustic emissions are unlikely to meet TTS or PTS thresholds. Noise levels are unlikely to be elevated in areas of aggregations such as haul out sites (not present in the Operational Area). Noise emissions associated with operational activities are not expected to elicit a behavioural response in protected fish species, such as sharks and rays. Noise interference is identified as a potential threat to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-6), however, with controls in place, operational activities will be conducted in a manner that is considered acceptable given the low levels of noise expected. Noise interference identified in the recovery plan is related to seismic or piling activities where the sound emitted is at levels that could cause injury or mortality. Given the low level of noise expected from platform operation, pipeline IMR, vessel and helicopter activities, and the short and temporary duration of noise emissions, significant impact to threatened or migratory species are not expected. Some behavioural response may be expected from the noise levels emitted, but not at levels that could cause mortality or injury to marine fauna.
Physical Environment/ Habitat	Acoustic emissions are unlikely to have significant impact on the physical environment or habitats.
Threatened ecological communities	Not applicable – no threatened ecological communities identified in the area over which noise emissions will disperse are expected
Protected Areas	Marine fauna and habitats found within the area potentially impacted from noise emissions are discussed above.

Receptor	Consequence
Socio-economic receptors	Not applicable – noise levels not expected to impact on socio-economic receptors due to low activity level in the vicinity and noise is not expected to significantly affect any fisheries resources. No stakeholder concerns have been raised regarding this aspect.
Acceptability of impact	The potential consequence of underwater acoustic emissions on receptors is discussed above. With the control measures in place, including compliance with industry standards and legislation, no significant impacts are expected. As such, noise emitted for the duration of operational activities is not expected to significantly impact on marine fauna within the receiving environment. The negligible impacts expected from the noise sources are considered acceptable.

6.1.2 Artificial Light

6.1.2.1 Description of hazard

Artificial lighting (navigation and work area lighting) is used during night-time routine operations or IMR activities on both the CHA and any vessels in accordance with marine safety requirements to ensure the vessel / platform can be clearly identified; does not present a collision hazard to other marine users and allows for safe movement of personnel during hours of darkness. IMR activities will predominately be performed during daylight hours. However, support vessels may mobilise and demobilise from the Operational Area during hours of darkness. Emergency repairs may be required on a 24-hour basis. Indicative frequencies and durations are provided in Section 2.3.3 and 2.4.2.

During the Non Production Phase, vessels will be required intermittently to undertake ongoing IMR (as described in Section 2.6). Given such activities will become less frequent during the Non Production Phase, light emissions are expected to be reduced compared to the Operations Phase.

Lighting on the project vessels is used to allow safe operations during night hours, as well as to communicate the vessel's presence and activities to other marine users (i.e. navigation lights). Lighting is required for operations and cannot reasonably be eliminated. Light levels of marine vessels will be reduced through industry standards in compliance with AMSA marine orders.

6.1.2.2 Potential impact

Light emissions can affect fauna in two main ways:

- Behaviour: Many organisms are adapted to natural levels of lighting and the natural changes associated with the day and night cycle as well as the night time phase of the moon. Artificial lighting has the potential to create a constant level of light at night that can override these natural levels and cycles.
- Orientation: Organisms such as marine turtles and birds may also use lighting from natural sources to orient themselves in a certain direction at night. In instances where an artificial light source is brighter than a natural source, the artificial light may act to override natural cues, leading to disorientation.

Fauna within the Operational Area are predominantly pelagic fish and zooplankton, with a low abundance of transient species such as marine turtles, marine mammals, migratory sea birds and foraging seabirds transiting through the Operational Area. The Operational Area is approximately 11km from the nearest beach and receptors present within a 20 km buffer of the Operational Area were considered as having potential for interaction, based on recommendations of the National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (CoA, 2020). The 20 km threshold provides a precautionary limit based on observed fledgling seabirds grounded in response to artificial light 15 km away. Relevant to the project location, birds are the most likely species to be impacted by artificial light.

Seabirds

Artificial lighting can attract and disorient seabird species resulting in species behavioural changes (e.g. circling light sources or disrupted foraging), injury or mortality near the light source as a result of collision (Longcore and Rich, 2004; Gaston et al., 2014). The Operational Area overlaps with foraging BIAs for Australian fairy tern, bridled tern, caspian tern, wedge-tailed shearwater, pacific gull and little shearwater. Within 20 km from the Operational Area, foraging BIAs, also occur for roseate terns (7 km south). No nesting BIAs for seabirds occur within the Operational Area, however a small number of individuals may be present along nearby shorelines, given the number of overlapping foraging BIAs. The nearest breeding site for seabirds are on the Beagle islands some 39 km to the south of the Operational Area and the Abrolhos Islands approximately 100 km north west of the Operational Area (CALM, 2004 and CoA, 2012). Migratory shorebirds may be present in or fly through the region between July and December and again between March and April as they complete migrations between Australia and offshore locations (CoA, 2012). Light pollution is identified as a key threat to species of marine turtles and seabirds identified as occurring within the Operational Area (Table 4-5). Relevant conservation actions outlined in recovery plans and Wildlife Conservation Management plans for these species are outlined in Table 4-6.

Studies conducted between 1992 and 2002 in the North Sea confirmed that artificial light was the reason that seabirds were attracted to and accumulated around illuminated offshore infrastructure (Marquenie et al., 2008) and that lighting can attract birds from large catchment areas (Wiese et al., 2001). Birds may either be attracted by the light source itself or indirectly as structures in deep water environments tend to attract marine life at all trophic levels, creating food sources and shelter for seabirds (Surman, 2002). The light from offshore rigs and vessels may also provide enhanced capability for seabirds to forage at night. Due to the proximity of CHA to the coast, passerines and other small birds, in particular fork tailed-swift (Section 4.6.7), may be attracted to artificial lighting. Artificial lights can “trap” migratory birds by causing them to lose sight of the horizon and circle within the cone of light endlessly. This can lead to exhaustion or collision with the light source. Artificial light can extend day length for diurnal species, potentially increasing their susceptibility to predators (FFWCC, 2013).

The CHA platform operates unmanned except for periodic visits for maintenance and inspection, and potential workover and side track activities. Lighting will therefore be minimal and limited to navigational lighting only. Any vessel activities will be intermittent and short duration and will add a small incremental increase to other vessel lighting in the area. The risk associated with collision from seabirds or migratory shorebirds attracted to artificial lighting is considered to be low, impacts are expected to be limited to minor behavioural disturbance to isolated individuals, with no displacement from important habitat.

Marine Turtles

Artificial lighting can impact turtle hatchlings as they orientate towards light when first emerging from the nest, which is typically the horizon / wave breaking zone and into open water. Hatchlings attracted to artificial lights when they emerge from a nest can result in disorientation and increased risk of predation. After entering the water, hatchlings use a combination of cues (wave direction and currents) to orient and travel into offshore waters.

No biologically significant areas (i.e. feeding, breeding or migratory pathways) for turtles are recorded at, or in proximity to, the Operational Area. However, it is acknowledged that marine turtle may transit the Operational Area in very low densities therefore artificial lighting may attract occasional transient individuals.

Fish

Experiments using light traps have found that some fish and zooplankton species are attracted to light sources (Meekan et al., 2001), with traps drawing catches from up to 90 m (Milicich et al., 1992). Lindquist et al., (2005) concluded from a study of larval fish

populations around an oil and gas platform in the Gulf of Mexico that an enhanced abundance of clupeids (herring and sardines) and engraulids (anchovies), both of which are highly photopositive, was caused by the platforms' light fields. The concentration of organisms attracted to light results in an increase in food source for predatory species and marine predators are known to aggregate at the edges of artificial light halos. Shaw et al., (2002), in a similar light trap study, noted that juvenile tunas (Scombridae) and jacks (Carangidae), which are highly predatory, may have been preying upon concentrations of zooplankton attracted to the light field of the platforms. Project artificial lighting could potentially lead to localised increased predation rates compared to unlit areas. No fish, shark or ray BIA's overlap with the Operational Area.

Marine Mammals

BIAs overlap the Operational Area for pygmy blue whales, humpback whales and Australian sea lions. However, cetaceans and other marine mammals are not known to be significantly attracted to light sources at sea; therefore, disturbances to behaviour are unlikely to occur. Cetaceans predominantly utilise acoustic senses to survey their environment, rather than vision (Simmonds et al., 2004).

6.1.2.3 Environmental performance

Environmental outcomes, performance standards and measurement criteria for artificial light are provided in the table below:

Environmental Risk	Disturbance to marine fauna due to artificial light		
Environmental Performance Outcomes	Activity lighting managed in accordance with navigational and safety requirements		
Hierarchy	**Control Measures**	**Environmental Performance Standards**	**Measurement Criteria**
Administration	Routine vessel and helicopter transfers completed during daylight hours to eliminate potential lighting impacts	Routine vessel and helicopter transfers (not including IMR activities) made during the day	CHA vessel and helicopter transfer records indicate routine vessel and helicopter operations are in daily hours only
Administration	External lighting of vessels operating at night and platform kept to the minimum required for navigation, vessel safety and safety of deck operations, except in the case of an emergency.	All project vessels to maintain appropriate navigation aids (light shapes etc.) in accordance with Marine Orders 21 (Safety of navigation and emergency procedures) and 30 (Prevention of collisions) as required in the Cliff Head Marine Operations Procedure (10OPGOPC04)	TEO vessel audit or third party inspection document confirm all project vessels maintain appropriate navigation aids.
		Platform marine navigation, aircraft and helicopter navigation aids are maintained on the CHA platform as required in the Cliff Head Marine Operations Procedure (10OPGOPC04)	TEO vessel audit or third party inspection document confirm external lighting of vessels and platform is maintained for navigational and safety requirements
		Timers/sensors for NavAids maintained to ensure platform is illuminated outside daylight hours	

6.1.2.4 ALARP

The use of low-level lighting is unavoidable to ensure safe and efficient operation of the CHA platform and vessels. Artificial lighting is required on a 24-hour basis during IMR

activities for navigational safety in the area. IMR activities are expected to be short in duration it is considered therefore that the risks of using 24-hour artificial lighting at an intensity to allow work to proceed are acceptable and ALARP.

The proposed management controls for artificial light are considered appropriate to manage the risk to ALARP. Additional controls considered but not adopted are detailed below.

Additional controls considered but not adopted	Hierarchy	Practicable	Cost effective	Evaluation
Reduction of vessel lighting below levels required for navigation, vessel safety and safety of deck operations	Substitute	×	×	No additional cost but introduces unacceptable safety risks to personnel and vessels. Little benefit given relatively low numbers of turtles and seabirds in Operational Area and surrounding waters.
All maintenance activities will be carried out during daylight hours	Eliminate	×	×	Daylight operations considered to introduce unnecessary cost (i.e. 12 vs 24 hr operations). Whilst delivering little / no environmental benefit. 24 hr operations reduces the total timeframe of activities (e.g. for a freespan activity the activity duration would increase from 35 to 70 days if operations were only conducted during daylight hours). Additional costs associated with longer term vessel hire, personnel day rates and equipment.
Use of lighting wavelengths that are less intrusive to marine fauna	Substitute	×	×	Not regarded as practicable given the range of marine fauna that may be present, and the different wavelengths that may affect behaviours of different species. Would result in little benefit given low level of impacts expected.

6.1.2.5 Residual risk

Aspect	Consequence	Likelihood	Residual risk
Artificial light	Moderate (2) – Moderate or slight environmental impact, negligible remedial/recovery work	B – very unlikely	Low (4)

6.1.2.6 Acceptability

Receptor	Consequence
Threatened / Migratory / Protected Fauna	Marine turtles are most at risk of adverse effects from artificial light, hatchlings in particular. Although individuals may occur in the Operational Area, large numbers are not expected and no nesting sites are located within the area over which artificial light may be visible. Therefore hatchlings are not expected to be impacted by light emissions from the activities. Cetaceans, adult turtles and marine mammals are not known to be significantly attracted to light sources at sea and therefore disturbances to behaviour are unlikely to occur. Fish and birds have been shown to be attracted to artificial light sources, however, the low level of light emitted from vessels and the platform is unlikely to lead to large scale changes in species abundance or distribution. Given the low level of light emissions expected, and the negligible effect of low level light on protected fauna, significant impacts are not

Receptor	Consequence
	expected, short term behavioural impacts may be observed in transient fish and seabirds.
Physical Environment/ Habitat	N/A – physical environment/habitat will not be impacted by light emissions
Threatened ecological communities	Not applicable – no threatened ecological communities identified in the area over which artificial light could be detected
Protected Areas	Not applicable – no protected areas identified in the area over which artificial light could be detected
Socio-economic receptors	Artificial light is not expected to impact socioeconomic receptors such as shipping, tourism or recreational/commercial fisheries. As described above, fish may be attracted to light, but large scale changes in fish abundance or distribution are unlikely to occur and therefore impacts to fisheries are not expected. No stakeholder concerns have been raised regarding this aspect.
Acceptability of impact	**The potential consequence of artificial light on receptors is discussed above. With the control measures in place, including compliance with industry standards and legislation, no significant impacts are expected. The impacts of lighting to the receiving environment are well understood and the consequence is expected to be low. Lighting will be minimal and limited to navigational lighting only. Any vessel activities will be intermittent and short duration and will add a small incremental increase to other vessel lighting in the area. The impact from light emissions to marine fauna are temporary in nature and unlikely to have an adverse effect on species at a population level. Impacts will be limited to short-term behavioural effects observed in transient fish and seabirds, these environmental impacts are considered acceptable.**

6.1.3 Seabed disturbance

6.1.3.1 Description of hazard

Dropped objects

During manned activities at CHA, lifts will be undertaken from vessels to the CHA platform utilising the CHA platform crane. Whilst not planned, it is possible that during lifting/workover activities, or vessel based IMR activities, equipment or solid objects may accidently be dropped overboard leading to loss of/or changes to benthic habitats. Objects that have been dropped during previous offshore activities include small numbers of personal protective gear (e.g. glasses, gloves, hard hats), small tools (e.g. spanners) and hardware fixtures (e.g. hose clamp); however, there is also potential for larger equipment to also be dropped during the activity (e.g. HWU during lifting activities).

IMR Activities

Some disturbance to the seabed during IMR activities could occur as ROVs are utilised (sediment disturbance due to use of thrusters on ROV) or tools are attached to the pipeline (emergency clamping, CP survey equipment, TOFD inspections). Typically, a small area of seabed may be disturbed temporarily during the activity due to tool usage as the seabed may need to be disturbed to allow tools to be attached.

High pressure water jetting

High pressure water jetting to remove marine growth is carried out on the pipeline to reduce the force resulting from drag. This is carried out to maintain the structural integrity of the pipeline. High pressure water jetting is also used to remove insulation for pipeline inspection and to create temporary spans to facilitate inspection (e.g. equipment that envelops the pipeline). Water jetting to remove the pipeline coating results in the coating and foam being reduced to very fine particles and some larger pieces. Larger pieces that

won't disperse or float away will be collected by ROV where possible. By using pre-cleared sections of pipeline, the need to use water jetting to remove the coating and insulation is reduced.

High pressure water jetting is carried out by ROV equipped with a water jet on small sections of the pipeline during some IMR activities, namely visual inspection and marine growth removal.

Stabilisation materials

Pipeline IMR activities may require the use of stabilisation materials such as rock dumping, installation of mattresses and grout bags.

Installation of stabilisation material may be required for span rectification or pipeline stabilisation. These activities may result in seabed disturbance due to placement of material on the seabed; however, the area of seabed affected will be small and localised and unlikely to extend beyond the area originally impacted during the laying of the pipeline.

Temporary moorings

The installation of temporary moorings may be required to facilitate IMR activities. Mooring installations typically consist of a series of clump weights (1.5 m diameter, <3 t weight) or Stingray anchors that allow the vessel to pull up on moorings to maintain position as required (Section 2.5.2).

Permanent moorings

Two moorings (approximately 2.5 t clump weight and 110 m of 32 mm chain) are also in place around the CHA platform to minimise seabed disturbance from anchoring. These moorings are inspected every two years via a vessel to ensure their integrity. They are removed to the vessel deck, checked for damage to assure moorings' integrity, and replaced on the seabed. The replaced moorings will be replaced in same location or in close proximity of the replaced ones. In case it is not practical to remove the moorings for inspection, they will be left on the seabed.

Vessel Anchoring in an Emergency

No vessel will deploy an anchor during routine operations. However, in an emergency situation, anchoring might be required, which may result in disturbance to, or loss of, benthic habitats within the footprint of the anchor and temporary reduction in water quality due to sediment resuspension.

Non Production Phase

As described in Section 2.6.1, during the Non Production Phase ongoing IMR activities would remain in order to ensure infrastructure are in suitable condition for decommissioning and removal. As described above, typically only a small area of seabed is temporarily disturbed during these activities due to ROV and/or tool usage. Given the reduced frequency of IMR activities during the Non Production Phase, seabed impacts will be reduced compared to the Operations Phase.

6.1.3.2 Potential impact

Existing Environment

The Operational Area is characterised as largely limestone pavement and sparse seagrass and macroalgae, with some areas of minor to moderate seagrass coverage along the pipeline (Section 4.5). The mostly sandy substrates within the Cliff Head exclusion zone are thought to support low densities of epibenthic communities. No known sensitive seabed features (e.g., reefs, canyons, shipwrecks) are present within the exclusion zone. There are large expanses of seagrass beds in the vicinity of the pipeline (Section 4.5) and these have been surveyed in State waters following the completion of offshore construction activities (as part of the State Waters approval requirements). The monitoring concluded that there had been a net recovery of seagrass although it was considered partially

complete due to varying colonisation rates between species. It can be reasonably expected that a similar recovery is expected in the Commonwealth waters area given the similar water depths and seagrass species; and that any seagrass beds impacted would recover over time, particularly given the seasonality of seagrass.

Existing habitat maps (Section 4.5) indicate the habitat types in the Operational Area are widespread throughout the region and significantly important areas of seagrass (e.g. marine parks) are noted in the vicinity of the pipeline or platform. Additionally, ROV footage taken during Q4 2018 IMR activities indicated that the seabed features along the pipeline are mainly characterised by thin veneer of fine or coarse uncemented sand and medium uncemented sand covered with kelp and minimal seagrass were disturbed due to mooring activity where only two out of 11 mooring locations were located on seagrass covered areas (Figure 6.1).

Dropped objects

The largest potential dropped object is the HWU during crane transfer, however is highly unlikely with lift controls in place. Other objects with the potential to be dropped include small items (tools, personal protective equipment etc.) The spatial extent in which dropped objects may occur is restricted to the Operational Area. Thus, minor loss of seabed habitat due to dropped objects is not considered a significant environmental impact given the sparseness of benthic cover. Dropped objects will be retrieved where practicable. Where not able to be recovered, dropped objects will result in a permanent loss of benthic habitat under the object, however is likely to be recolonised.

Furthermore, industry standards already in place ensure risks are reduced, these include:

- CHA crane, rigging and lifting connections (designed, constructed and installed to appropriate standards and codes) are inspected and maintained fit-for-purpose;
- CHA crane has appropriate rating for loads being lifted during HWU operations; and

Lifts are completed under a Permit-to-Work (PTW) and JHA.IMR Activities.

ROV usage during IMR activities including attachment of tools to the pipeline will likely result in small areas of seabed disturbance directly beneath the pipeline (e.g. ToFD tool attached which encircles the pipeline). In addition, a small amount of turbidity is likely as the sediment is disturbed. These impacts will be temporary given the nature of the activity and over a small area in the immediate vicinity of the pipeline.

High pressure water jetting

High pressure water jetting can result in disturbance to, or loss of, benthic habitat. Such disturbance occurs when biota attached to a section of pipeline, or the seabed in the immediate vicinity of the pipeline, are removed by water jetting. Such removal affects a highly localised area (several metres) and is of short duration (water jetting typically occurs for several hours). Pieces of non-toxic insulation (refer to Section 2.4), are removed and small pieces will settle onto the seabed. The removal of marine growth includes sessile fauna such as ascidians, sponges and macroalgae.

Stabilisation materials

Installation of stabilisation material is expected to alter the benthic habitat where the material is installed, by providing additional hard substrate in the marine environment and acting as an artificial reef along with the main pipeline structure. Given the relatively shallow depths of the pipeline, stabilisation materials are expected to be rapidly colonised by sessile epifauna, such as macroalgae and filter feeders, by providing suitable attachment points. During IMR activities conducted in 2016, the substrate below planned freespans was identified as rock, affecting an area of 100 m^2 per freespan (total affected area = 300m^2). Freespan rectification works may be undertaken to provide support, and will disturb approximately 8 m^2 per linear meter of pipeline span, aligning with 2016 freespan rectification work (Section 2.4.2.7). However, the area of seabed disturbance is inherently limited to the minimum amount required to achieve pipeline integrity.

Stabilisation materials provide habitat for species such as the western rock lobster, however, given the small, localised areas requiring installation of stabilisation materials the effects of this are considered to be negligible. The existing habitat in the footprint of areas to be stabilised will be significantly modified, however, the footprint is small and highly localised (8 m^2 of seabed per linear metre of span). The installation of stabilisation material will not alter the structure or function of the coastal marine ecosystem, nor interrupt coastal processes such as sediment transport.

The installation of stabilisation materials may also result in a temporary reduction in water quality due to sediment resuspension. However, given the nature of sediments in the region (typically medium to coarse sand) and the highly localised disturbance footprint, resuspension is expected to be short lived and highly localised.

Temporary moorings

Temporary moorings will be installed on a pipeline or platform IMR activity-specific basis as required, for 2-3 weeks up to 2 months. Types of moorings used may include clump weights or stingray anchors. Clump weights (1.5 m diameter, <3 t) are expected to disturb only the seafloor directly below the weight due to the use of floating lines; a conservatively estimated area of 9 m^2. Stingray anchors are laid within a 5 m target area, and subsequent chain movement may occur within 1-3 m of either side. Dependent on the seabed, Stingray anchors should usually “set” immediately and are not expected to drag. Alternative options may include daily anchoring (deployed and retrieved daily) which would result in multiple disturbed areas.

Disturbance to the seabed as a result of temporary moorings is likely to result in a short term, highly localised loss of benthic habitat, including seagrass meadows within the footprint of the mooring (i.e. within the arc through which the mooring chain rotates). The size of the mooring is dependent on vessel size and weather conditions. Given that IMR activities will require calm weather conditions, and the relatively small size of the potential vessels, temporary moorings are expected to be relatively small in size.

It is not always feasible to utilise ROVs to conduct pre-lay surveys due to time and cost of the activity, and subsequent delays to review footage. However, the scope for adjusting the location of moorings is limited due to the mooring pattern required to conduct the rectification. Furthermore, given the water depths of the Operational Area (~18 m) it is occasionally possible to view the seafloor prior to placement of moorings.

Permanent Moorings

Disturbance from permanent moorings (approximately 2.5 t clump weight and 110 m of 32 mm chain), the footprint and area of seabed contacted by towing line or excess chain is expected. Where moorings are installed for long periods of time, the mooring footprint typically becomes bare sediment and creates ‘scars’ on the seabed as the chain results in disturbance to benthic biota such as seagrasses and macroalgae. Increased turbidity may occur when seabed sediments are stirred up by activities such as the lifting or deposition of these moorings. As described above, permanent moorings are removed every two years to inspect their integrity and replaced on the seabed. The moorings will be replaced in same location or in close proximity. Impacts will be temporary and not outside the impacts caused by storm events and cyclones. Disturbance to the seabed as a result of temporary moorings is likely to result in a short term, highly localised loss of benthic habitat, including seagrass meadows within the footprint of the mooring (i.e. within the arc through which the mooring chain rotates). The size of the mooring is dependent on vessel size and weather conditions. Given that IMR activities will require calm weather conditions, and the relatively small size of the potential vessels, temporary moorings are expected to be relatively small in size. Seabed disturbance associated with permanent moorings is expected to be restricted to a localised footprint ‘scar’, and the replacement of moorings after inspection will be as close to the original location. Furthermore, the moorings are to be removed at the end of the activity reducing the potential for long term disturbance to benthic habitats. Recovery is also facilitated as habitat forming species (e.g. seagrass species) are still

present and may regrow or recolonise the disturbed area. Flora and fauna (i.e. fouling organisms) dislodged by these activities are likely to die, but recolonisation of subsea infrastructure and seabed sediments will re-occur, with negligible impacts on local species diversity and abundance.

Therefore, the worst-case estimate of up to 9 m^2 of disturbed seagrass from mooring is conservative and the cumulative impacts of multiple disturbances are considered negligible given the minimal disturbed area. The frequency of the disturbances will be low (occurring years apart for up to 25 days in total for temporary moorings and two yearly for inspection of permanent moorings); no long-term impacts are therefore expected. As evidenced through monitoring surveys conducted by TEO (previously Roc Oil (WA) Pty Limited), seagrass beds recover over time and can reasonably be expected to recolonise areas disturbed during planned activities (Coffey, 2008, 2009).

Vessel Anchoring in an Emergency

The typical anchor for support vessels (e.g. Southern Spirit) is a CQR/Plow style anchor weighing approximately 80 kg. If utilised in an emergency situation, the anchor will only be deployed for a short period and then removed, thereby reducing the potential disturbance to the seabed. Given the short duration, the temporary nature of emergency anchoring and relatively small size of the anchor, the event is not expected to result in habitat loss beyond the footprint of the anchor.

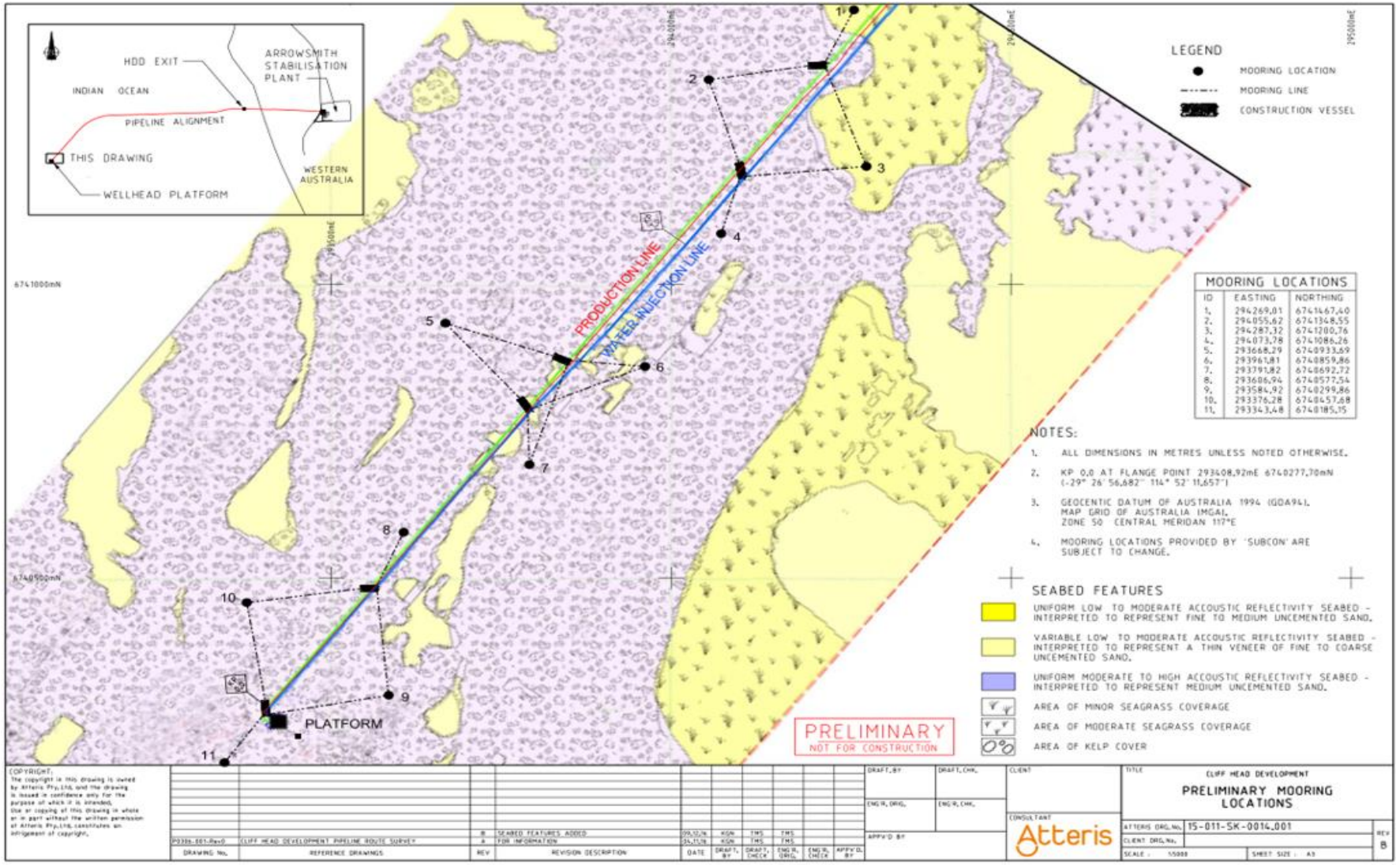


Figure 6.1: Seabed Habitat map and mooring Location Map during 2016 IMR Activities.

6.1.3.3 Environmental performance

Environmental outcomes, performance standards and measurement criteria for seabed disturbance are provided in the table below:

Environmental Risk	Disturbance to the seabed and benthic habitats during planned operational and IMR activities
Environmental Performance Outcomes	No dropped objects during operational activity No unplanned seabed disturbance Temporary moorings removed within two weeks of completion of each IMR activity Seabed disturbance restricted to pipeline corridor and CHA exclusion zone where benthic habitat type is known (Section 4.5)

Hierarchy	Control Measures	Performance Standards	Measurement Criteria
Engineering	Lifting plan implemented to reduce potential for dropped objects to prevent impact to pipeline	Cliff Head Lift Plan (10HSEQGENPC24FM01) is implemented for all lifting operations detailing load ratings of lifting equipment, intended loads, operational limits (e.g. weather) and procedures.	Documented lifting plan verifies all lifting operations considered load ratings of lifting equipment, intended loads and operational limits (e.g. weather).
Engineering	Lifting activities are undertaken in accordance with Cliff Head Lifting Operations and Lifting Equipment Procedure (10HSEQGENPC24)	Lifting activities are undertaken in accordance with Cliff Head Lifting Operations and Lifting Equipment Procedure (10HSEQGENPC24), which requires: • The security of loads to be checked prior to commencing lifts. • Loads to be covered if there is a risk of losing loose materials. • All lifting equipment is rated for intended activities and maintained.	Permit to Work (PTW) and Job Safety Analysis (JSA) records demonstrate that the following requirements were followed: • The security of loads were checked prior to commencing lifts • Loads were covered if there is a risk of losing loose materials. • All lifting equipment was rated for intended activities and maintained.
Administrative	Personnel involved in lifting operations are competent as per requirements within the Cliff Head Lifting Operations and Lifting Equipment Procedure (10HSEQGENPC24)	Personnel involved in lifting operations are competent as per requirements within the Cliff Head Lifting Operations and Lifting Equipment Procedure (10HSEQGENPC24). • Competency of equipment operators meets Australian legislative standards and all equipment operators hold a Certificate of Competency issued by a recognised State Authority or a National License issued in accordance with the National Standard NOHSC-1006-2001 - Lifting Competency Requirements. • Lifting Equipment Maintenance Personnel hold current Certificates of Competency and Licenses.	Training/certification records demonstrate all personnel involved in lifting operations have the appropriate training/certifications.
Engineering	Floating lines and pennant buoys will be used on temporary moorings to reduce seabed disturbance from chain drag	Temporary moorings will utilise floating lines and pennant buoys for the duration of any IMR activities	Documented inspection during activity to confirm floating lines are used on moorings.

Hierarchy	Control Measures	Performance Standards	Measurement Criteria
Administrative	ROV footage from pipeline IMR activities will be reviewed after the IMR activities are complete to inform future work and minimise environmental impact to any identified sensitive seabed features	ROV footage of any activities undertaken under the EP will be reviewed to capture any relevant environmental data including: • Location of footage • Habitat type in the area • General notes on flora/fauna observed This report can then inform future anchor/mooring locations to ensure locations of least environmental sensitivity are selected	ROV Survey report ROV footage
Administration	Vessels operate within weather limitations to reduce likelihood of anchoring	Vessel Master to monitor meteorological forecasts at least once daily as per operating conditions in Cliff Head Marine Operations Procedure (10OPGOPC04).	Vessel logs record timing and weather conditions/sea state for operations on a daily basis.
Administration	Equipment to be securely sea-fastened to prevent objects being lost overboard	All equipment on vessels to be secured in accordance with good seamanship to prevent objects being lost overboard	Inspection during activity to confirm equipment on deck is secured as required to prevent loss overboard
Engineering	During water jetting, large pieces of insulation are recovered by ROV. Only exception if ROV is unable to recover due to weather, safety or tooling failure	ENVID completed prior to high pressure water jetting identifies capability of ROV to recover insulation and agreed with ROV contractor what is recoverable prior to activity commencement.	ENVID prior to water jetting activities
Administration	Dropped objects large enough to be a danger to navigation or fishing vessels using the area will be retrieved, retrieval timing will be based on NEBA assessment	Dropped objects large enough to be a danger to navigation or fishing vessels using the area will be retrieved – if items cannot be immediately recovered, the item location will be recorded for retrieval during future project or decommissioning activities.	Dropped object incident reports Records of dropped object recovery.
Administration	All personnel receive CHA Site induction	All personnel will receive the CHA Site Induction (10SPTRNTM18) detailing environmental sensitivities which will also include reinforcement of “no objects overboard”.	Training records show all personnel travelling offshore have received the CHA Site induction
Administration	Any dropped object incident is reported to inform lessons learned	Immediate recording and reporting of any dropped objects via the incident reporting system.	Dropped object incident reports which include lessons learned
Engineering	No anchoring of vessels during routine operation except in case of emergency	Vessels will only anchor in emergency situations	Vessel log records anchoring events
Administration	Pipeline inspections to utilise existing CP and TOFD inspection locations for inspections used to establish corrosion loss trends to minimise marine growth removal and subsequent seabed disturbance	Pipeline inspections utilise existing CP and TOFD inspection locations when used for establishment of corrosion loss trends (note that the safety and structural integrity of the pipeline is the prime consideration when undertaking inspections and maintenance).	Pipeline inspection documentation verifies the CP and TOFD inspection location status (i.e. whether previously cleared of insulation). Pipeline inspection documentation verifies the CP and TOFD inspection location status to confirm that IMR activities are restricted to Operational Area where benthic habitat type is known.

Hierarchy	Control Measures	Performance Standards	Measurement Criteria
Administration	Locations requiring pipeline stabilisation to be confirmed visually prior to stabilisation activities to verify rectification required and extent of marine growth removal required	Visual inspection (e.g. ROV survey) of spans to be carried out prior to pipeline stabilisation activities	Documentation to confirm the location(s) of spans was confirmed prior to pipeline stabilisation
Engineering	Undertake engineering assessment of pipeline rupture risk prior to freespan rectification activities to verify rectification is required	Engineering assessment will be completed for any freespan rectifications prior to any span rectification activities	Documented engineering assessment for any freespan rectifications
Administration	Stabilisation material to be lowered to seabed slowly to minimise impact force and sediment resuspension and subsequent seabed disturbance	Installation of stabilisation material to be lowered to seabed slowly in accordance with activity specific freespan rectification plan	Documented inspection during activity to confirm stabilisation material installation is in accordance with activity specific freespan rectification plan
Engineering	Temporary moorings to be clearly marked to ensure vessels can see moorings clearly and avoid the need to anchor, and aid in recovery following completion of activity	All temporary moorings to be clearly marked with high visibility surface float	Documented inspection during activity to confirm all temporary moorings are clearly marked with high visibility surface float
Administration	Mooring locations to be installed in accordance with activity specific mooring plan within the Operational Area	All moorings to be installed within the pipeline corridor and/or CHA exclusion zone and avoid subsea infrastructure in accordance with activity specific mooring plan	Documented inspection during activity to confirm moorings are installed in accordance with activity specific mooring plan
			Documented inspection during activity to confirm permanent moorings are removed, checked and replaced (as appropriate) in accordance with activity specific mooring plan
Administration	Temporary moorings to be recovered following completion of inspection and maintenance activities to allow rapid recovery of disturbed seabed	All temporary moorings to be removed within two weeks following completion of maintenance activity	Documented inspection following IMR activities to confirm temporary moorings have been removed within two weeks.
Eliminate	All operational activities occur within the Operational Area where seabed habitat type is known	Activity specific mooring plan clearly defines the area of operation within which TEO can operate	HSE meetings and bulletins indicate area of operation, activity specific mooring plan details Operational Area for vessels End of activity reports

Hierarchy	Control Measures	Performance Standards	Measurement Criteria
Administration	Cliff Head Pipeline and Umbilical Integrity Management Plan, in place.	All operational activities are performed to ensure adequate safety and environmental management in accordance with the Cliff Head Pipeline and Umbilical Integrity Management Plan, specifically: • The recommended inspection, maintenance and monitoring activities are identified and applied to ensure the integrity risk of the system is as ALARP. • Maximum inspection intervals are met based on the risk levels identified. • Acceptance criteria when evaluating the results of the activities are met.	Maintenance/inspection records demonstrate that: • The recommended inspection, maintenance and monitoring activities have been identified and applied to ensure the integrity risk of the system is as ALARP. • Maximum inspection intervals have been met based on the risk levels identified. • Acceptance criteria when evaluating the results of the activities have been met.
Administration	Marine growth removal undertaken with ROV/diver surveillance.	Marine growth removal undertaken with ROV/diver surveillance.	Documentation to confirm marine growth removal was undertaken using ROV/diver visual surveillance.

6.1.3.4 Residual Risk

Aspect	Consequence	Likelihood	Residual risk
Dropped objects	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)
High pressure water jetting	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)
Stabilisation materials	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)
Temporary and permanent moorings	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)

6.1.3.5 Acceptability

Receptor	Consequence
Threatened / Migratory / Protected Fauna	Seabed disturbance may result in direct (e.g. physical loss of habitat) and indirect disturbance (e.g. sedimentation, loss of habitat leading to reduced food availability). The Operational Area is characterised as sandy bottom and minor to moderate seagrass and kelp habitats. The area that may be potentially impacted is marginal compared to the amount of habitat available. Big Horseshoe Reef is the nearest reef habitat, located 2 km south of the Operational Area. Through the implementation of controls when working in the Operational Area (e.g. temporary mooring removal, lowering of equipment slowly, activity specific mooring plans) impacts to the seabed will be minimised to small areas of known habitat type. Therefore, the disturbance is not expected to significantly affect prey availability, and subsequently protected fauna species. Marine invertebrates may inhabit sandy seafloor and can contribute to the diet of some fauna. The area of sandy habitat that is potentially impacted is small

Receptor	Consequence
	compared to the amount of habitat available and therefore the disturbance is not expected to affect prey availability, and therefore protected fauna species, significantly. Habitat modification is identified as a potential threat to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-6). However, the area potentially impacted is small compared to the size of the areas used by these species for foraging and is likely to recolonise rapidly and therefore no long term impacts to these species is expected. A number of BIAs and KEFs overlap the Operations Area, such as the Commonwealth Marine Environment within and adjacent to the west coast inshore lagoons and Western Rock Lobster KEFs (Section 4.4.1), as well as a range of foraging and migration BIAs for marine mammals, sharks and avifauna (Table 4-7). However, seabed disturbance will be highly localised and temporary in nature, resulting in no long term implications for the values and sensitivities of these receptors.
Physical Environment/ Habitat	The physical environment and habitat could be disturbed during the proposed activities. Notably, activities on, or in close proximity to, the seabed (e.g. use of ROVs, placement of moorings and stabilisation materials) may result in a localised drop in water quality due to the resuspension of sediments. However, this change is likely to be highly temporary in nature and restricted to the immediate vicinity of the activity or item. With regards to impacts to benthic habitats, the area potentially impacted is small compared to the wider environment and in the majority of cases, the disturbed area is expected to recolonise. This is evidenced through the recolonisation of seagrasses in the area previously cleared during pipeline construction. Furthermore, the subsea infrastructure provides attachment points for sessile organisms. As such, long term disturbance and negative impacts to the wider ecosystem are not expected.
Threatened ecological communities	Not applicable – no threatened ecological communities are identified in the area where seabed disturbance could occur
Protected Areas	Not applicable – no protected areas are identified in the area where seabed disturbance could occur
Socio-economic receptors	Disturbance of the seabed is unlikely to impact socioeconomic receptors such as shipping and tourism. Seabed disturbance may temporarily alter rock lobster habitat; however, this is expected to be short term and over small discrete areas with no lasting impact on rock lobster abundance or distribution and therefore impacts to commercial fisheries are not expected. Rock lobster are usually found within rocky areas which would not be disturbed during the planned operational activities. No stakeholder concerns have been raised regarding this aspect.
Acceptability of impact	**The potential consequence of seabed disturbance on receptors is discussed above. With the control measures in place, including compliance with industry standards and legislation, no significant impacts are expected.** **The activity will occur in habitat that is widely represented in the area and is not of significance for particular species (i.e. no key areas have been designated for protection), additionally the seabed will likely recover rapidly following removal of any temporary equipment (e.g. moorings).** **No impacts to the fishing industry are expected. As such, the risk is considered acceptable given the nature and scale of potential impacts and controls in place**.

6.1.3.6 ALARP

Lifting operations are required in the field to ensure safe and efficient operation of the CHA platform. The removal of marine growth and addition of stabilisation materials is imperative to ensuring the integrity of the pipeline, to not carry out these activities would result in additional safety and environmental risks. The use of permanent and temporary moorings is required to ensure safe operation of vessels while in close proximity to the CHA platform and pipeline. Prior to conducting IMR activities, assessments will be completed to ensure the IMR activities are required, minimise seabed disturbance through consideration of whether marine growth removal, temporary moorings and stabilisation are required, confirmation of suitable locations for the activities and consultation with the selected contractor. Furthermore, a Cliff Head Pipeline and Umbilical Integrity Management Plan will be implemented to ensure environmental and safety management. It is considered therefore that the risks of these activities conducted to maintain safe operation of the CHA facility are acceptable and ALARP.

The proposed management controls for seabed disturbance are considered appropriate to manage the risk to ALARP. Additional controls considered but not adopted are detailed below.

Additional controls considered but not adopted	Hierarchy	Practicable	Cost effective	Evaluation
No installation of stabilisation materials	Eliminate	×	×	Introduces unacceptable risk to the safe operation of the pipeline. Stabilisation materials are required to maintain the structural integrity of the pipeline.
Use of single anchors instead of temporary moorings	Substitute	×	✓	Daily anchoring results in an increased disturbance to the seabed compared to longer-term temporary moorings. Anchoring is not as stable as mooring and therefore poses additional safety and environmental risks e.g. anchor drag across pipeline, should the vessel move under anchor.
Recover pipeline coating and insulation	Eliminate	×	×	Water jetting to remove the pipeline coating results in the coating and foam being reduced to very fine particles. Retaining these particles is not feasible given their size and the subsea location. Larger pieces will be collected by ROV. Some pieces will be too small for ROV retrieval and would not be considered to have a significant environmental impact given the benign nature of the particles and small sizes. As described above, particles that can be retrieved easily by ROV as agreed with the contractor, will be returned to surface for onshore disposal. By using pre-cleared sections of pipeline, the need to use water jetting to remove the coating and insulation is reduced.
No removal of marine growth	Eliminate	×	✓	This control was rejected as it introduced unacceptable risk to the safe operation of the pipeline. Removal of marine growth is considered necessary to reduce the drag the pipeline is subjected to in order to maintain the structural integrity of the pipeline
Use of vessels with dynamic positioning (DP) systems	Engineering	×	×	Delays to activities caused by delays in contracting a vessel. Given the lack of emergent features/shallow water in the Operational Area, risk of grounding is low.
Cessation of operations until all lost equipment is located / recovered	Eliminate	×	×	Substantial additional cost due to downtime over and above value of equipment lost. Little benefit given water depths and sparse distribution of sensitive benthic habitats in Operational Area.

Additional controls considered but not adopted	Hierarchy	Practicable	Cost effective	Evaluation
Use of seagrass friendly temporary moorings	Substitute	×	×	"Seagrass friendly" moorings are used elsewhere in Australia; however, these are more suitable for permanent moorings which are regularly used, rather than temporary moorings, and therefore were not considered a cost effective substitute when conducting IMR activities.
Pre-lay ROV surveys	Eliminate	✓	×	Pre-lay ROV surveys could identify bare patches of substrate to place moorings rather than on seagrass. However, given the abundance of seagrass in the Operational Area, the low likelihood of ideal sea state conditions for the duration of the activity and the negligible impact to the seabed from the proposed activities, this additional control measure is not considered to change the impacts and risks with respect to achieving ALARP.

6.1.4 Interference with other sea users

6.1.4.1 Description of hazard

The presence of the CHA platform and pipeline may cause a minor interference with the activities of other marine users (i.e. snagging of anchors or fishing gear). A safety exclusion zone of 500 m radius around the CHA platform will be maintained and enforced at all times, as gazetted under Chapter 6 of the OPGGS Act 2006, with the exception of rock lobster fishers with whom TEO has a Memorandum of Understanding (MoU) (see Section 10). The Operational Area encompasses 500 m either side of the pipeline corridor. Vessels are not excluded from the pipeline corridor, however during IMR activities, a 500 m exclusion zone is requested through the issue of notice to mariners.

The presence of project vessels and equipment during routine IMR activities and non-routine workover and sidetrack activities could present a minor navigational hazard to shipping and commercial and recreational fishing activities. The indicative frequency each year of the routine platform IMR activities are outlined in Table 2-1 and vary for each activity with approximate durations ranging from 0.5 to 10 days. A support vessel may be required from some IMR activities. Work over activities are typically not a scheduled activity and are only planned as and when there is reason to carry out a well intervention activity. Since 2006, ten workover (ESP replacement) activities have been undertaken, each took approximately 5 weeks with the support of a CTU or HWU; workover activities are expected to be of similar frequency over the life of this EP. The frequency of workovers is determined by well performance and identification of potential issues. Sidetrack activities are also not a scheduled activity and are only planned as and when there is reason to carry out a well sidetrack activity.

Temporary moorings will also be installed during IMR activities, potentially presenting a snagging hazard to commercial fisheries. For major IMR activities, temporary moorings will be installed for up to two months and when required for short periods, will be in place for 2 to 3 weeks. Moorings will be installed prior to commencing activities and recovered following completion of an activity. The size of the mooring is dependent on the load that it is required to hold, which is a function of vessel size and weather conditions. Given that IMR activities will require calm weather conditions, and the relatively small size of the potential vessels, temporary moorings are expected to be relatively small in size (Section 2.5.2).

During the Non Production Phase, IMR activities will be undertaken intermittently (Section 2.6.1). The number of vessel and helicopter movements will become less frequent therefore reducing the impacts associated with vessel/helicopter movements during non-production compared to the Operations Phase.

6.1.4.2 Potential impact

Commercial fisheries

Potential impacts to commercial fisheries include loss of fishing area, and a potential inconvenience to fishing practices, or damage to fishing nets. One Commonwealth managed fishery (Western Tuna and Billfish Fishery) and five Western Australian state managed fisheries (Octopus interim managed fishery; West coast demersal gillnet and demersal longline (interim) management fishery; West coast demersal scale fish (interim) managed fishery; west coast rock lobster managed fishery; and open access in the North coast, Gascoyne coast and West coast bioregions) were identified as having a potential for interaction within the Operational Area (Section 4.7.4).

The ongoing presence of permanent subsea infrastructure (including the CHA platform and pipeline), could present a hazard to bottom trawl fisheries due to the risk of equipment entanglement and subsequent equipment damage/loss. The only potential for contact with subsea infrastructure would potentially be with trawl fishery operations. However, Section 4.7.4 and stakeholder engagement undertaken for the Petroleum Activities Program (Section 10) indicates that trawl fisheries are not undertaken in the Operational Area; therefore, trawl fisheries are not at risk of interference and impacts to fishers from the presence of subsea infrastructure are not considered credible.

The safety exclusion zone of 500 m radius around the CHA platform and 500 m vessel exclusion zone around the pipeline corridor during IMR activities may temporarily exclude the above identified fishers from the area resulting in a potential displacement and potential loss of gear (particularly in relation to deployed traps).

Additional vessels may be present within the Operational Area intermittently for short periods during routine IMR activities and non-routine workover and sidetrack activities. Project and support vessels may pose a navigational hazard to shipping and commercial and recreational fishing activities. In observance of good seamanship, all support vessels will avoid any close and/or disruptive engagement with any commercial fishing activity.

The presence of temporary moorings during routine IMR activities may create a fishing snag risk, during the short period the moorings are installed. However as identified above, no trawl fisheries are active within the Operational Area. The potential impact to commercial fisheries identified as having a potential for interaction is considered to be localised displacement/avoidance by commercial fishing vessels within the immediate vicinity. As such, the potential impact is considered to be localised with no lasting effect.

The Cliff Head Operational Area is located within an important rock Lobster Fishing Ground. TEO (previously Roc Oil (WA) Pty Limited), has consulted extensively with fishing industry representatives prior to and during the design phase and continues to do so during the operations phase. The offshore pipelines and offshore platform have been designed to allow for lobster fishing activities to take place unaffected throughout the area traversed by the pipelines and to permit fishing up to the platform except when workover, construction or maintenance operations are active.

The MoU with rock lobster fishermen contains a number of requirements, those relevant are provided below, including how TEO meets those requirements:

(1) The President of the association is provided sufficient time to allow them to advise members of the fishing area.

In the case of Q1 2022 Workover activity, TEO Pty Limited) provided a consultation package and follow up emails/phone calls to the Dongara Professional Fishermen's Association (DPFA) informing them of the proposed dates, vessels and locations for the activity. These have been logged in the consultation register and TEO remains in contact with the association. Future IMR and Workover activities will follow the same process.

(2) Marine buoys will be deployed around the area where maintenance activities are being undertaken.

(3) TEO will use reasonable endeavours not to conduct significant maintenance activities on the platform during the "whites" season (mid-November to end December).

TEO will endeavour to meet this commitment to fishermen, although there may be times it is not possible such as due to weather delays, regulatory approvals or vessel availability. In the event of this occurring, consultation with fishermen is undertaken ahead of the activity to ascertain if there are any concerns. It is noted that during the 2022 Workover, no concerns were raised by fishermen when consulted given the intended duration and areas of maintenance activities.

All consultation with stakeholders is logged in the register along with any merits or objections. It is noted that no objections have been raised as a result of the most recent consultation.

Recreational fishers

Being relatively close to shore (~11 km) tourism activities are likely in proximity to the Cliff Head platform. Recreational fishing in particular is a popular activity, with the Abrolhos Islands and Port Denison being recreational fishing hubs. Ongoing impacts to recreational fishers will be minimal with a safety exclusion zone of 500 m radius around the CHA platform and 500 m vessel exclusion zone around the pipeline corridor. Support vessels may interfere with recreational fishers however they will only be present intermittently for short periods during routine IMR activities and non-routine sidetrack and workover activities. TEO (previously Roc Oil (WA) Pty Limited) has consulted with local councils and recreational fishing charters to minimise impacts.

Shipping

The CHA platform and the 500 m exclusion zone may be an obstacle for shipping traffic in the region. These impacts include a loss of access to the area, navigational hazards and a collision risk. However, the CHA platform has been in place for over fifteen years and both the platform and pipeline corridor are marked on current nautical charts and shipping traffic is expected to be low in the area (Section 4.7.2).

Industry standards already in place ensure risks are reduced, these include:

- CHA has navigational lights at all times and is identified on Navigation Charts.

6.1.4.3 Environmental performance

Environmental outcomes, performance standards and measurement criteria for interference with other sea users are provided in the table below:

Environmental Risk	Presence of CHA platform and vessels interfere with activities of other marine users.
Environmental Performance Outcomes	No complaints from other marine users regarding ongoing operations or IMR activities. Information available to regulatory authorities and marine users directly affected by planned activities.

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Administration	Consultation with rock lobster fishermen ongoing to ensure they are aware of all upcoming activities and MoU remains valid.	In accordance with the rock lobster MoU, prior to any maintenance activities, TEO is required to • advise the President of the DPFA in sufficient time • mark the area of use with marine buoys Avoid the “whites” season unless otherwise agreed with DPFA and rock lobster fishery through consultation prior to activity commencement • Consider any additional requests that arise through ongoing consultation, and update MoU accordingly	Consultation records with DPFA and rock lobster fishery maintained Signed and valid MoU with DPFA in place
Prevention	Other marine users are informed of the facility’s presence via AHS nautical charts. This allows the presence of the facilities to be considered during planning of activities	Facility location and cautionary zones are marked on navigational charts.	AHS Nautical Charts confirms this Performance Standard
Prevention	Exclusion zones marked on navigation charts	Exclusion zones marked on navigational charts.	AHS Nautical Charts confirms this Performance Standard
Engineering	Navigational equipment and lighting is installed, maintained and operated on the CHA platform. This provides early warning preventing further interference.	Navigational lighting on the CHA Platform are maintained on a planned schedule to ensure CHA is visible to other marine users	TEO vessel audit or third party inspection documents confirm external lighting of platform is maintained in accordance with vendor recommendations
Administration	Stakeholder consultation log is maintained throughout the field operation	Relevant stakeholder responses and/or complaints are captured and responded appropriately	TEO vessel audit or third party inspection document confirm that stakeholder consultation log is maintained with stakeholders’ response and/or complaints Complaints are managed in accordance with Cliff Head Stakeholder Consultation Plan (10HSEQENVPL12)

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Administration	Consultation with other users prior to and during vessel-based IMR activities	Relevant stakeholder responses and/or compliant are captured and responded appropriately	TEO vessel audit or third party inspection document confirm that stakeholder consultation log is maintained with stakeholders' response and/or complaints Complaints are managed in accordance with Cliff Head Stakeholder Consultation Plan (10HSEQENVPL12)
Administration	Vessels maintain compliance with Marine Order 21	Vessels maintain compliance with Marine Order 21 for the duration of the EP, specifically: • Vessels adhere to minimum safe manning levels • Emergency management plan is on board vessels.	TEO vessel audit or third party inspection document demonstrate that: • All vessels have adhered to minimum safe manning levels. • The emergency management plan was on board all vessels
Administration	Vessels maintain compliance with Marine Order 27	Vessels maintain compliance with Marine Order 27 for the duration of the EP, specifically: • Radio and navigational systems of project vessels are in accordance with Regulations 7 to 11, 19 and 20 of SOLAS • AIS is in place and functioning • Radio navigation equipment is maintained in efficient working order (compass/radar)	TEO vessel audit or third party inspection document demonstrate that: • Radio and navigational systems of project vessels are in accordance with Regulations 7 to 11, 19 and 20 of SOLAS • AIS was in place and functioning on all relevant project vessels. • Maintenance of radio navigation equipment completed.
	Vessels maintain compliance with Marine Order 30	Vessels maintain compliance with Marine Order 30 for the duration of the EP, specifically: • Adherence to steering and sailing rules including maintaining lookouts (e.g. visual, hearing, radar), proceeding at safe speeds, assessing risk of collision and taking action to avoid collision (monitoring radar). • Adherence to navigation light display requirements, including visibility, light position/shape appropriate to activity • Adherence to navigation noise signals as required	• TEO vessel audit or third party inspection document demonstrate that: • All project vessels have adhered to steering and sailing rules including maintaining lookouts (e.g. visual, hearing, radar), proceeding at safe speeds, assessing risk of collision and taking action to avoid collision (monitoring radar). • All project vessels have adhered to navigation light display requirements, including visibility, light position/shape appropriate to activity • All project vessels have adhered to navigation

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
			noise signals as required.
Administration	Support vessel in place during IMR activity to reduce potential for collision or interference with other marine users	At least one support vessel on standby at all times to monitor the exclusion zone to identify approaching third-party vessels and communicate with the vessels.	TEO vessel audit or third party inspection document confirms vessel logs and completed operational report
Engineering	Temporary moorings to be clearly marked.	Temporary moorings to be clearly marked.	Documented inspection records during activity confirm that temporary moorings are marked in accordance with the Activity-specific Mooring Plan.
Administration	Maintenance of safety exclusion zone around CHA to prevent potential collision with CHA platform, unless users are signatory to MoU. (CCTV when platform is unmanned)	500 m radius safety exclusion zone around the Cliff Head platform maintained, with the exception of Zone B Commercial Western Rock Lobster fishermen, as gazetted under Chapter 6 of the OPGGS Act 2006	Exclusion zone gazetted Signed and valid MoU with DPFA in place
Administrative	Notifications to AUSCOAST issued prior to any IMR activity to ensure other sea users aware of activity and reduce potential for 3rd party vessel interference	Notifications to AUSCOAST, via Joint Rescue Coordination Centre (JRCC), to ensure radio navigation warnings for maintenance activities conducted on pipeline or other offshore infrastructure, and that fall outside the NOPSEMA gazetted Petroleum Safety Zone Information provided should include: • vessel details • satellite communication details • area of operation • start and end dates	AMSA notification records
Administrative	Notifications to Australian Hydrographic Service (AHS) issued prior to any IMR activity to ensure other sea users aware of activity and reduce potential for 3rd party vessel interference	Notice to Mariners, via notification of AHS no less than 4 weeks prior to activity commencing, to be issued for maintenance activities conducted on pipeline or other offshore infrastructure, and that fall outside the NOPSEMA gazetted Petroleum Safety Zone	AHS notification records
Administrative	Notifications to rock lobster fishery issued prior to any IMR activity to ensure other sea users aware of activity and reduce potential for 3rd party vessel interference	Notification to rock lobster fishery, of non-routine activity e.g. IMR or HWU activities	Consultation records with DPFA and rock lobster fishery maintained. Signed and valid MoU with DPFA in place.

6.1.4.4 ALARP

There are no possible alternative options to the use of vessels or the presence and operation of the CHA platform. In the event of IMR activities, vessels will be in the field for a longer period and could therefore exclude fishermen from other areas along the pipeline route for an extended period of time (weeks). However, the area over which IMR activities take place represents a very small percentage of the overall available fishing grounds and the exclusion would be temporary.

The proposed control measures for interaction with other marine users are considered appropriate to manage the risk to ALARP. Additional controls considered but not adopted are detailed below.

Additional controls considered but not adopted	Hierarchy	Practicable	Cost effective	Evaluation
Payment of compensation to fishermen for loss of catch	Administration	×	×	Financial losses to fishermen are unlikely to be significant given the small area that potentially excludes fishing, compared with the area available to fish. Difficulty of proving cause/effect relationship between operational activities and any real/perceived loss of catch. Substantial additional cost of claims. The MoU with the rock lobster fishery reduces potential impact to this fishery.
Operations will only occur outside key fishing seasons	Eliminate	×	×	Not possible given that there is no closed season for the fisheries highlighted in the region, which operate year-round.

6.1.4.5 Residual Risk

Aspect	Consequence	Likelihood	Residual risk
Commercial fisheries	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)
Recreational fisheries	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)
Shipping	Minor (1) – Negligible environmental impact, effect contained locally	A – extremely unlikely	Low (1)

6.1.4.6 Acceptability

Receptor	Consequence
Threatened / Migratory / Protected Fauna	Not applicable – potential impacts relate to socioeconomic receptors only.
Physical Environment/ Habitat	
Threatened ecological communities	
Protected Areas	
Socioeconomic receptors	The presence of the CHA platform, pipeline and vessels could exclude fishers from fishing grounds leading to loss of catch and income. The area where fishers are excluded is small compared to the area available to fish and an MoU with the rock lobster fishers and consultation with fishing licence holders reduces potential disturbance further as fishermen can continue to fish around the existing infrastructure and when exclusion zones are in place due to

Receptor	Consequence
	activities occurring, fishermen are consulted with in advance to minimise the potential disruption. The proximity of the CHA platform to the coast means that tourism may be impacted although consultation with relevant tourism stakeholders has not raised any concerns. A review of shipping data indicates that there will not be a significant disruption to commercial shipping due to the distance of the activity from the nearest shipping lane and lack of concerns raised through consultation. AMSA require a high level of communication during the activity therefore reducing the likelihood of interaction with other sea users. No unresolved stakeholder concerns have been raised regarding this aspect.
Acceptability of impact	**The potential consequence of interference with other sea is discussed above. With the control measures in place, including compliance with industry standards and legislation, no significant impacts are expected. The small amount of area around the CHA platform and vessels impacted by physical presence is not expected to significantly affect commercial fishing or tourism operations given the amount of similar habitat available in the surrounding areas and the MoU in place with rock lobster fishermen allowing them to fish in close proximity the CHA infrastructure. Therefore, the effect on commercial fishing operations and the risk level of inhibiting commercial fishing are thought to be small. As such, the risk is considered acceptable.**

6.1.5 Physical presence

6.1.5.1 Description of hazard

The presence of vessels, helicopters and CHA platform facilities in the Operational Area during normal production activities and IMR activities including but not limited to marine growth removal, emergency clamping and pipeline repair could have the potential to attract or displace marine fauna or have a behavioural impact through localised displacement and temporary interruption to migratory species such as humpback whales due to the presence of vessels.

Impacts and control measures for collision between marine fauna and vessel are discussed in Section 7.2. The effect of noise and light from vessels and the CHA platform, and the potential to attract or displace marine fauna, are discussed in Sections 6.1.1 and 6.1.2 respectively.

During the Non Production Phase, IMR activities will be undertaken intermittently (Section 2.6.1). The number of vessel and helicopter movements will become less frequent therefore reducing the impacts associated with vessel/helicopter movements during non-production compared to the Operations Phase.

6.1.5.2 Potential impact

Marine growth on subsea infrastructure

Marine growth may occur on subsea infrastructure (e.g. pipeline, stabilisation materials, CHA platform legs) resulting in artificial habitat attracting other species such as fish, mobile invertebrates and higher predators. While marine growth may be removed from the pipeline to ensure integrity (see Section 2.4.2.9), marine growth removal on other subsea structures is not planned. Marine growth removal is undertaken on an as needed, typically less than once every 10 years

The additional marine growth provides habitat in an otherwise relative barren environment increasing biodiversity in the area. This has positive impacts on both ecosystem health and productivity, with potential benefits to socioeconomic receptors such as fisheries. It is unlikely that the addition of this habitat will attract fish away from existing habitat (and thus out of accessible fishing grounds) but rather populations around the CHA platform will be recruited from existing habitat and add to the regional metapopulational size and viability.

Larger marine fauna may be attracted to these communities, potentially increasing risk of collision and harm to individuals. The effect of physical presence on marine fauna behaviour is discussed below.

Vessel activities

During IMR activities, vessels will be utilised to support the activities 24 hours a day resulting in a temporary physical presence. The use of temporary moorings also presents a temporary hazard to marine fauna. During normal operations, vessels are used to transport personnel and equipment to the CHA platform.

The presence of vessels has the potential for behavioural impact through localised displacement and temporary interruption to migratory species such as humpback whales. A humpback whale migration BIA and pygmy blue whale distribution BIA also overlap with the Operational Area.

Vessels pose a threat of disturbance and displacement from key habitats to cetaceans such as humpback whales and pygmy blue whales (TSSC, 2022; Commonwealth of Australia, 2015). Disturbance from vessels has been recorded in Humpback whale populations through visible changes in behaviour and increased dive times (TSSC, 2022). Cetaceans are naturally inquisitive marine mammals that are often attracted to offshore vessels and facilities, and dolphins commonly 'bow ride' with offshore vessels. The reaction of whales to the approach of a ship is quite variable. Some species remain motionless when in the vicinity of a ship while others are known to be curious and often approach ships that have stopped or are slow moving, although they generally do not approach, and sometimes avoid, faster moving ships (Richardson et al., 1995). In avoiding vessels, cetaceans may also have longer dive times.

A foraging BIA for Australian sea lions overlaps with the Operational Area. Vessels and aircraft have the potential to cause disturbance to Australian sea lions eliciting responses in individuals such as fright, vigilance, aggression, reduced pup suckling time and/or relocation of females to suboptimal habitat (Orsini, 2004, Lovasz et al., 2008).

The Operational Area overlaps with foraging BIAs for the bridled tern, caspian tern, Australian fairy tern, little shearwater, pacific gull, wedge-tailed shearwaters. The physical presence of vessels is a threat to seabirds, causing temporary habitat loss, collisions, and chemical and noise pollution for foraging seabirds (BirdLife International, 2012).

All marine fauna species including seabirds, cetaceans and fish species (including whale sharks) are likely to avoid any moving vessels and return to normal behaviour patterns when the interruption has passed (i.e. vessel or moved on). The impact of the physical presence of vessels on marine fauna within the Operational Area is expected to be low due to limited vessel movements and the short-term temporary nature of routine IMR activities and non-routine workover and sidetrack activities.

6.1.5.3 Environmental Performance

Environmental outcomes, performance standards and measurement criteria for physical presence are provided in the table below:

Environmental Risk	Presence of CHA and vessel may alter species distribution and behaviour
Environmental Performance Outcomes	Avoid adverse impacts from operations and physical presence on marine fauna No death or injury to EPBC Act listed marine fauna from planned operational activities

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Administration	Marine fauna sightings reported to DCCEEW and any vessel strikes reported	Marine Fauna Sighting Datasheets submitted to DCCEEW.	Cetacean Sighting Records maintained; records of transmittal to DCCEEW

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
		Vessel strikes reported to NMMC Death or injury to EPBC Act listed marine fauna (including cetaceans or whale sharks) from vessel collision are recorded/reported to NOPSEMA and DCCEEW in line with regulations	
Administration	Contractor procedures reviewed to ensure vessels adhere to EPBC Regulations (Part 8) during activity to reduce potential for impact to cetaceans prior to mobilisation	In accordance with Part 8 of EPBC Regulations (Vessels), all vessels must travel at less than 6 knots within the caution zone of a cetacean (150 m radius for dolphins, 300 m for whales) known to be in the area.	Records demonstrate that contractor procedures are reviewed to ensure compliance with EPBC regulations prior to mobilisation TEO vessel audit or third party inspection document confirm contractors comply with Cliff Head Marine Operations Procedure (10OPGOPC04) which includes EPBC regulations requirement All incidences of non-compliance with EPBC Regulations 2000 - Part 8 Division 8.1 (interacting with cetaceans) to be recorded Incident report in MyOsh and written notification as per reporting requirements.
Administration	Contractor procedures reviewed to ensure helicopters adhere to EPBC Regulations (Part 8) during activity to reduce potential for impact to cetaceans prior to mobilisation	Helicopter complies with Part 8 of EPBC Regulations for interacting with cetaceans, unless taking off or landing because they are taking reasonable actions necessary to reduce safety risk to humans.	
Administration	CHA Site inductions completed by all personnel to ensure understanding of reporting requirements and EPBC regulations	CHA Site Induction (10SPTRNTM18) carried out for all personnel which includes cetacean sensitivity issues	CHA Site Induction documentation includes information on sensitive marine fauna. Training records show all personnel travelling offshore have received the CHA Site Induction
Administration	Vessels to maintain bridge watch as per Marine Orders 21 to ensure risk of marine fauna collision is minimised	Vessels maintain compliance with Marine Order 21 for the duration of the EP, specifically: • Vessels adhere to minimum safe manning levels • Emergency management plan is on board vessels.	• TEO vessel audit or third party inspection document demonstrate that: • All vessels have adhered to minimum safe manning levels, including bridge watch • The emergency management plan was on board all vessels

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Administration	Operations of the project/ support vessels will be in accordance with Marine Notice 15/2016: Minimising the risk of ships colliding with cetaceans.	Vessels are required to: • maintain a look out for cetaceans, in particular in times and locations identified for five EPBC Act listed whale species; • warn other vessels in the vicinity, using all appropriate means of communication, if whales have been sighted; • consider reducing vessel speed in areas where whales have been sighted; and • consider modest course alterations away from sightings	TEO vessel audit or third party inspection document demonstrate that: • Conformance checked via vessel logs and completed marine fauna data sheet
Administration	Equipment maintained on a planned schedule to ensure vessels and machinery are working properly and reduce risk of breakdown and subsequent marine fauna impacts (e.g. through loss of propulsion or engine failure resulting in being unable to slow down or avoid marine fauna)	Vessels, helicopters, IMR equipment and platform machinery are maintained in accordance with vendor recommendations through auditable planned maintenance systems to avoid impacts on marine fauna caused by loss of propulsion or engine failure resulting in being unable to slow down or avoid marine fauna.	Equipment maintenance records demonstrate that equipment is maintained in accordance with vendor recommendations.
Administration	Pipeline inspections to utilise existing CP and TOFD inspection locations for inspections used to establish corrosion loss trends to minimise requirement to undertake high pressure water jetting to reduce potential for noise impacts	Pipeline inspections will utilise existing CP and TOFD inspection locations when used for establishment of corrosion loss trends (note that the safety and structural integrity of the pipeline is the prime consideration when undertaking inspections and maintenance)	Pipeline inspection documentation verifies the CP and TOFD inspection location status (i.e. whether previously cleared of insulation).

6.1.5.4 ALARP

The presence of the CHA platform and associated infrastructure are necessary for the production of hydrocarbons from the Cliff Head field and vessels are required for the safe operation of facilities.

The proposed control measures for physical presence of the project infrastructure and vessels are considered appropriate to manage the risk to ALARP. Additional controls considered but not adopted are detailed below.

Additional controls considered but not adopted	Hierarchy	Practicable	Cost effective	Evaluation
Removal of CHA platform	Eliminate	×	×	Production of crude from the Cliff Head field would not be possible
No vessels used during operations	Eliminate	×	×	Operation of CHA would not be possible without the replenishment of supplies required for safe operation of machinery. IMR activities would not be possible leading to pipeline integrity risk and associated environmental risks as a result.

Additional controls considered but not adopted	Hierarchy	Practicable	Cost effective	Evaluation
Marine growth removal on infrastructure besides pipeline	Eliminate	×	×	Additional operation costs. More likely to result in negative effects of removing habitat for fish and invertebrates in an otherwise relatively barren environment. The increased biodiversity provided by the infrastructure will have positive benefits on the marine communities with potential secondary benefits to socioeconomic receptors such as fisheries.
Use of MFOs	Administration	×	×	Additional operation costs ($150-200k per year). Unlikely to increase detection of marine fauna given the platform is unmanned and low frequency of vessels travelling to and from the platform and therefore would not significantly reduce impacts.
Use of vessels with dynamic positioning (DP) systems	Engineering	×	×	The requirement for DP would significantly constrain vessel selection. DP systems generate high intensity broadband underwater noise, increasing the environmental risks and impacts associated with increased underwater noise. DP thrusters may also resuspend sediments in shallow areas, leading to a temporary, localised decrease in water quality. TEO does not commit to using DP vessels for operational or IMR activities, although retains the option to use DP vessel if required.
Vessels to operate outside whale, migration, aggregation and calving period	Eliminate	×	×	Minor benefit in terms of reduced risk to whales, given low frequency of vessel's operations and also the low numbers of whale individuals expected to be encountered within the Operational Area. Would result in 4-5 months where no activities or production could occur leading to losses of >$5m.
No use of stabilisation materials	Eliminate	×	×	The increased safety risk of not installing pipeline stabilisation materials outweighs the potential impact of the change in habitat that will arise from its presence. The hard substrate will provide for benthic fauna to attach to and therefore has potentially positive impact.
No high pressure water jetting	Eliminate	×	×	Alternative mechanical methods are likely to be less efficient and may not achieve the level of cleanliness required. It may reduce noise, however, is likely to result in similar material waste while increasing the duration of the activity, prolonging noise and physical presence.

6.1.5.5 Residual risk

Aspect	Consequence	Likelihood	Residual risk
Physical presence	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)

6.1.5.6 Acceptability

Receptor	Consequence
Threatened / Migratory / Protected Fauna	Individuals may alter behaviour in response to vessel presence, either through avoidance or attraction to the area. This may temporarily alter the distribution of populations, potentially excluding individuals from foraging areas or result in barriers to migration. However, given the temporary and short duration of time vessels may be operating, and the length of migratory periods, absence of known resting areas in the CHA Operational Area and the low level of response

Receptor	Consequence
	expected, significant impacts are unlikely. Due to management controls in place, significant disturbance to marine fauna is unlikely. Subsea infrastructure may allow substrate for marine growth and establishment of communities by attracting fish and other higher predators such as threatened species that would normally be absent. The effect of marine growth is positive by allowing existence of communities and individuals in an area where they would otherwise be absent. No controls are in place to reduce marine growth.
Physical Environment/ Habitat	Subsea infrastructure may allow substrate for marine growth and establishment of habitats that would otherwise not exist. The effect of marine growth is positive by allowing existence of species in an area where they would otherwise be absent.
Threatened ecological communities	Not applicable
Protected Areas	
Socio-economic receptors	The establishment of additional habitat may have positive impacts on fisheries due to the increase in biodiversity around the CHA platform and pipeline. This additional habitat is unlikely to attract fish away from existing habitat (and thus out of accessible fishing grounds) but rather add to the existing population. The potential impact of vessel presence on other sea users is discussed in Section 6.1.4 No stakeholder concerns have been raised regarding this aspect.
Acceptability of impact	**The potential consequence of physical presence of vessels and the CHA platform on receptors is discussed above. With the control measures in place, including compliance with industry standards and legislation, no significant impacts are expected. Temporary impacts to marine fauna behaviour may occur due to vessel presence but this would not result in significant impacts. Physical presence of subsea infrastructure may actually have a positive influence on the physical environment (provision of hard substrate for colonisation) and fish/invertebrate abundance. As such, the risk is considered acceptable.**

6.1.6 Atmospheric emissions

6.1.6.1 Description of hazard

Atmospheric emissions such as NOx, SOx, smoke and particulates will be emitted from all combustion equipment engaged during workovers, normal CHA operations and vessel-based activities. This includes the diesel engines on the HWU, CTU, generators/engines on support vessels, crane, and helicopter fuel used in logistical support. These activities will also produce emissions of CO_2, a greenhouse gas (GHG).

Vessels may utilise ozone-depleting substances (ODS) in closed-system rechargeable refrigeration systems.

Activities such as IMR and workovers/sidetrack are expected to be carried out intermittently and be of short duration (typically less than one week for each IMR activity). IMR activities typically involve the use of one vessel for the duration of each activity. Expected project vessels are relatively small commercial work boats which would use marine diesel supplied locally in accordance with MARPOL Annex VI restrictions on sulphur content. Most fuel use (and hence vessel emissions) will occur during vessel transits; once on station and securely moored, main engine use will be minimal. Onboard combustion engines other than the main engines may include generators and pumps which may run on diesel or petrol; emissions from these engines are expected to be negligible.

Note that under normal operational conditions, all power for CHA is supplied from the ASP generators via an electric umbilical (i.e. no combustion emissions during normal operations).

Potential emissions during workover /sidetrack activities are assessed in Section 6.3.3.

During the Non Production Phase, IMR activities will be undertaken intermittently (Section 2.6.1). The number of vessel and helicopter movements will become less frequent therefore reducing the atmospheric emissions associated with vessel/helicopter movements during non-production compared with the Operations Phase.

Greenhouse gas emissions

The CHA and vessel-based activities will produce emissions of CO_2, methane (CH_4), and nitrous oxide (N_2O) which are collectively called greenhouse gas (GHG) emissions. GHG emissions are expressed as tonnes of carbon dioxide (t $CO_{2\text{-}e}$) by using global warming potential (GWP). Global warming potential is a measure of the total heat absorbed by any greenhouse gas over a period of time (usually 100 years), compared to heat absorbed by same amount of CO_2. For example, GWP were obtained from IPCC sixth assessment report (IPCC, 2021) and has a value of 1 for CO_2, 27.9 and 273 for CH_4 and N_2O, respectively.

Categories of GHG emissions

Based on the source of emission the GHG emissions are characterised into three categories such as i) Scope 1, ii) Scope 2 and iii) Scope 3 emissions. In accordance with the Greenhouse Gas Protocol (WRI & WBCSD, 2004), each category is defined as follows:

- Scope 1 (Direct emissions): Emissions that occur from sources that are owned or controlled by a company, for example, emissions from combustion of fuel in sources like boilers, furnaces, incinerators, and fleet vehicles, etc. This also includes fugitive emissions such as gas venting and flaring.
- Scope 2 (Indirect emissions): GHG emissions released into the atmosphere from the use of purchased electricity (electricity that is purchased or otherwise brought into the organisational boundary of the company) consumed by the company.
- Scope 3 (Indirect emissions): All indirect emissions not included in Scope 2 and emit from sources that are not owned and not directly controlled by the reporting company. These emissions are the consequence of the company activities. For example, Scope 3 emissions include the activities associated with the extraction and production of purchased materials, transportation of purchased fuels and use of sold products and services.

The main sources of GHG emissions associated with Triangle Energy Cliff Head Development offshore and onshore operations are provided in Table 6-3. It also shows the emission sources (i.e., Scope 3) from their upstream and downstream operations that occur in a company's value chain.

Table 6-3: Direct and indirect GHG emissions sourced from CHA and ASP facilities and their supply chain

Process /Emission source	Emission type	Scope	GHG component
Transportation combustion-diesel in light vehicles	Direct	Scope 1	CO_2, CH_4 and N_2O
Transport combustion – kerosene in aircraft	Direct	Scope 1	CO_2, CH_4 and N_2O
Stationary combustion – natural gas	Direct	Scope 1	CO_2, CH_4 and N_2O
Stationary combustion - diesel	Direct	Scope 1	CO_2, CH_4 and N_2O
Flaring – processed natural gas	Direct	Scope 1	CO_2, CH_4 and N_2O
Flaring-unprocessed natural gas	Direct	Scope 1	CO_2, CH_4 and N_2O
Fugitive emissions from crude oil production	Direct	Scope 1	CH_4

Process /Emission source	Emission type	Scope	GHG component
Purchased electricity consumption	Indirect	Scope 2	CO_2-e
Landfill	Indirect	Scope 3	CH_4
Employee commute	Indirect	Scope 3	CO_2-e
Crude oil transport to Kwinana Port – transport combustion*	Indirect	Scope 3	CO_2-e
Crude oil transport to Kwinana Port – fugitive emissions*	Indirect	Scope 3	CH_4
Crude oil transport from Kwinana Port to Spain (Port of Castelló de la Plana)*	Indirect	Scope 3	CO_2-e
Crude oil refining	Indirect	Scope 3	CO_2-e
Combustion of refined oil products	Indirect	Scope 3	CO_2, CH_4, and N_2O

**It is noted that Scope 3 emissions estimations presented below are based on transport of crude to Kwinana Port and onwards to Spain. Current practice is to transport crude to Geraldton and an onwards to an Asian Refinery, therefore the estimations are considered to be conservative.*

Methodology employed to estimate direct and indirect GHG emissions

The GHG Scope 1 and Scope 2 emissions were estimated based on the methods outlined in the following documents:

- NGER (Measurement) Determination 2008 (Australian Government, 2021a); describes the methods, standards, and criteria to be applied when estimating GHG emissions, energy production and energy consumption.
- NGER Measurement Technical Guidelines (Australian Government, 2017); provide guidance for the estimation of emissions by facilities in Australia, assist corporations and liable entities to understand and apply the NGER (measurement) determination.

In addition to the above outlined methodologies, Scope 3 emissions were also estimated based on the Greenhouse Gas Protocol – Technical guidance for calculating Scope 3 emissions (WRI and WBCSD, 2013). Scope 3 calculations use a combination of methodologies for various categories throughout the inventory.

Table 6-4 illustrates an overview of Scope 1, Scope 2 and Scope 3 categories, categories description and relevant methodology for each category. Based on the methodology deployed in Greenhouse Gas Protocol documents the estimated GHG emissions inventory (emissions quantified using standardised methods) from Cliff Head Development Facility that comprises of CHA and the ASP is portrayed in the next section. The emission inventory calculations take forecasted production and activity data provided by TEO as an input resource.

Table 6-4: Overview of Scope 1, Scope 2 and Scope 3 categories and relevant methodologies

Category	Category description	Methodology employed	Reference methodology Chapter
		Scope 1	
Transport combustion	Diesel consumed in light vehicles at the onshore facility. Kerosene consumed in air crafts used to access the offshore oil platform	NGER Determination	Division 2.4.2, Method 1 *emissions of carbon dioxide, methane and nitrous oxide from liquid fuels other than petroleum-based oils or greases). Emission and energy content factors are extracted from Division 4.2, Part 4, Schedule 1 of NGER Determination. Forecasted annual quantities of fuel combusted in light vehicles and aircraft were provided by TEO.*

Category	Category description	Methodology employed	Reference methodology Chapter
Stationary combustion	Diesel and piped natural gas are used for stationary fuel combustion	NGER Determination	Division 2.3.2, Method 1 *emissions of carbon dioxide, methane and nitrous oxide from gaseous fuels*, or Division 2.4.2, *Method 1 emissions of carbon dioxide, methane and nitrous oxide from liquid fuels other than petroleum-based oils or greases. Emission and energy content factors are taken from Pert 2&3, Schedule 1, NGER determination. Forecasted annual quantities of the diesel and natural gas consumption were provided by TEO.*
Natural gas flaring	Flaring of unprocessed natural gas separated from crude oil during operations at the ASP. Flaring of processed natural gas used as a fuel in the flare	NGER Determination	Section 3.53, Method 1 c*rude oil production flared emissions* and section3.86, Method 1 g*as flared from natural gas production*). Emission factors extracted from part 3.3, Division 3.3.3 & 3.3.9A, NGER Determination. Forecasted total annual quantities for the processed and unprocessed natural gas flared were provided by TEO.
Fugitive emissions	Fugitive emission of methane from leaks during crude oil production process	NGER Determination	Section 3.49, Method 1*crude oil production (non-flared) emission of methane, Emissions factors are taken from Division 3.3.3, Chapter 3, Section 3.49 of the NGER Determination.* Forecasted annual quantities of crude oil passing through the ASP facility (crude oil production) were provided by TEO.
Scope 2			
Electricity consumption	Purchased electricity	NGER Determination	Division 7.2, Method 1 *purchase of electricity from main electricity grid in a state or territory.* Emission factors are taken from Part 6, Schedule 1 of the NGER Determination. he forecasted annual power requirements for the Project were provided by TEO.
Scope 3			
Waste generated (Landfill)	Waste generated throughout the life of the project sent to an off-site landfill	NGER Determination	Division 5.2.2, Method 1 emissions of methane released from landfills of the NGER Determination. The methane in landfill gas is estimated using the estimates of the decomposed degradable organic carbon. Factors of organic carbon fraction, degradable organic carbon, methane generation rate and fraction of methane in generated landfill gas were taken from section 5.12, Division 5.2.2, Section 5.14A Division 5.2.2, and section 5.14 Division 5.2.2 of the NGER Determination. Input activity data is provided by TEO.
Business travel	Employee commute to the site (does not include any corporative activity)	GHG Protocols, Technical Guidance for calculation scope 3 emissions	Distance-based' method from the '*Greenhouse Gas Protocol - Technical Guidance for Calculating Scope 3 Emissions*'. Emission factors were taken for cars and buses from the UK Government's '*Greenhouse gas reporting: conversion factors 2021' (UK Government,2021). Commute activity data is provided by TEO.*

Category	Category description	Methodology employed	Reference methodology Chapter
Crude oil transport	Transportation of crude oil from ASP facility to the port of Kwinana Transportation of crude oil from port of Kwinana to port of Castelló de la Plana in Spain	GHG Protocols, Technical Guidance for calculation scope 3 emissions	Distance-based' method from the '*Greenhouse Gas Protocol - Technical Guidance for Calculating Scope 3 Emissions.* Emission factors were taken for truck and ship freight transport from the UK Government's '*Greenhouse gas reporting: conversion factors 2021 (UK Government, 2021). Forecasted quantities of crude oil and total cumulative distance of trucks transporting crude oil were provided by TEO.*
Transport fugitive	Fugitive emission of methane from leaks during crude oil transport	NGER Determination	Section 3.59, Method 1 – crude oil transport. Emission factors are taken from Division 3.3.4, Part 3.3, Chapter 3, Section 3.59 of the NGER Determination. Forecasted annual quantities of crude oil transported were provided by TEO.
Heating tanks	Purchased electricity from grid	NGER Determination	Division 7.2, Method 1-*purchase of electricity from main electricity grid in a state or territory.* Emission factors are taken from Part6, Schedule 1 of the NGER Determination. The annual power requirement for tank heating were provided by TEO.
Crude oil refining	Crude oil refining takes place in Spain	NGER Determination	Data is extracted from Part 3, Schedule 1, NGER Determination and emission factor from a recent publication by Jing et al., (2020); '*Carbon intensity of global crude oil refining and mitigation potential.*
Fuel combustion	It is uncertain to define what products will be produced from refining of the crude oil and these products will be used for. Hence, for the purpose of assessment it was assumed that the refining of the one 42-gallon barrel of crude oil would produce 45 gallons of refined oil products (US Energy Information Administration).	NGER Determination	Division 2.3.2, Method 1 *emissions of carbon dioxide, methane and nitrous oxide from gaseous fuels*, or Division 2.3.2, *Method 1 emissions of carbon dioxide, methane and nitrous oxide from liquid fuels other than petroleum-based oils or greases. Emission factors are taken from Pert 2&3, Schedule 1, NGER determination.*

Quantification of GHG emissions

The following section demonstrates all sources of the GHG emissions associated with the operation of an offshore oil platform and an offshore stabilisation plant, as well as the emissions associated with the transporting, refining and combustion of the oil products produced. The quantities of CH_4 and N_2O released from project activities are expressed as $CO_{2\text{-}e}$ by multiplying the amount of the CH_4 and N_2O with their respective GWP factors. For example, waste generated throughout the life of project is sent to an off-site landfill where CH_4 released from landfills. The amount of methane released is estimated to be 1.74 tonnes for the year of 2025 calculated based on NGER determination method listed in Table 6-4. The amount of $CO_{2\text{-}e}$ is determined by multiplying 1.74 (total methane released) with 27.9 (GWP) that gives a value of 46 tonnes of $CO_{2\text{-}e}$. Table 6-5 presents the total annual emissions from all activities associated with onshore, offshore and supply chain operations from year 2021 to year 2025 (ERM, 2021).

Table 6-5: Estimated Scope 1, Scope 2 and Scope 3 annual GHG emissions from CHA, ASP operations and Company's value chain for the year 2021 to year 2025

Process variable/Activity	Annual GHG emissions (t CO_2-e/year)				
	2021	2022	2023	2024	2025
Scope 1					
Transport combustion (Diesel consumed in light vehicles)	23	23	23	23	23
Transport combustion (Kerosene consumed in aircraft)	20	20	20	20	20
Stationary combustion (Natural gas combusted in stationary combustion processes	10157	10157	10157	10157	10157
Stationary combustion (Diesel combusted in stationary combustion processes)	33	33	33	33	33
Unprocessed natural gas flared	327	395	357	1423	789
Processed natural gas flared	1401	1359	1383	734	111,9
Fugitive emissions	44	53	48	192	107
Scope 2					
Purchased electricity consumption	29	29	29	29	29
Scope 3					
Waste generated (Landfill)	0	12	24	35	46
Business travel	42	42	42	42	42
Product transport to Kwinana port*	285	344	310	1238	687
Transportation of Crude Oil to Port of Castelló de la Plana*	1742	2102	1897	7569	4199
Product transport to Kwinana port fugitive*	27	33	29	114	65
Tank heating (Emissions from grid energy usage for the storage of crude oil)	9	0	0	0	0
Emissions from crude oil refining	9150	11042	9968	39765	22057
Combustion of all crude oil products	83957	101317	91459	364877	202392
Scope 1 total emissions	12005	12041	12020	12582	12248
Scope 2 total emissions	29	29	29	29	29
Scope 3 total emissions	95211	114891	103730	413644	229487

**It is noted that Scope 3 emissions estimations presented are based on transport of crude to Kwinana Port and onwards to Spain. Current practice is to transport crude to Geraldton and an onwards to an Asian Refinery, therefore the estimations are considered to be conservative.*

GHG emissions analysis

Table 6-5 reported the total annual Scope 1, Scope 2 and Scope 3 emissions from year 2021 to year 2025 for the full project that covers Perth office, CHA, ASP and company supply chain activities. Scope 1 and Scope 2 emissions are consistent, with slightly greater flaring emissions in year 2024 in comparison to other years due to the start of extraction from western development well.

Scope 3 emissions are expected to vary substantially from year to year, with increase in emissions production resulting due to increase in emissions from refining and product combustion. On the basis of estimated annual average emissions and life of the project Scope 3 emissions are predicted to contribute approximately 93 % of the total project emissions and remaining 7 % contribution is from Scope 1 and Scope 2 emissions. For Scope 3 emissions, the major contribution is by the combustion of refined oil products whereas, for Scope 1 and Scope 2 emissions major contribution is associated with the stationary combustion of natural gas.

The contribution of direct emissions from Cliff Head Development project to the total Australia GHG emissions inventory for Year 2021 has been estimated. The total annual direct GHG emissions from Cliff Head operations comprise approximately 0.0023 % of Australia's annual GHG inventory, based on total estimated Australia emissions of 494.2 million tonnes in the year to March 2021 (Australian Government 2021b). Scope 1 and Scope 2 emissions are projected to remain the same throughout the life of the project. The emissions contribution from TEO Cliff Head Development project that comprise of the CHA, ASP facilities and Perth office to the Australian annual GHG inventory will likely remain small. Further, the total GHG emission inventory for the offshore activities that consist of NNM platform (CHA), vessel, and helicopter activities will make a small fraction of the total GHG emissions (i.e., a small percentage of total 7 % GHG emissions contribution). The detail components structure of the Cliff Head Oil Field Development project has been discussed in Section 2 of this EP. During a non-production phase that is expected to commence around 2025, all sources of emissions associated with upstream and downstream activities will become zero (i.e., Scope 3 emissions) and Scope 1 and 2 emissions becomes very small that would be only associated with the reduced consumption of purchased electricity and transportation of vehicles.

Further, the actual annual projected emissions for year 2021 to year 2025 with the forecasted emissions prior to project start-up were compared. In Cliff Head Development Public Environmental Review and Draft Public Environmental Report' (ROC, 2004) and Environmental Impact Statement (EIS) application 2004; forecasted the project Scope 1 and Scope 2 emissions prior to the project start-up to be 35,000 t $CO_{2\text{-}e}$/year. Whereas the majority of historical and forecasted emissions are between 10,000 – 15,000 t $CO_{2\text{-}e}$/year, two and three times lower than the actual annual emissions.

Further GHG emissions analysis estimated using the total emission intensity for the project (i.e., total Scope 1 emissions per GJ of crude oil produced) and comparing it with the Safeguard mechanism value. Safeguard mechanism value is an emission limit (a baseline) proposed by Department of Climate Change, Energy, Environment and Water (DCCEEW) to help industry reduce emissions in line with Australia's climate targets. The National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015 (Australian Government, 2021c) presented Safeguard Mechanism reference value of (0.0038 $tCO_{2\text{-}e}$/GJ of crude oil) for comparison. The estimated intensity for overall project activities is expected to be higher than the reference value except for year 2024. Whereas, in reality, offshore activities present a small portion of all project activities. The GHG emissions intensity will remain well below the Safeguard mechanism reference value for the entire life of the project and GHG emissions level will be considered below the acceptable levels.

6.1.6.2 Potential impact

Vessels utilised by TEO use marine diesel supplied locally in accordance with MARPOL Annex VI restrictions on sulphur content. Atmospheric emissions will add to the global inventory of GHGs. The quantities of gaseous emissions are however relatively small and given the short duration of vessel based activities (typically 1-25 days, with a maximum of up to two months for pipeline IMR activities) and will under normal circumstances, quickly dissipate into the surrounding atmosphere; they are not expected to have any local environmental consequences. Impacts are therefore expected to be minor and very unlikely.

Hydrocarbon combustion may result in a temporary, localised reduction of air quality in the environment immediately surrounding the discharge point during the activity. Non-GHG emissions, such as NOX and SOX, and GHG emissions can lead to a reduction in local air quality which can impact seabirds, marine reptiles and mammals, and humans in the immediate vicinity and add to the national GHG loadings. GHG emissions refers to gases that cause the greenhouse effect (i.e., the way in which heat is trapped by GHGs close to earth's surface) that warms the climate, leading to many other changes around the world in the atmosphere, on land and in the ocean. Potential impacts of emissions depend on various factors such as the nature of emission, location of emission and the nature of receiving environment, GHG emissions include both direct and indirect GHG gases as portrayed in Table 6-3.

The impact assessment considers the contribution of emissions attributed to offshore CHA facility to global emissions and potential impacts to climate change. As explained previously, the direct GHG emissions from total project activities make only 0.0023% of Australian GHG emissions. Consequently, the overall GHG emissions contribution from offshore activities to the Global GHG emissions would be very negligible in the context of existing and future predicted global concentrations. It is essential to acknowledge that climate change impacts cannot be ascribed directly by any offshore activity, as climate changes instead linked to the result of global GHG emissions, minus global GHG sink, that have accumulated in the atmosphere. It is the net global GHG concentrations that are responsible for climate change and climate related impacts. Therefore, it is practical to say that the contribution of GHG emissions from offshore activities would not cause any impacts on climate change and climate change activities.

6.1.6.3 Environmental performance

Environmental outcomes, performance standards and measurement criteria for atmospheric emissions are provided in the table below:

Environmental Risk	Atmospheric emissions may result in a localised reduction in air quality and provide a minor contribution to global GHG emissions.		
Environmental Performance Outcomes	Vessel emissions to air meet requirements of MARPOL 73/78 and Marine Order 97. Use of low sulphur fuel will be optimised to increase efficiency and limit GHG emissions. Air emissions generated from the activity are as low as reasonably practicable.		
Hierarchy	**Control Measures**	**Environmental Performance Standards**	**Measurement Criteria**
Substitute	Project vessels compliant with Marine Order 97 (marine pollution prevention – air pollution),	Project vessels compliant with Marine Order 97 (marine pollution prevention – air pollution), specifically: • Current International Air Pollution Prevention Certificate, by vessel class. • Use of low sulphur fuel when available. • Ship Energy Efficiency Management Plan, where required by vessel class. • Shipboard incinerators (if onboard) possess an IMO type approval certificate for each incinerator as per Marine Order 97.	TEO vessel audit or third party inspection document demonstrate: • Current International Air Pollution Prevention Certificate, by vessel class. • Use of low sulphur fuel when available. • Ship Energy Efficiency Management Plan in place, where required by vessel class • Shipboard incinerators (if onboard) possess an IMO type approval certificate for each incinerator as per Marine Order 97
Administration	Equipment that produces air emissions is maintained to ensure efficient operation thus minimise air emissions	Regular equipment monitoring and maintenance as per vendor recommendation to ensure maximum efficiencies thus minimise air emissions	Maintenance records indicate that equipment are maintained as per vendor recommendation
Administration	Any vessels containing ODS maintain a record book in accordance with MARPOL	Ozone-depleting substances (ODS) managed by trained personnel and captured in record book in accordance with Regulation 13 of MARPOL Annex VI	ODS Record Book in accordance with MARPOL requirements.

6.1.6.4 ALARP

It is not practicable to routinely shutdown non-essential machinery on vessels/CHA and there are no possible alternative options to the use of fuel by vessels. Although ODS is not normally used on the vessels commonly selected for these activities, if they are used, they are controlled in accordance with MARPOL.

The proposed control measures for atmospheric emissions are considered appropriate to manage the risk to ALARP. Additional controls considered but not adopted are detailed below.

Additional controls considered but not adopted	**Hierarchy**	**Practicable**	**Cost effective**	**Evaluation**
Use of single source fuel at CHA even if not available in local port	Substitute	×	×	Substantial additional cost– vessel would have to source fuel from other ports, potential increase in transit times for the vessel. Little benefit given frequency/scale of emissions and lack of sensitive receptors in the Operational Area.
Routine shutdown of	Eliminate	×	×	Little benefit given frequency/scale of emissions, lack of sensitive receptors and remoteness of the Operational Area.

Additional controls considered but not adopted	Hierarchy	Practicable	Cost effective	Evaluation
machinery on vessels/CHA				

6.1.6.5 Residual Risk

Aspect	Consequence	Likelihood	Residual risk
Combustion emissions	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)

6.1.6.6 Acceptability

Receptor	Consequence
Threatened / Migratory / Protected Fauna	Short term behavioural impacts to avifauna, marine mammals and reptiles could be expected if they approach the area of activity. It is expected they may avoid the area due to other factors (e.g. noise, vessel traffic) and therefore impacts are expected to be negligible.
Physical Environment/ Habitat	Not applicable –these receptors will not be impacted by air emissions.
Threatened ecological communities	
Protected Areas	
Socio-economic receptors	As the Cliff Head Field Operation activity occurs in offshore waters, the combustion of fuel in such remote locations will not impact on air quality in coastal towns. The quantities of gaseous emissions are relatively small and will under normal circumstances, quickly dissipate into the surrounding atmosphere. The highly dispersive nature of local winds (i.e. strong and consistent) is expected to reduce potentially harmful or 'noticeable' gaseous concentrations within a short distance from the vessels. Based on the assessment, the overall GHG emissions contribution from offshore activities to the Global GHG emissions would be negligible in the context of existing and future predicted global concentrations. No stakeholder concerns have been raised regarding this aspect.
Acceptability of impact	**The potential consequence of atmospheric emissions on receptors is discussed above. With the control measures in place, including compliance with industry standards and legislation, no significant impacts are expected. No impacts to other marine users in the vicinity are expected given the rapid dissipation of air emissions. Negligible impacts to marine fauna are expected given the lack of important areas for fauna (e.g. breeding/ feeding/ resting areas) and low volumes of emissions. As such, the risk is considered acceptable.**

6.2 Vessel based activities

6.2.1 Planned discharges

During normal operations and activities such as IMR and workover/sidetrack activities, vessels will be used to transport personnel and equipment to the CHA and to undertake IMR activities along the pipeline route. Potential discharges from the CHA (e.g. drainage water) are assessed in Section 6.3.

6.2.1.1 Description of hazard

Deck and bilge water drainage

Deck drainage from vessels consists of rain water or deck wash-down which may contain a small amount of oil, grease, chemicals or detergent. Deck drains which contain rainwater only are directly overboard. Spills which occur within designated deck containment areas where chemicals, oils and wastes are stored, are either pumped out to the waste oil settling tank or mopped up utilising spill clean-up materials.

Contaminants on the deck surface will be in trace quantities and will comprise contaminants such as detergents, and oil and grease.

Equipment / machine space drainage

Equipment and machine spaces on vessels are fully contained and have dedicated drains leading to the bilge water system for oily waste products. For vessels larger than 400 gross tonnage, oily water residue is treated in an approved oily water treatment system to an oil-in-water concentration of 15 ppm and then discharged to the marine environment. For smaller vessels, or those unable to discharge oily water at a concentration of <15 ppm, oily water is retained on board for onshore disposal.

An oily water monitor continuously monitors the discharge stream, is routinely calibrated and calibration records retained, as appropriate for the vessel class. Oily residues collected in this system are containerised in transit tanks and returned to shore for disposal. Note that oily water discharge occurs only while the vessel is enroute. While the vessel is stationary oil and oily mixtures are retained onboard the vessel.

Separated oil collected will be transported to shore for onshore disposal. Oil transfers are documented in the vessel's oil record book, as appropriate for the vessel class.

Sewage, greywater and putrescible

Vessels will generate domestic wastes (greywater, sewage and putrescible wastes, such as food scraps) during operational activities. Approximately 100 L of sewage/greywater, and approximately 1 L of food waste, will be produced per person per day. Such wastes are considered to decompose naturally and will be routinely discharged to the marine environment.

Cooling water or brine

Seawater is used as a heat exchange medium for the cooling of machinery engines. Seawater is drawn from the ocean and flows counter current through closed-circuit heat exchangers, transferring heat from the vessel engines and machinery to the seawater. The seawater is then discharged to the ocean (i.e. it is a once-through system). Cooling water temperatures vary dependent upon the vessel's engines work load and activity.

Workover activities will primarily utilise KCL brine which is a PLONOR substance. Workover fluids are recirculated during the activity with the intention that excess brine is either processed through the CHA production system or collected in tanks for onshore disposal. Cuttings and swarf (from milling operations) contained within the brine will be captured and disposed onshore via waste disposal (skip bins) (i.e. not discharged overboard).

Non Production Phase

During the Non Production Phase, IMR activities will be undertaken intermittently (Section 2.6.1). The number of vessel movements will become less frequent therefore reducing routine discharges associated with vessels operating in the Operational Area during non-production compared to the Operations Phase.

6.2.1.2 Potential impacts

Potential Receptors: fish (pelagic) & sharks, marine mammals, marine turtles and seabirds

The potential sources of oily water from vessels include bilge water and deck washdown water. Once discharged into the marine environment, oily water may result in a localised, temporary decrease in water quality and toxicity to marine organisms in the immediate vicinity of the discharge point. Oily water discharged from vessels will be treated to a concentration (<15 ppm) or contained and not discharged to sea, the potential for impact is therefore low and would be further reduced due to the strong tidal movements experienced in the region and the naturally turbid environment. Dispersion and biodegradation of potentially contaminated oily water drainage is expected to be rapid and highly localised resulting in no long-term or adverse effects on water quality or marine ecology.

Putrescible waste discharge is routinely carried out as a standard practice during maritime activities and is permitted (and regulated) under the MARPOL Annexes IV (Prevention of pollution – sewage) and V (Prevention of pollution by garbage), as appropriate for vessel class. Putrescible waste discharged to the marine environment may result in a localised, temporary reduction in water quality, namely increased turbidity and nutrient availability. Increased water column turbidity can temporarily inhibit photosynthesis by plankton and benthic primary producers by decreasing light availability in the surface waters. Sewage can result in eutrophication in the surrounding waters resulting in changes to plankton in the immediate area. However, Friligos (1985) reported no appreciable differences in the inorganic nutrient levels between the outfall area and background concentrations suggesting rapid uptake of nutrients and/or rapid dispersion in the surrounding waters. Similar studies (Parnell, 2003) concluded similar results with rapid dispersion and dilution within hours of discharge. Because of the small volumes generated and the well mixed surface waters in the defined area, no significant impacts from routine discharges of putrescible wastes from vessels are expected.

Ingestion of sewage discharges by fish, cetaceans, marine turtles or foraging seabirds could result in bioaccumulation of contaminants. In general, dilution after dumping at sea is rapid with results showing 1 in 1000 dilution within 30 minutes (Costello and Read, 1994). Based on this, acute toxicity is unlikely to occur at ecologically significant or detectable levels at discharge sites.

When discharged to sea, cooling water will initially be subjected to turbulent mixing and some transfer of heat to the surrounding waters. The plume will disperse and rise to the sea surface where further dilution and loss of heat will occur. The plume of heated water will move in accordance with the prevailing currents. Temperatures will drop swiftly to ambient with distance from the discharge point. Cooling water discharge points vary for each vessel; however, they all adopt the same discharge design that permits cooling water to be discharged above the water line, in order to facilitate cooling and oxygenation of this wastewater stream before mixing with the surrounding marine environment.

Woodside undertook waste water discharge modelling (vertical, horizontal and temperature) for their Torosa South-1 appraisal well drilled near Scott Reef (Woodside, 2008). Vertical modelling indicated that most of the discharged volume remains in the upper water column (in the upper 10 metres) due to the neutral buoyancy of the discharge, but a small portion penetrates below the water surface, where it rapidly dissipates through the water column (Woodside, 2008). For the horizontal modelling, results indicate that there are only small differences in movement for each of the four seasons. Results show that a concentration of a component within the discharge stream

is reduced to 1% of its original concentration at no less than 50 m from the discharge point under any condition (Woodside, 2008). Temperature dispersion modelling shows that discharge water temperature will decrease quickly as it mixes with the receiving waters, with discharge waters being less than 1°C above background levels within less than 100 m (horizontally) of the discharge point. Vertically, the discharge will be within background levels within 10 m (Woodside, 2008).

While the environmental conditions may be different in the Perth Basin compared to Scott Reef, such as current speed, wind patterns and water depth, results are indicative of dispersion within open water. Due to the short duration and low frequency of proposed vessel activities associated with CHA operations, relatively low volume of cooling water, temperature differential, the deep, open water surrounding the vessels, and any marine fauna which may occur within 100 m of the vessel will be transitory, impact on water quality is expected to be low and short-term.

Current industry standards will reduce these impacts; such standards include:

- Compliance with MARPOL 73/78, as appropriate for vessel class:
    - Treatment of sewage in a treatment plant which comminute and disinfects effluent prior to disposal; or
    - Sewage is stored in an on-board holding tank for onshore disposal.
    - Food scraps on-board the vessels will be containerised for onshore disposal, given the proximity of CHA platform to the WA coastline (i.e. <12nautical miles).
    - The disposal of domestic wastes will be done in accordance to the requirements of MARPOL Annex IV (Prevention of Pollution by Sewage from Ships) and Annex V (Prevention of pollution by garbage from ships), as appropriate for vessel class.
    - Whilst en route OIW discharge is monitored and meets MARPOL Annex 1 discharge criteria (>15ppm), as appropriate for vessel class

6.2.1.3 Environmental performance

Environmental outcomes, performance standards and measurement criteria for planned discharges are provided in the table below:

Environmental Risk	Planned discharges may result in a localised decrease in marine water quality
Environmental Performance Outcomes	All emissions and discharges to sea are as low as reasonably practicable All emissions and discharges to sea are in accordance with legislative requirements

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Engineering	Bunding (temporary or permanent) is provided for those areas/activities where there is an increased risk of oil/chemical spill	Vessel(s) will have a functional drain system that includes: • Drips and minor leaks from fixed equipment, such as engines and generators, are contained in bunded areas; • Kick-plating around the vessel's main deck; and • Hazardous area drains are routed to the bilge tank.	TEO vessel audit or third party inspection document confirm contractors comply with Cliff Head Marine Operations Procedure (10OPGOPC04) which includes MARPOL Annexes I, IV, V and VI and related Marine Orders requirements
Administration	Contaminated wastes are contained and shipped to shore for disposal and not discharged to sea to minimise impacts to water quality	Absorbent material, used for clean-up, is containerised and sent to shore as hazardous waste	Waste transfer documentation maintained showing dates, types, quantities and fate

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Engineering	Bilge water system and oily waste system drain to contained tanks to prevent untreated oily water being discharged to sea	Equipment and machine spaces are fully contained and have dedicated drains leading to the bilge water system for oily waste products	TEO vessel audit or third party inspection document demonstrate project vessels have a functioning drainage systems
Engineering	Oily water discharges do not exceed a concentration of 15 ppm	Oily water discharged does not exceed an oil-in-water concentration of 15 ppm as per MARPOL Annex IV. For vessels unable to discharge oily water at a concentration of <15 ppm, oily water is retained on board for onshore disposal	TEO vessel audit or third party inspection document demonstrate an oil record book is maintained showing dates, volumes and oil concentration Waste transfer documentation maintained showing dates, types, quantities and fate for vessels unable to discharge oily water at a concentration of <15 ppm
Administration	Oily residues unable to be treated are disposed of onshore to prevent untreated oily water being discharged to sea	Oily residues are containerised in transit tanks and returned to shore for disposal by a licensed waste management contractor	TEO vessel audit or third party inspection document demonstrate an oil record book is maintained Waste transfer documentation maintained showing dates, types, quantities and fate
Administration	Oily water is only discharged enroute (if OIW concentration is <15 ppm) to ensure rapid dissipation in marine environment	When enroute, oily water is only discharged if OIW concentration is <15 ppm When stationary, oily water mixtures will be contained on board the vessels	TEO vessel audit or third party inspection document confirm contractors comply with Cliff Head Marine Operations Procedure (10OPGOPC04) which includes oily water discharge requirements. TEO vessel audit or third party inspection document demonstrate an oil record book is maintained showing dates, volumes and oil concentration.
Administration	Equipment allowing discharges to the marine environment is maintained to ensure discharges meet MARPOL requirements	Vessels and equipment (including sewage system and oil filtering equipment) are maintained in accordance with vendor recommendations through auditable planned maintenance systems to ensure discharges are able to meet requirements.	Equipment maintenance records demonstrate vessels and equipment (including sewage system and oil filtering equipment) were maintained in accordance with vendor recommendations.
Engineering	Cooling water allowed to cool prior to discharge and minimum biocide dosage maintained to minimise potential water quality impacts	Cooling water will be discharged above surface waters to allow rapid cooling of water before it reaches marine waters. Biocide dosage is to be maintained at the minimum dosage required to maintain the cooling water system	TEO vessel audit or third party inspection document confirm contractors comply with Cliff Head Marine Operations Procedure (10OPGOPC04) which includes cooling water discharge requirements.

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Administration	Food waste discharges from support vessel(s) must comply with requirements of MARPOL Annex V and Marine Order 95 (as appropriate to vessel class)	Food waste discharges from support vessel(s) must comply with the following requirements of MARPOL Annex V and Marine Order 95 (as appropriate to vessel class): • Food waste comminuted or ground to particle size <25 mm must be discharged ≥3 nm from the nearest land whilst vessel is enroute • Food waste that is not comminuted or ground must be discharged ≥12 nm from the nearest land whilst vessel is enroute; • Operations of the project/ support vessel will be in accordance with Marine Notice 1/2022: MARPOL Annex V (Garbage) Discharges; and • Garbage Log in place for support vessel(s)	TEO vessel audit or third party inspection document demonstrate compliant macerator on board all project vessels. Completed garbage record book (if applicable) showing dates and location of discharge. TEO vessel audit or third party inspection document confirm contractors comply with Cliff Head Marine Operations Procedure (10OPGOPC04) which includes food waste discharge requirements.
Administration	CHA Site Induction includes information on discharge requirements to ensure discharges are as low as reasonably practicable	All personnel will receive the CHA Site Induction (10SPTRNTM18) detailing environmental commitments including requirements on reporting of unplanned discharges and measurement of discharges	Training records show all vessel-based personnel travelling offshore have received the CHA Site Induction.
Administration	Project vessels compliant with Marine Order 96 (as appropriate to vessel class),	Project vessels compliant with Marine Order 96 (as appropriate to vessel class), specifically: • A valid International Sewage Pollution Prevention Certificate, as required by vessel class. • A sewage treatment plant approved by AMSA or an issuing body. • A sewage comminuting and disinfecting system. • A sewage holding tank sized appropriately to contain all generated waste (black and grey water) • Discharge of sewage which is not comminuted or disinfected only occurs at a distance of more than 12 nm from the nearest land • Discharge of sewage which is comminuted or disinfected using a certified approved sewage treatment plant only occurs at a distance	TEO vessel audit or third party inspection document demonstrate all project vessels have: • A valid International Sewage Pollution Prevention Certificate, as required by vessel class. • A sewage treatment plant approved by AMSA or an issuing body. • A sewage comminuting and disinfecting system. • A sewage holding tank sized appropriately to contain all generated waste (black and grey water). • Records demonstrating discharge of sewage which is not comminuted or disinfected only occurs at a distance of more than 12 nm from the nearest land. • Records demonstrating sewage which is comminuted or disinfected using a

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
		of more than 3 nm from the nearest land. • Discharge of sewage occurs at a moderate rate while support vessel is proceeding (> 4 knots).	certified approved sewage treatment plant is only discharged at a distance of more than 3 nm from the nearest land. • Records demonstrating discharge of sewage occurs at a moderate rate while support vessel is proceeding (> 4 knots).
Substitute	Biodegradable detergents used where greywater cannot be treated	If vessel is unable to treat/store grey water (i.e. wastewater from sinks and showers) biodegradable soaps and detergents will be used	TEO vessel audit or third party inspection document confirm that biodegradable soaps and detergents are be used if vessel is unable to treat/store grey water Safety Datasheet for each chemical used onboard.
Administration	A record of waste management on board vessels is maintained	Vessel Waste Log will be maintained to record waste management practices, waste volume and waste disposal methods	TEO vessel audit or third party inspection document confirm an approved Shipboard Waste Management Plan or Garbage Management Plan is in place.
Eliminate	All wastes generated (excluding routine discharges) will be retained onboard, recyclables segregated and disposed of onshore at appropriate facility	All solid wastes (including replaced pipeline sections) generated at sea to be retained on project vessel and disposed of onshore (excludes putrescible wastes and sewage), including recyclables	TEO vessel audit or third party inspection document to confirm use of vessel garbage log detailing waste disposed of onshore at appropriate facility, including recyclables (excluding routine discharges)
Administration	Implementation of Prescribed Waste Management Procedure (10HSEQENVPC04)	All hazardous wastes are to be handled and disposed of in accordance with the Prescribed Waste Management Procedure (10HSQENVPC04)	TEO vessel audit or third party inspection document to confirm that hazardous wastes are managed in accordance with Prescribed Waste Management Procedure (10HSEQENVPC04)

6.2.1.4 ALARP

Vessels are required to undertake operational activities. On-board treatment of most wastes and their subsequent discharge to the marine environment is considered to be the most environmentally sound method of disposal, considering that the waste streams will either be treated to a level unlikely to cause significant environmental harm or will be of a nature not considered to pose significant risk to the receiving environment. Where vessels cannot meet the requirements of MARPOL and TEO's waste management procedures, wastes will be contained for appropriate onshore disposal. The proposed management controls for planned operational discharges are considered appropriate to manage the risk to ALARP. Additional controls considered but not adopted are detailed below.

Additional controls considered but not adopted	Hierarchy	Practicable	Cost effective	Evaluation
Storage, transport and treatment/ disposal onshore of sewage, greywater, putrescible and bilge wastes	Eliminate	×	×	Additional cost due to costs associated with onshore treatment and disposal, operation downtime, and increase in fuel consumption for vessel, given additional transits required. Risk of spills/leaks during transfer operations. Introduction of additional safety risks to personnel during transfer operations.
All contaminated bilge water from vessels to be transferred onshore for treatment/disposal, regardless of oil content or chemical toxicity	Eliminate	×	×	Substantial additional cost due to costs associated with onshore treatment and disposal, operation downtime. Increase in fuel consumption for vessel, given additional transits required. Risk of spills/leaks during transfer operations. Little benefit given lack of sensitive receptors within Operational Area.

6.2.1.5 Residual risk

Aspect	Consequence	Likelihood	Residual risk
Deck drainage	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)
Equipment/machine space drainage	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)
Sewage, greywater and food scraps	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)
Cooling water	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)

6.2.1.6 Acceptability

Receptor	Consequence
Threatened / Migratory / Protected Fauna	Planned discharges in the same location for an extended period of time may result in significant water quality perturbations and alteration to marine fauna behaviour. Sensitive receptors that may be impacted include fish at surface, marine turtles and mammals, and seabirds. Given the low volume of planned discharge, and the offshore location, impacts will be limited to short-term water quality impacts and potential temporary behavioural effects in fish and seabirds. Impacts to water quality will be experienced in the discharge mixing zone which will be localised and will occur only as long as the discharges occur (i.e. no sustained impacts), therefore recovery will be measured in hours to days. Containment of any wastes that cannot meet MARPOL requirements further reduce potential for impacts to water quality and subsequently marine fauna. Deteriorating water quality is identified as a potential threat to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-6), however this is related to pollution events and urbanisation close to land resulting in a permanent decline in water quality subsequently affecting food sources (e.g. seagrass for turtles). Given the planned discharges will quickly dissipate into the surrounding marine environment, water quality will not deteriorate significantly to result in long term impacts to marine fauna. Low numbers of marine fauna are
Physical Environment/ Habitat	
Socio-economic receptors	

Receptor	Consequence
	expected in the vicinity, and few protected species (e.g. whales, turtles) given the lack of feeding/breeding/resting areas for these species. No stakeholder concerns have been raised regarding this aspect.
Threatened ecological communities	Not applicable – no physical environments and/or habitats identified in the area over which planned discharges are expected to disperse other than open water which will not be impacted.
Protected Areas	The Cliff Head platform is 48 km to the Abrolhos AMP, and 80 km to the Jurien Bay AMP. In State waters, the Cliff Head platform is 97 km from the Abrolhos Islands' Fish Habitat Protection Area declared under the WA Fish Resources Management Act and 68 km to the Jurien Bay Marine Park. With these distances to protected areas, and controls in place to minimise impacts generated from planned discharges, the risk to the marine environment is considered low.
Acceptability of impact	**The potential consequence of planned discharges on receptors is discussed above. With the control measures in place, including compliance with industry standards and legislation, no significant impacts are expected. The planned discharges are not expected to significantly impact the marine environment given the low toxicity and small volumes discharged. As such, the risk is considered acceptable.**

6.3 Cliff Head platform

6.3.1 Contaminated drainage water and waste oils

6.3.1.1 Description of hazard

CHA has been designed with deck drains (main & mezzanine), which collect and route liquids to deck drainage boxes. Valves allow the liquids to be routed overboard during normal operations (clean rainwater), or to a hose connected to portable storage drums during maintenance and workover activities. During unmanned operations, deck drainage discharges may contain trace amounts of waste oil, grease and detergent from machinery and residual cleaning agents, however will be small volumes and intermittent, depending on rainfall and sea spray. At the end of each maintenance period the equipment is cleaned, the decks washed down. The main and cellar decks on the platform are designed with plating and perimeter bunds (inverted half-pipe) to contain spillage and wash water with containment of 19.6m^3. All hydrocarbons and dirty water released during maintenance activities is then collected and stored in leak-proof containers for disposal onshore (refer Controlled Use of Drains on CHA Platform Procedure-10HSEQENVPC02).

High standards in housekeeping practices and mandatory safety standards ensure that decks are kept clean and tidy at all times. The platform has oil spill kits stored at strategic locations to immediately contain any potential spills; therefore, runoff from decks is not highly contaminated.

Flushing water is used to flush the production tubing of the well prior to removal of the ESP (during workover activities). This minimises hydrocarbon inventory in the production system prior to workovers for maintenance, and effectively minimises the potential for an oil spill.

Non Production Phase

During the Non Production Phase, IMR activities at the CHA will be undertaken intermittently (as described in Section 2.6). Contaminated drainage water and waste oils will be managed the same as during the Operations Phase and therefore potential impacts will be similar.

6.3.1.2 Potential impact

Once discharged into the marine environment, rainwater run-off containing trace quantities of oil, grease and detergent from decks may result in a localised, temporary decrease in water quality and toxicity to marine organisms in the immediate vicinity of the discharge point. Dispersion and biodegradation of potentially contaminated drainage is expected to be rapid resulting in no long-term or adverse effects on water quality or marine ecology.

6.3.1.3 Environmental performance

Environmental outcomes, performance standards and measurement criteria for contaminated water and waste oils from CHA platform are provided in the table below:

Environmental Risk	Contaminated water and waste oils		
Environmental Performance Outcomes	Emissions or discharges to sea are as low as reasonably practicable No hydrocarbons discharged to sea		
Hierarchy	**Control Measures**	**Environmental Performance Standards**	**Measurement Criteria**
Eliminate	No discharge of hydrocarbons and contaminated water during maintenance activities on CHA	All hydrocarbons and contaminated water generated during maintenance activities are collected and stored in leak-proof containers and removed from site for disposal onshore	Containment standards are inspected during quarterly workplace inspections Waste documentation showing dates, types, volumes and fate of hydrocarbons and contaminated water
		At the end of each maintenance period the equipment is cleaned, the decks washed-down and all liquids collected for disposal onshore, this is checked in accordance with the First & Last On-Board CHA Checklist (10OPGOPC11FM01).	Standards are verified by PIC during activity First & Last On-Board CHA Checklist
Administration	Implementation of Controlled Use of Drains on CHA Platform Procedure (10HSEQENVPC02) to ensure no unplanned discharges via drains to sea	Deck drainage during manned activities on the platform is controlled via the Controlled Use of Drains on CHA Platform Procedure (10HSEQENVPC02): • Upon arrival at the CHA platform, the drainage system is isolated so as to not allow any liquids to be discharged overboard, this shall be achieved by closing the two valves located on the drain lines that direct liquids overboard	Standards are verified by PIC during activity First & Last On-Board CHA Checklist
Engineering	Decks are cleaned prior to opening drain lines to allow rainwater discharge to sea	When decks are washed down and is complete the overboard drain lines are opened, to enable disposal of clean rainwater runoff to the sea. The main and cellar decks on the platform are designed with plating and perimeter bunds (inverted half-pipe or kick-plate) to contain spillage and wash water. This is checked in accordance with the First & Last On-Board CHA Checklist (10OPGOPC11FM01).	Standards are verified by PIC during activity First & Last On-Board CHA Checklist
Administration	All personnel received the CHA Site Induction which includes drainage and discharge requirements	CHA Site Induction (10SPTRNTM18) carried out for all personnel which includes reporting of drainage unplanned discharge	Training records show all vessel-based personnel travelling offshore have received the CHA Site Induction

6.3.1.4 ALARP

Contaminated water and waste oils from CHA platform operation are unavoidable however are appropriate managed to mitigate the volume of waste oils, grease and other contaminated water that is discharged. All hydrocarbons and dirty water generated during maintenance activities is collected and stored in leak-proof containers for disposal onshore. The proposed management controls for planned operational discharges are considered appropriate to manage the risk to ALARP. Additional controls considered but not adopted are detailed below.

Additional controls considered but not adopted	Hierarchy	Practicable	Cost effective	Evaluation
No hazardous materials will be used	Eliminate	×	×	Hazardous materials (e.g. hydraulic fluid, lubricating oils, cleaning chemicals, paints, solvents, batteries) are required routinely for safe and efficient operation of the platform. Potential introduction of additional safety risks to personnel (e.g. inability to clean up spills, maintain platform decks in good working order). Suitable cost-effective non-hazardous alternatives are not known to be available.

6.3.1.5 Residual risk

Aspect	Consequence	Likelihood	Residual risk
Contaminated drainage and waste oils	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)

6.3.1.6 Acceptability

Receptor	Consequence
Threatened / Migratory / Protected Fauna	Planned discharges in the same location for an extended period of time may result in significant water quality perturbations and alteration to marine fauna behaviour. Sensitive receptors that may be impacted include fish at surface, marine turtles and mammals, and seabirds. Given the low volume of planned discharge (i.e. from rainwater only), and the offshore location, impacts will be limited to short-term water quality impacts and temporary behavioural effects observed in fish and seabirds. Impacts to water quality will be experienced in the discharge mixing zone which will be localised and will occur only as long as the discharges occur (i.e. no sustained impacts), therefore recovery will be measured in hours to days. Deteriorating water quality is identified as a potential threat to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-6) however this is related to pollution events and urbanisation close to land resulting in a permanent decline in water quality subsequently affecting food sources (e.g. seagrass for turtles). Given the planned discharges will quickly dissipate into the surrounding marine environment, water quality will not deteriorate significantly to result in long term impacts to marine fauna. The Operational Area overlaps a humpback whale migration BIA, as well as a number of foraging BIAs for marine avifauna, and therefore individuals may come in contact with planned discharges. However, discharges are temporary in nature and will disperse rapidly in the open ocean environment. Furthermore, individuals are transitory and unlikely to experience prolonged exposure to contaminated drain water. No stakeholder concerns have been raised regarding this aspect.
Threatened ecological communities	
Socio-economic receptors	
Physical Environment/ Habitat	Not applicable – no physical environments and/or habitats identified in the area over which deck runoff from CHA platform are expected to disperse other than open water which will not be impacted.

Receptor	Consequence
Protected Areas	The Cliff Head platform is 48 km to the Abrolhos AMP, and 80 km to the Jurien Bay AMP. In State waters, the Cliff Head platform is 97 km from the Abrolhos Islands' Fish Habitat Protection Area declared under the WA Fish Resources Management Act and 68 km to the Jurien Bay Marine Park. With these distances to protected areas, and controls in place to minimise impacts generated from CHA platform's contaminated water and waste oils, the risk to the marine environment is considered low.
Acceptability of impact	**The potential consequence of CHA platform's contaminated water and waste oils on receptors is discussed above. With the control measures in place, including compliance with industry standards and legislation, no significant impacts are expected as only rain water would be discharged, and all oily water will be contained therefore no impacts to marine fauna would be expected. With personnel having awareness of sensitivity of the location and values of the environment prior to commencement of the activity, and the procedures in place, this will reduce the frequency of accidental release at the CHA. As such, the risk is considered acceptable.**

6.3.2 Waste management

6.3.2.1 Description of hazard

The environmental issues in relation to waste and hazardous materials management during operations are:

- Contamination of marine waters;
- Health risks to operations personnel and the public;
- Adverse effects on flora and fauna;
- Reduction in visual amenity;
- Inefficient resource use.

Key waste streams include:

- General Domestic and Industrial Waste.

Waste materials include paper, rags, packaging, scrap metal, drums, drainage runoff (from workover activities) and wood. Disposal of these wastes into offshore waters is strictly prohibited.

- Naturally Occurring Radioactive Material (NORM) Waste.

Workover activities have the potential to recover completion tubing from a well which may contain Naturally Occurring Radioactive Material (NORM). While this is not considered to be a likely outcome as no NORMs have been recorded offshore to date, it has been included for contingency.

Sources of NORM may include process cleaning equipment, which sometimes contains scales and sludges containing radium, and these wastes are described as Naturally Occurring Radioactive Materials (NORM). Any equipment above acceptable radiation limits, used or recovered during routine operations or well workovers is not to be cleaned or decontaminated on board CHA.

NORMs may also be present within geological formations and are typically found in sand and produced water brought to the surface during production.

Cuttings from Milling Operations

Cuttings will be generated from milling operations to remove an ESP during work over or to mill a window in the casing to prepare for sidetrack activities. Milled cuttings may include annular cement, casing and formation cuttings. All cuttings and fluids utilised during milling are contained and transported to shore for appropriate disposal. Drill cuttings generated during sidetrack activities are assessed in Section 6.3.4.

Non Production Phase

During the Non Production Phase, IMR activities at the CHA will be undertaken intermittently (as described in Section 2.6). Waste materials will be managed the same as during the Operations Phase and therefore potential impacts will be similar.

6.3.2.2 Potential impact

General Domestic and Industrial Waste

Accidental waste discharges to sea from inappropriate handling would result in litter and/or pollution that may impact the planktonic or benthic communities due to reduced water quality. General domestic waste such as plastics have the potential to smother benthic environments and harm marine fauna through entanglement or ingestion. Marine turtles and seabirds are particularly at risk from entanglement. Marine turtles may mistake plastics for food; once ingested, plastics can damage internal tissues and inhibit physiological processes, which can both potentially result in fatality. Entanglement in marine debris is also a significant source of mortality for Australian Sea Lions (Page et al., 2004; Shaughnessy et al., 2006). In addition, the Commonwealth Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Marine Life notes that the Australian sea lion has been "documented as negatively impacted by ingestion of, or entanglement in, harmful marine debris" (DEWHA, 2009 as cited in Commonwealth of Australia 2013). Entanglements in marine debris can also cause serious injury and distress to whales, and in some cases lead to mortality (TSSC, 2022). Solid material accidently lost to the marine environment could potentially lead to slight localised contamination of benthic sediments.

NORM Waste

Harmful low-level radioactive discharges (NORM) to the marine environment have the potential to impact human health in addition to health of marine organisms due to localised changes to water quality and toxic effects on marine species. Occupational health and safety requirements for handling radioactive waste are contained within the *Radiation Safety (general) Regulations, 1983*. Guidelines to the level of NORMs in waste permitted to be disposed to landfill is provided in the Disposal of radioactive Wastes by the User (1985) while guidelines for the transportation of radioactive waste is provided in the Code of Practice for the Safe Transport of Radioactive substances (Transport Code, 1990). If NORMs have the potential to be present (e.g. when downhole equipment is brought to surface), waste will be handled in accordance with TEO's NORM Management Plan (10HSEQGENPL09) to avoid mishandling and accidental discharge to the marine environment.

Cuttings from Milling Operations

Cuttings from milling operations are contained and not discharged to sea. Milling mud and cuttings are all contained with the fluid circulation system, captured by a "junk basket" on surface and the mud is recirculated downhole following treatment via shale shakers (as required).

6.3.2.3 Environmental performance

Environmental outcomes, performance standards and measurement criteria for waste management are provided in the table below:

Environmental Risk	Waste management
Environmental Performance Outcomes	No solid waste discharged offshore No planned NORMs discharged offshore

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Administration	All solid waste segregated and transported to shore for appropriate disposal	All solid waste generated offshore will be segregated into covered marked skips or collection areas prior to disposal or recycling at an appropriate site on shore in line with Prescribed Waste Management Plan (10HSEQENVPC04).	TEO audit or third party inspection document demonstrate compliance with TEO's Prescribed Waste Management Waste containment standards are verified by PIC First & Last On-Board CHA Checklist
Administration	All waste skips and rubbish bins are covered to prevent loss of wastes overboard	Care will be taken to ensure all wastes are contained and not blown overboard (e.g. waste skips and rubbish bins will be covered to contain wastes).	TEO audit or third party inspection document demonstrate all wastes are contained Waste containment standards are verified by PIC First & Last On-Board CHA Checklist
Administration	Waste (garbage) management procedure reduces potential for accidental overboard release	Waste management procedure implemented to reduce the risk of unplanned release of waste to sea. The procedure includes standards for: • Bin types. • Lids and covers. • Waste segregation. • Bin storage.	Waste management standards are verified by PIC during routine visits First & Last On-Board CHA Checklist
		No waste (garbage) discharged to sea, unless the waste is food waste disposed in accordance with MARPOL Annex V.	Waste transfer documentation maintained showing dates, types, quantities and fate Annual environmental performance reports indicate no unplanned discharge of solid hazardous waste Incident report includes volume of unplanned hazardous waste discharged offshore
		Wastes are segregated for onshore recycling in accordance with Prescribed Waste Management Plan (10HSEQENVPC04)	
		In accordance with MARPOL Annex V regulation 9.1, AMSA placards will be displayed on board to provide guidance on garbage disposal requirements.	AMSA placards displayed in appropriate locations.

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Administration	All personnel receive the CHA Site Induction detailing waste management expectations on CHA and vessels	CHA Site Induction (10SPTRNTM18) carried out for all personnel detailing waste management expectations on CHA	Training records show all personnel travelling offshore have received the CHA Site Induction
Administration	If NORM waste is a potential (e.g. when downhole equipment is brought to surface), trained radiation specialists are present to identify and containerise	Identify materials with radiation levels above background levels (undertaken by trained radiation specialists) in accordance with NORM Management Plan (10HSEQGENPL09)	NORMs waste transfer documentation maintained showing dates, types, quantities and fate
Administration	Any NORMs waste generated is containerised and transported to shore for appropriate disposal	Cap pipe, segregate and containerise all NORM wastes clearly identifying and send onshore for further onshore assessment and possible treatment/disposal via water injection system in accordance with NORM Management Plan (10HSEQGENPL09)	NORMs waste transfer documentation maintained showing dates, types, quantities and fate Annual environmental performance reports indicate no unplanned discharge of NORMs waste Incident report includes volume of unplanned NORMs waste discharged offshore
Administration	Offshore radiation surveys conducted to identify NORMs as required e.g. when downhole equipment is brought to surface	Carry out offshore radiation surveys to confirm exposure risks and identify above-background radiation areas (undertaken by trained radiation specialists) in accordance with NORM Management Plan (10HSEQGENPL09).	TEO audit or third party inspection document indicate radiation surveys are undertaken as required
Administration	NORMs awareness training provided to all personnel	Implement NORM awareness, management and OHS protection measures for all personnel	Training records show relevant personnel have received NORM awareness training
Administration	Any NORMs packaged or transported is managed in accordance with NORM Management Plan (10HSEQGENPL09)	Any NORM contaminated equipment on CHA is to be packaged and transported in accordance with NORM Management Plan (10HSEQGENPL09)	NORMs packaging standards are verified by PIC during routine visits
Administration	Any NORMs identified has appropriate clearance certificate in accordance with NORM Management Plan (10HSEQGENPL09)	The appointed RSO is to ensure that a NORM Clearance Certificate 10HSEQGENPC07FM01 is completed, signed and provided to the owner/operator of any equipment prior to the equipment leaving site.	TEO audit or third party inspection document indicate the required form is completed

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Administration	Any NORMs identified is disposed of in accordance with NORM Management Plan (10HSEQGENPL09)	Disposal of potentially contaminated material may only be done after approval by the RSO in consultation with the regulatory authority in accordance with NORM Management Plan (10/HSEQ/GEN/PL09).	NORMs waste transfer documentation maintained showing dates, types, quantities and fate Annual environmental performance reports indicate no unplanned discharge of NORMs waste Incident report includes volume of unplanned NORMs waste discharged offshore TEO audit or third party inspection document indicate approval is in place prior to disposal of NORMs
Engineering	Any cuttings generated (from milling operations) are contained and shipped to shore for disposal	Cuttings generated in milling will be separated by the shale shaker to reduce concentration of fluid on cuttings and collected in skips for disposal onshore.	Segregation standards verified by PIC during milling operations Cuttings transfer documentation maintained showing dates, types, quantities and fate

6.3.2.4 ALARP

Waste will be generated during the operation of CHA platform and vessel-based IMR activities. The proposed management controls for waste management are considered appropriate to manage the risk to ALARP. Additional controls considered but not adopted are detailed below.

Additional controls considered but not adopted	Hierarchy	Practicable	Cost effective	Evaluation
Continuous NORM detection devices installed on platform	Engineering	×	×	Additional costs for little benefit given the low level of detection found during onshore testing.

6.3.2.5 Residual risk

Aspect	Consequence	Likelihood	Residual risk
General domestic and industrial waste	Moderate (2) – Moderate or slight environmental impact, negligible remedial/recovery work	B – very unlikely	Low (4)
NORM waste	Moderate (2) – Moderate or slight environmental impact, negligible remedial/recovery work	B – very unlikely	Low (4)
Cuttings from milling operations	Minor (1) – Negligible environmental impact, effect contained locally	A – extremely unlikely	Low (1)

6.3.2.6 Acceptability

Receptor	Consequence
Threatened / Migratory / Protected Fauna	In the event of a solid waste loss, the quantities would be limited. This waste stream could cause localised impacts to water quality and the benthic or shoreline environment if the solid can degrade, which could lead to impacts on localised flora and fauna species. Cuttings will be not released to the marine environment in the event of milling operations. Ingestion of solid wastes by some marine fauna could occur in small quantities. Only small volumes of this waste stream would be generated during the activity, as a result, any discharge to the environment would be small in size. Any impacts would be restricted to a small number of individuals in the close proximity to the release, if any. As such there is the potential for short term behavioural impacts only to a small proportion of a local population and not during critical lifecycle activity for cetaceans, marine turtles or fish. NORMs are not expected as part of this activity, however the handling and transportation of them will not result in direct impacts to the marine environment.
Physical Environment/ Habitat	No NORMS or solid waste will be discharged overboard during the activity. In the event that solid waste is released into the marine environment, damage could occur to sensitive habitats such as coral reefs or seagrasses. However, the damage would have expected to be very localised and unlikely to negatively impact large areas or overall habitat quality. Discharge of milled cuttings is not planned.
Threatened ecological communities	Not applicable – no threatened ecological communities identified in the area over which waste management could impact
Protected Areas	Not applicable – no protected areas identified in the area over which waste management could impact
Socio-economic receptors	In the event of a release of a buoyant object that cannot be recovered (e.g. accidental waste discharge), it could present an obstacle to other sea users or have aesthetic impacts. Eventually the buoyant object may become non-buoyant and sink to the seabed where it may degrade over time. The time taken for this is dependent on the material released and any impacts to marine fauna and the seabed are described above. Given the likely size of buoyant equipment and it will drift with the currents, it is considered unlikely to present a significant hazard to other sea users or significant aesthetic impact and the consequence level is therefore negligible. No stakeholder concerns have been raised regarding this aspect.
Acceptability of impact	**The potential consequence of waste management on receptors is discussed above. With the control measures in place, including compliance with industry standards and legislation, no significant impacts are expected. With all personnel receiving the CHA Site Induction detailing waste management expectations, this will reduce the frequency of accidental release of solids to the marine environment. No planned discharge of solid waste (including NORMs) is planned, as such, the risk is considered acceptable.**

6.3.3 Workover and sidetrack activity emissions

6.3.3.1 Description of hazard

Cliff Head oil is a heavy crude with a very low Gas Oil Ratio (GOR) [31scf/Bbl]. Very little gas is evolved during normal production operations. Methane (CH_4) is contained in produced gas and has a global warming potential 21 times that of CO_2.

Prior to workover activity commencement, wells will be circulated to brine to eliminate hydrocarbons from the well. During workover activity, it is possible that an influx of hydrocarbons may occur into the brine system. Similarly, an influx of hydrocarbons may occur during sidetrack activities. All workover/ sidetrack fluid is handled via the HWU/CTU circulation system which processes fluid returns. This incorporates an emergency degasser/vent system. When utilising the

HWU, a shale-shaker system (for milling operations) is also present. Should hydrocarbons enter the workover/ sidetrack fluid, and in the unlikely event of gas generation, the discharge will be released through the degasser/vent. Release of gas through vents/degasser is required for safety purposes.

6.3.3.2 Potential impacts

Emissions from vented hydrocarbons can contribute to greenhouse gases and reduce local air quality with possible impacts on marine fauna, in particular seabirds. While it is not expected given the characteristics of CHA crude and well control activities, it is possible that a small volume of gas could be released to air through the degasser/vent on the HWU unit. Further impacts from the release of gaseous emissions are described in Section 6.1.6. As the crude is not processed offshore, any flushed fluid will be flowed back onshore to the process plant and it is therefore unlikely that gas will be vented, and if any is vented volumes would be less than 100 Sm^3.

6.3.3.3 Environmental performance

Environmental outcomes, performance standards and measurement criteria for workover and sidetrack activity emissions are provided in the table below:

Environmental Risk	Workover and sidetrack activity emissions may result in a localised reduction in air quality and provide a minor contribution to global GHG emissions		
Environmental Performance Outcomes	No release of reservoir fluids to sea during workover or sidetrack activity		
Hierarchy	**Control Measures**	**Environmental Performance Standards**	**Measurement Criteria**
Engineering	Reservoir fluids maintained in formation by maintaining overbalance to prevent discharge to sea	The well is circulated with brine and workover fluids are monitored and maintained overbalance during the activity to ensure that reservoir fluids are retained in formation	TEO audit or third party inspection document confirms monitoring of brine and workover fluid
Engineering	Any gas produced during workover/ sidetrack activities due to hydrocarbons in the workover/ drilling fluid is vented to atmosphere	Workover/ drilling fluids treated in the HWU circulation system with any gas evolved handled in the degasser system (i.e. a safe vent location).	Vent location and function referenced in Well intervention program and verified by PIC

6.3.3.4 ALARP

The release of gas during Workover/sidetrack activities through the degasser/vent is required for safety purposes. The proposed control measures for workover and sidetrack activities emissions are considered appropriate to manage the risk to ALARP. Additional controls considered but not adopted are detailed below.

Additional controls considered but not adopted	Hierarchy	Practicable	Cost effective	Evaluation
No gas release from vents/ degasser	Eliminate	×	×	Release of gas through vents/degasser is required for safety purposes. Minimal benefits in not releasing the gases given volume of vents and the offshore environment within the Operational Area

6.3.3.5 Residual risk

Aspect	Consequence	Likelihood	Residual risk
Workover and sidetrack activity emissions	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)

6.3.3.6 Acceptability

Receptor	Consequence
Threatened / Migratory / Protected Fauna	Short term behavioural impacts to avifauna, marine mammals and reptiles could be expected if they approach the area of activity. It is expected they may avoid the area due to other factors (e.g. noise, vessel traffic) and therefore impacts are expected to be negligible. No discharge of reservoir fluids to the marine environment are planned.
Physical Environment/ Habitat	Not applicable –these receptors will not be impacted by air emissions.
Threatened ecological communities	
Protected Areas	
Socio-economic receptors	As the Cliff Head Field Operation activity occurs in offshore waters, the workover/sidetrack activity emissions in such remote locations will not impact on air quality in coastal towns. The quantities of gaseous emissions are relatively small and will under normal circumstances, quickly dissipate into the surrounding atmosphere. The highly dispersive nature of local winds (i.e. strong and consistent) is expected to reduce potentially harmful or 'noticeable' gaseous concentrations within a short distance from the vessels. No discharge of reservoir fluids to the marine environment are planned. No stakeholder concerns have been raised regarding this aspect.
Acceptability of impact	**The potential consequence of workover/sidetrack activity emissions on receptors is discussed above. With the control measures in place, including compliance with industry standards and legislation, no significant impacts are expected. No impacts to other marine users in the vicinity are expected given the rapid dissipation of air emissions. Negligible impacts to marine fauna are expected given the lack of important areas for fauna (e.g. breeding/ feeding/ resting areas) and low volumes of emissions. In addition, reservoir fluids will be retained in the formation and as such, the risk is considered acceptable.**

6.3.4 Sidetrack cuttings and fluids

6.3.4.1 Description of hazard

Sidetrack operations are not a scheduled activity and are only planned as and when there is reason to carry out a well sidetrack activity. In the event that a sidetrack activity is required (as described in Section 6.3.4), cuttings and fluids will be generated.

If undertaken, an 8.5" well interval will be drilled using water based muds (WBM) with calcium carbonate and no bentonite. A shale shaker will be used during any drilling operations to separate out returned cuttings which are then discharged into the sea at or near sea level. The cuttings (32 m^3) shall be discharged from a vertically orientated pipe at the sea surface over five days.

Sidetrack activities will primarily utilise KCL brine which is a listed PLONOR substance. Sidetrack fluid chemical additives identified for proposed use during the workover program are detailed and environmentally assessed in Appendix A.

Sidetrack fluids are recirculated during the activity with the intention that excess brine is either processed through the CHA production system for discharge (approximately 500 m^3) or collected in tanks for offshore disposal. Cuttings will be discharged into the sea at or near sea level from the CHA.

As described above, the primary discharges used as the basis of the impact assessment for this activity are as follows:

- Cuttings: drilling generates cuttings due to the breakup of solid material from within the borehole. The resultant cuttings are basically rock particles of various shapes, with sizes typically ranging from very fine to very coarse.
- Drilling fluids: serve many purposes including maintaining borehole stability and hydrostatic pressure, reducing friction and cleaning/ cooling of the drill bit, in addition to acting as a medium to carry cuttings from the well bore and return them to the surface at seabed or on the CHA. WBMs will be used and consists mainly of fresh water or seawater with the addition of chemical and mineral additives to aid in its function. Drilling additives typically used may include chlorides (e.g. sodium, potassium) or calcium carbonate. These additives are either completely inert in the marine environment, naturally occurring benign materials, or readily biodegradable organic polymers with a very fast rate of biodegradation in the marine environment. KCL brine is included on the Oslo Paris (OSPAR) Commission PLONOR (chemicals that 'pose little or no risk to the environment') list (OSPAR Commission, 2021). Swarf from the milling of casing will be disposed of onshore (no discharge to sea). There will be no cement discharges. Table 6-6 summarises the estimated volume of cuttings and muds.

Table 6-6: Summary of the estimated volume of cuttings and mud solids

Hole Diameter (inches)	Well interval	Cuttings Discharge Volume (m^3)	Mud Type (WBM)	Liquid Mud Volume (m^3)	Mud Solids Volume (m^3)	Discharge Duration (days)
8.5	Based on side-track of CH-10 (850m x 0.037m^3/m)	32	Water based muds, with calcium carbonate. No bentonite to be used	500	0	5

6.3.4.2 Potential impacts

Routine and non-routine sidetrack-related discharges may result in the following impacts:

- change in water quality
- change in seabed sediment quality
- change in seabed habitat
- injury/mortality to marine fauna (benthic communities).

Sidetrack Cuttings Modelling

To quantify the distribution and sediment thicknesses from the discharged cuttings on the seabed in the event sidetrack activity is undertaken, TEO commissioned a dispersion study (RPS, 2022a).

As the spud date can vary, 25 simulations were modelled per quarter (i.e. Quarter 1 (Q1); January–March, Quarter 2 (Q2); April–June, Quarter 3 (Q3); July–September and Quarter 4 (Q4); November–December). Each simulation had a randomly chosen start time, ensuring that a range of wind and water current conditions were considered. Lastly, the results from all 100 simulations were integrated to present the "outer envelope" for the distribution and sediment thicknesses from the discharged cuttings on the seabed.

The potential exposure to the nearest receptor, Horseshoe Reef (approximately 1.52 km south-east of the release location) was also assessed during the study.

Based on available literature, the modelling applied thresholds of 1 mm and 10 mm to define low and high exposure levels (Table 6-7).

Table 6-7: Reporting thresholds for sediment thickness for the cuttings discharge modelling

Reporting criteria thresholds	Sediment Thickness (mm)
Minimum reporting	0.05
Low exposure	1
High exposure	10

The modelling confirmed that there is no exposure predicted to reach the receptor Horseshoe Reef or other sensitive receptors. The closest distance to the minimum sediment reporting threshold of 0.5 mm is 0.91 km.

The discharged cuttings were predicted to settle predominately north of the release location during Q1 and Q4 in line with the current directions. While under Q2 and Q3 conditions due to the greater occurrence of southerly current flows, the cuttings were predicted to settle north and south from the release location.

Maximum thicknesses generated by the cuttings ranged between 2.3 mm (Q4) and 3.4 mm (Q1 and Q3), occurring up to approximately 150 m north of the release location, well below the High exposure threshold.

The maximum distance from the release location to the outer extent of the minimum threshold of 0.05 mm ranged from 1.41 (Q4) to 1.67 km (Q1 and Q2), north from the release location. The minimum distance from Horseshoe Reef to the minimum threshold of 0.05 mm ranged between 0.91 km (Q3) to 1.00 (Q2).

The maximum distances from the release location to the low (≥1 mm) exposure threshold were between 0.35 km (Q3) and 0.61 km (Q2), and the maximum area of coverage from the deposited cuttings was 0.032 km2 (Q2). There was no exposure at the high threshold (≥10 mm).

The results from all 100 simulations ("annualised conditions") revealed that the area of coverage of deposited cuttings on the seabed and maximum distance from the release location above the minimum reporting threshold of 0.05 mm were 0.85 km^2 and 1.7 km, respectively. The area of coverage of deposited cuttings based on the low threshold was 0.035 km^2 and the maximum distance from the release location was 0.6 km. Due to the greater occurrence of currents flowing north, the area of low exposure was also mostly predicted north of the release location. There was no exposure at the high threshold (≥10 mm).

Water Quality and Planktonic Communities

Cuttings and retained drilling fluid discharges are expected to increase turbidity and TSS levels above ambient concentrations in the upper surface layers. Cuttings discharge will be of a very short duration (over a total period of 5 days).

Cuttings with retained drilling fluids (WBM) will be discharged below the water line (from the CHA), small particle size distributions (PSDs) for cuttings (0.0014 mm- 1.41 mm) will be generated during the operation. During all four quarters, the cuttings thickness above the minimum threshold of 0.05 mm were more than 75 m from the release location due to the slow settling velocities of the sediments.

There is a large body of knowledge indicating a discharge of cuttings with adhered fluids diluting rapidly. These studies have found that within 100 m of the discharge point, a drilling cuttings and fluid plume released at the surface will have diluted by a factor of at least 10,000. Further to that, Neff (2005) states that in well mixed oceans waters, the plume is diluted by more than 100-fold within 10 m of the discharge site.

Given the generally low concentration of TSS outside the immediate vicinity of the discharge point, due to rapid dispersion of sediment and the short period of the discharge, the plume is not expected to have more than a very highly localised reduction in water quality and area of potential ecological impact. It is not predicted to impact productivity of the water column.

Injury/mortality to planktonic species may occur due to a change in water quality following discharges of drill cuttings and fluids. Impacts to these organisms can be as a product of both physical and chemical alterations of water quality, predominantly in the water column.

Impacts to zooplankton from turbidity are associated with variations in predator prey dynamics, which favours planktonic feeders over visual feeders (Gophen, 2015), while impacts to phytoplankton occur due to decreases in available light, therefore reducing productivity (Dokulil, 1994).

Jenkins and McKinnon (2006) reported that levels of suspended sediments greater than 500 mg/L are likely to produce a measurable impact upon larvae of most fish species, and that levels of 100 mg/L will affect the larvae of some species if exposed for periods greater than 96 hours. Jenkins and McKinnon (2006) also indicated that levels of 100 mg/L may affect the larvae of several marine invertebrate species, and that fish eggs and larvae are more vulnerable to suspended sediments than older life stages. However, the modelling suggest suspended sediment concentrations caused by the discharge of drill cuttings will be well below the levels required to cause an effect on fish or invertebrate larvae beyond the immediate vicinity of the discharge.

Due to the low levels of planktonic productivity in the offshore area, plankton populations on a regional scale are not expected to be affected by drilling operations. In addition, due to the open nature of the marine environment of the Operational Area and associated environmental conditions, the content and dispersive nature of drilling muds within the marine environment and the high population replenishment of these organisms, it is expected that impacts to plankton species will be limited to within tens of metres of the discharge point and return to previous conditions within a relatively short period of time. On this basis, the impacts to plankton from routine and non-routine discharges during drilling activities is slight.

Sediment Quality and Benthic Communities

Accumulation of cuttings on the seabed causes changes in the physical properties of the seabed sediment such as the particle size distribution (PSD), the introduction of contaminants from retained drilling fluids (WBM), and associated ecological effects.

KCL brine as outlined above is of flow toxicity and is considered to 'pose little or no risk to the environment'.

As described above, cuttings and unrecoverable fluids are discharged below the water line at the CHA site, resulting in cuttings and retained drilling fluids rapidly dispersing through the water column. The larger cuttings particles will drop out of suspension and deposit in proximity to the well site (tens to hundreds of metres distance) with potential for localised spreading downstream, while the finer fluid particles will remain in suspension and will be transported further away from the well site, rapidly diluting and eventually depositing over a larger area. The final deposition of cuttings and drilling fluids is largely determined by seabed depth and the time to drop out of suspension within the water column and deposit on the seabed. This leads to the coarser cuttings material being deposited at a location offset but closest to the well site in an area downstream and a distance up to of several hundreds of metres, with associated ecological effects within this area and the fines (predominately drilling fluids) dispersed over a greater distance from the discharge site, with no associated ecological effects.

Benthic organisms below the cuttings pile may be buried and smothered; however, the cuttings piles recolonise over time. Ecological impacts to benthic biota are predicted when sediment deposition is equal to or greater than 6.5 mm in thickness (IOGP, 2016). The maximum thickness as predicted by the modelling is 3.4 mm, therefore impacts to benthic organism is not expected. Therefore, impacts associated with routine and non-routine drilling discharges will be limited to the immediate area surrounding the well location, in the offshore, open water environment.

As described above, the sediment deposition from the discharge of drill cuttings and drilling fluids will be highly localised and no potential exposure to the nearest receptor, Horseshoe Reef (approximately 1.52 km southeast of the release location) is expected from the generation of drill cuttings and fluids. The minimum distance from Horseshoe Reef to the minimum threshold of 0.05 mm ranged between 0.91 km (Q3) to 1.00 (Q2).

The low sensitivity of the benthic communities/habitats within and in the vicinity of the Operational Area, combined with the low toxicity of WBMs, the highly localised nature and scale of predicted physical impacts to seabed biota, affirm that any predicted impact is considered likely but of a slight environmental consequence.

6.3.4.3 Environmental performance

Environmental outcomes, performance standards and measurement criteria for the discharge of cuttings and fluids are provided in the table below:

Environmental Risk	Discharge of cuttings and fluids		
Environmental Performance Outcomes	All discharges to sea are as low as reasonably practicable All discharges to sea are in accordance with legislative requirements		
Hierarchy	**Control Measures**	**Environmental Performance Standards**	**Measurement Criteria**
Administration	Chemicals used are assessed for environmental impact prior to purchase (refer Appendix A); 10OPGOPC06	Chemicals used are assessed for environmental impact prior to purchase (refer Appendix A). 10OPGOPC06 Chemical Management are used to inform selection. Chemical substitutes will be assessed prior to service and only those with an equivalent or better environmental performance selected.	Chemical assessment records verify chemicals are assessed prior to purchase and substitutes only selected if they have an equivalent or better environmental performance.
Engineering	Cuttings generated during sidetrack operations will be processed (using shale shakers) prior to discharge.	Returned cuttings will be processed using shale shakers equipment.	TEO audit or third party inspection document demonstrate that operational shale shaker is in use.
Engineering	Any cuttings generated from milling operations are contained and shipped to shore for disposal	All cuttings generated from milling operations are contained and shipped to shore for disposal	TEO audit or third party inspection document demonstrate all cuttings generated from milling operations are contained and shipped to shore for disposal.
Engineering	Shale shakers maintained to ensure efficient operations	An operational shale shaker must be in use at all times.	Records demonstrate that operational shale shaker is in use.
Engineering	KCl brine-based drilling fluids in compliance with PLONOR list.	PLONOR compliant KCl brine-based drilling fluids will be used.	TEO audit or third party inspection document demonstrate only PLONOR compliant KCl brine-based drilling fluids are used.

6.3.4.4 ALARP

The discharge of cuttings and fluids are required to safely undertake sidetrack operations. If the control measures are adhered to then the risk of cuttings and fluid discharges will have been reduced to ALARP. The proposed control measures for cuttings and fluid discharges are considered appropriate to manage the risk to ALARP. Additional controls considered but rejected are detailed below.

Rejected controls	Hierarchy	Practicable	Cost effective	Evaluation
Water quality and/or sediment monitoring of cuttings or drilling fluids to verify impact during activity.	Administration	×	×	No environmental benefit would be gained by implementation of monitoring during the activity. There is a considerable body of existing scientific literature on potential impacts of cuttings and impacts are generally well understood. Furthermore, it is not guaranteed that additional controls would be feasible, or if they would provide any environmental benefit. Cost/sacrifice outweigh benefit to be gained in the context of existing environment (deep water, open ocean communities with no proximity to sensitive benthic communities or receptors) and the extent of impact based on the drill cuttings modelling.

6.3.4.5 Residual risk

Aspect	Consequence	Likelihood	Residual risk
Side track cuttings and fluids	Moderate (2) – Minor environmental impact, slight or negligible impact, negligible remedial/recovery work	B – Very unlikely	Low (4)

6.3.4.6 Acceptability

Receptor	Consequence
Threatened / Migratory / Protected Fauna	Given the small volume of the planned discharge, the short duration (5 days) and the offshore location, alteration to marine fauna behaviour and impacts to sensitive receptors such as fish, marine turtles and mammals, and seabirds are not expected. Impacts will be limited to slight water quality impacts and highly localised impacts to benthic communities. Deteriorating water quality is identified as a potential threat to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-6), however this is related to pollution events and urbanisation close to land resulting in a permanent decline in water quality subsequently affecting food sources (e.g. seagrass for turtles). Given the planned discharges will quickly dissipate into the surrounding marine environment, water quality will not deteriorate significantly to result in long term impacts to marine fauna. Low numbers of marine fauna are expected in the vicinity, and few protected species (e.g. whales, turtles) given the lack of feeding/breeding/resting areas for these species.
Physical Environment/ Habitat	Not applicable – no physical environments and/or habitats identified in the area over which planned discharges are expected to disperse other than open water which will not be impacted.
Threatened ecological communities	Not applicable – no threatened ecological communities identified in the area over which planned discharges are expected to disperse other than open water which will not be impacted.
Protected Areas	The Cliff Head platform is 48 km to the Abrolhos AMP, and 80 km to the Jurien Bay AMP. In State waters, the Cliff Head platform is 97 km from the Abrolhos Islands' Fish Habitat Protection Area declared under the WA Fish Resources Management Act and 68 km to the Jurien Bay Marine Park. With these distances to protected areas, and controls in place to minimise impacts generated from planned discharges, the risk to the marine environment is considered low.
Socio-economic receptors	No stakeholder concerns have been raised regarding this aspect.
Acceptability of impact	**The potential consequence of CHA platform's discharge of cuttings and fluids in the event sidetrack activities are undertaken on receptors is discussed above. Given the results of the modelling and the control measures in place no significant impacts to sensitive receptors are expected. As such, the risk is considered acceptable.**

7 Potential environmental impacts and mitigation measures: Unplanned activities

7.1 Introduction of invasive marine species

7.1.1 Description of hazard

Invasive Marine Species (IMS) are a subset of Non-indigenous Marine Species (NIMS) that have been introduced into a region beyond their natural range resulting in impacts to social/cultural, human health, economic and/or environmental values. NIMS are species that have the ability to survive, reproduce and establish founder populations. However, not all NIMS introduced into an area will thrive or cause demonstrable impacts. The majority of NIMS around the world are relatively benign and few have spread widely beyond sheltered ports and harbours.

During operations and workover activities, vessels will be transiting to and from the Operational Area, potentially including traffic mobilising from beyond Australian waters. TEO usually contracts vessels that are located in Australian waters and would not usually mobilise a vessel from international waters. However, in the event that this occurs, there is a higher risk of IMS introduction.

During operations and workover activities, vessels have the potential to introduce IMS to the Operational Area through ballast water exchanges and biofouling. Cross contamination between vessels can also occur (e.g. IMS translocated between project vessels).

All vessels are subject to some level of marine fouling. The use (intake/ storage/ discharge) of seawater ballast is a standard operation in the management of vessel stability during operations. Organisms can also be drawn into ballast tanks during onboarding of ballast water. The organisms may survive within ballast tanks and can be relocated and then discharged with the ballast water into the Operational Area.

Organisms attach to the vessel hull, particularly in areas where organisms can find a good attachment surface (e.g. seams, strainers and unpainted surfaces) or where turbulence is lowest (e.g. niches, sea chests). Biofouling on vessels hulls, on other external/internal niche areas, and on equipment routinely immersed in water all pose a potential risk of translocating marine species. This can lead to the introduction of non-native marine species which can become established IMS, if the environmental conditions at the point of release are suitable. Commercial vessels typically maintain anti-fouling coatings to reduce the build-up of fouling organisms as per AMSA Marine Order 98—Marine pollution—anti-fouling systems.

During the Non Production Phase, IMR activities will be undertaken intermittently (Section 2.6.1). The number of vessels will become less frequent therefore reducing the risk of IMS introduction in the Operational Area during non-production compared to the Operations Phase.

7.1.2 Potential impact

IMS have the potential to cause a range of potentially serious ecological effects including:

- over-predation of native flora and fauna
- out-competing of native flora and fauna for food
- human illness through released toxins
- depletion of viable fishing areas and aquaculture stock
- reduction of coastal aesthetics
- damage to marine and industrial equipment and infrastructure
- impact to commercial users of the sea such as fisheries

- change in habitat quality
- injury/ mortality to fauna
- changes to the functions, interests or activities of other users.

IMS have been introduced and translocated around Australia by a variety of natural and human means including biofouling and ballast water. Species of concern are those that are not native to the region; are likely to survive and establish in the region; and are able to spread by human mediated or natural means. Species of concern vary from one region to another depending on various environmental factors such as water temperature, salinity, nutrient levels and habitat type. These factors dictate their survival and invasive capabilities. IMS typically require hard substrate in the photic zone, therefore requiring shallow waters to become established. Highly-disturbed, shallow-water environments such as shallow coastal waters, ports and marinas are more susceptible to IMS colonisation, whereas IMS are generally unable to successfully establish in deep water ecosystems and open-water environments where the rate of dilution and the degree of dispersal are high (Williamson and Fitter, 1996; Paulay et al., 2002; Geiling, 2014). Therefore, given the relatively shallow water location of the Operational Area (approximately 18 m), it may represent suitable habitat for the establishment of IMS.

It is recognised that artificial, disturbed and/or polluted habitats in tropical regions are susceptible to introductions which is why ports are often areas of higher IMS risk (Neil et al., 2005). However, in Australia there are limited records of detrimental impact from IMS compared to other tropical regions (such as the Caribbean).

Following their establishment, eradication of IMS populations is difficult, limiting management options to ongoing control or impact minimisation. Case studies in Australia indicate that from detection to eradication this can take approximately 4 weeks (Bax 1999). However, this is dependent on the environmental conditions and species. For this reason, increased management requirements have been implemented in recent years by Commonwealth and State regulatory agencies.

Under the arrangements of the Australian Ballast Water Management Requirements (CoA, 2020) that are enforced under the Biosecurity Act 2015, all vessels that have travelled from international waters are obligated to assess and manage their ballast water in accordance with the Australian Ballast Water Management Requirements. These arrangements prohibit the discharge of high-risk ballast water within Australian territorial seas (within 12 nautical miles of Australian territories) including Australian ports. It is also recommended under the Australian Ballast Water Management Requirements that ballast exchanges be conducted as far as possible away from shore and in water at least 200 m deep.

Ballast water is responsible for 20–30% of all marine pest incursions into Australian waters, however, research indicates that biofouling (the accumulation of aquatic micro-organisms, algae, plants and animals on vessel hulls and submerged surfaces) has been responsible for more foreign marine introductions than ballast water (DAFF, 2011).

Biofouling on vessel hulls and other external niche areas, biofouling on internal niches and biofouling on equipment routinely immersed in water all pose a potential risk of introducing IMS into Australia. The potential biofouling risk presented by the project/ support vessels will relate to the length of time that these vessels have already been operating in Australian waters or, if they have been operating outside Australian waters, the location/s of the surveys they have been undertaking, the length of time spent at these location/s, and whether the vessels have undergone hull inspections, cleaning and application of new anti-foulant coating prior to returning to operate in Australia.

Under the National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Commonwealth of Australia, 2009), the Cliff Head IMS Risk Assessment procedure (10HSEQENVPC06) is used to manage biofouling. The Cliff Head IMS Risk Assessment Procedure must be conducted for all vessels associated with a project prior to the vessel first mobilising to the project and within the CHA Operational Area includes the following:

- Provide the IMS vessel questionnaire (10HSEQENVPC06FM02) to the vessel provider / contractor prior to undertaking the assessment. Where a question is not relevant, indicate that this is the case. Where information is not available or unknown, this should be documented in the questionnaire
- Following receipt of the completed questionnaire, the information should then be entered into the Vessel-Check portal https://vessel-check.com/
- Note: the previous system of assessing IMS risk was through the Vessel Risk Assessment Score Sheet (VRASS). Vessel-Check supersedes VRASS; however, the VRASS can be utilised if the assessment for a particular vessel cannot be conducted using the Vessel-Check
- Complete a Submersible Equipment Risk Assessment Score Sheet (ERASS) (10HSEQENVPC06FM02) on all equipment that may be submerged whilst undertaking work in relation to the project e.g. anchors, moorings, ROVs.

The Vessel-Check portal provides an indicative risk assessment for a vessel, based primarily on the documented management practices used to mitigate the transfer of IMS. It follows the 'best practice' set out by the International Maritime Organisation (IMO) guidelines (Biofouling Guidelines).

An indicative biofouling management risk of the vessel (based on the information provided in the vessels profile) is automatically calculated (using the DPIRD developed risk assessment) when the vessel designates a Western Australian port as its destination port (through its transponding Automatic Identification System (AIS), or manually through the Vessel-Check portal). The indicative risk score is updated automatically on a daily basis up to 24hrs from the vessels expected arrival into the intended jurisdiction. After which time, the indicative risk can be re-calculated by the jurisdiction which oversees the intended destination port of the vessel

Vessels that remain in the region and do not enter ports that are known to host IMS do not require re-assessment between operations. Short duration trips from the project site, such as returning personnel to shore, refuelling or short duration berthing (days) in local harbours that do not have documented pest incursions will not require a vessel to be re-assessed. However, a risk assessment will be conducted annually on vessels providing ongoing support to CHA Operations.

It is then up to TEO in consultation with the Vessel Owner/Operator to consider the actions suggested and decide which actions are most appropriate for the vessel to ensure potential biofouling risks are mitigated to ALARP. The Department will actively provide advice to vessels should they require more detailed information to manage potential biofouling risks prior to their arrival into WA state waters.

International vessels will carry a current Statement of Compliance for International Anti-fouling Inspection Systems and will be assessed for bio-fouling risk prior to entry into Australian waters in accordance with the National Biofouling Management Guidance to the Petroleum Production and Exploration Industry with any required corrective actions such as inspection, cleaning and coating reapplication undertaken as appropriate.

Industry standards already in place ensure risks are reduced, these include recently introduced mandatory requirements of the Department of Agriculture, Fisheries and Forestry (DAFF) Australian Ballast Water Management:

- Operators of all vessels subject to biosecurity control will be required to provide information on how biofouling has been managed prior to arriving in Australian territorial seas. This information will need to be reported through the department's Maritime Arrivals Reporting System (MARS)
- Vessel operators will receive less intervention for biofouling if they comply with one of the following three accepted biofouling management practices:
    - Implementation of an effective biofouling management plan; or
    - Cleaned all biofouling within 30 days prior to arriving in Australian territory; or
    - Implementation of an alternative biofouling management method pre-approved by the department.
- A vessel operator that has not applied one of the three accepted biofouling management practices will be subject to further questions and assessment of the biosecurity risk associated with biofouling on the vessel.

Given the water depth of the Operational Area (approximately 18 m) and the distance from the closest landfall (11 km due east), it is unlikely that an IMS would be able to successfully translocate from the Operational Area to surrounding shallower habitats. With controls in place as above to reduce the risk of introduction of IMS the likelihood of introducing an IMS is considered low. In addition, TEO have never had any incident in relation to introduction of IMS.

If an IMS is introduced, they have been known to colonise areas outside of the areas they are introduced to. Subsequently there is the potential for an introduction. In the event that an IMS is introduced into the Operational Area, given the lack of diversity and extensiveness of similar benthic habitat in the region, there would only be a minor reduction in the physical environment.

7.1.3 Environmental performance

Environmental outcomes, performance standards and measurement criteria for Introduction of IMS are provided in the table below:

Environmental Risk	Introduction of IMS
Environmental Performance Outcomes	No introduction of IMS as a result of activities

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Engineer	All vessels to have a suitable antifouling coating in sound condition on the hull to minimise risk of IMS attachment	All project/ support vessels have a valid antifouling certificate from the International Association of Classification Societies in accordance with AMSA Marine Order 98 (Marine pollution—anti-fouling systems).	Valid antifouling certificate from the International Association of Classification Societies in accordance with AMSA Marine Order 98 (Marine pollution—anti-fouling systems) was in place and accessible for all project vessels.

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Administration	Annual IMS Risk Assessment on vessels providing ongoing support to CHA Operations	IMS risk assessment (10HSEQENVPC06) (operational history, ballast water assessment, anti-fouling coating) to be carried out annually on vessels providing ongoing support to CHA Operations	TEO vessel audit or third party inspection document demonstrate DPIRD vessel check risk assessment has been undertaken annually on vessels providing ongoing support to CHA Operations
Administration	All vessels and submersible equipment to be subject to IMS risk assessment prior to contracting and entering Operational Area	IMS risk assessment (10HSEQENVPC06) (operational history, ballast water assessment, anti-fouling coating) to be carried out as part of vessel contracting process demonstrating IMS risk is acceptable or low	TEO vessel audit or third party inspection document demonstrate IMS risk assessment has been undertaken to show vessel/ submersible equipment IMS risk is acceptable or low
Administration	Implementation of additional management measures	Management measures are implemented that are commensurate with the risk (such as the treatment of internal systems, IMS inspections or cleaning), to minimise the likelihood of translocating IMS within a vessel's biofouling to the Operational Area.	TEO vessel audit or third party inspection document demonstrate management measures which have been implemented where identified through the IMS vessel risk assessment process were maintained.
Administration	Ballast water on all vessels managed to reduce risk of IMS	Ballast water on all vessels to be managed in accordance with Australian Ballast Water Management Requirements	Ballast Water Records System maintained by vessels which verifies compliance against Australian Ballast Water Management Requirements.
Eliminate	No high risk (i.e. beyond Australia) ballast water on board vessels	All ballast water onboard vessels to be low risk (i.e. sourced from Australian waters - 200 NM EEZ)	
Administration	Project/ support vessels to have Ballast Water Management Plan in accordance with relevant IMO and International Convention for the Control and Management of Ship's Ballast Water and Sediments requirements	Ballast Water Management Plan for project/ support vessels must comply with: • Regulation B-1 of the International Convention for the Control and Management of Ship's Ballast Water and Sediments 2004; and should have been prepared in accordance with: • IMO Guidelines for Ballast Water Management and the Development of Ballast Water Management Plans (IMO Resolution MEPC.127(53).	TEO vessel audit or third party inspection document demonstrate Vessel Ballast Management Plan in place
Eliminate	No ballast water discharge or hull cleaning in CHA exclusion zone to reduce chance of IMS establishment on existing infrastructure.	No ballast discharge from vessel or hull cleaning in CHA exclusion zone	Vessel ballast log books (and management plan if needed) indicate no ballast discharge in CHA exclusion zone Hull cleaning recorded in vessel log indicate no hull cleaning in CHA exclusion zone

7.1.4 ALARP

The proposed management controls for IMS are considered appropriate to manage the risk of pest introduction in this case and bring the chance of pest introduction to ALARP. Additional controls considered but rejected are detailed below.

Rejected controls	Hierarchy	Practicable	Cost effective	Evaluation
All vessels to be sourced from Australian waters	Administration	×	×	Delays to activities caused by delays to contracting vessel. Minimal benefit expected given the implemented controls would ensure only low IMS risk vessel are contracted.
No routine discharge of ballast water from vessels	Eliminate	×	×	Due to water depths in the Operational Area, ballast water is required to be discharged to control the position of the vessel in the water.
IMS inspection of all vessels	Administration	×	×	The IMS inspection of all vessels would result in significant cost and schedule impacts. In addition, TEO's the Cliff Head Invasive Marine Species Risk Assessment Procedure is seen to be more cost effective as this control allows TEO to manage the introduction of marine pests through biofouling, while targeting its efforts to and resources to areas of greatest concern. Inspection of all vessels for IMS would reduce the likelihood of IMS being introduced to the Operational Area. However, this reduction is unlikely to be significant given the other control measures implemented. No change in consequence would occur.
Transfer of ballast water to separate vessel for discharge outside Operational Area	Eliminate	×	×	Substantial additional cost. Potential activity downtime and increase in activity duration as operations would likely need to cease during ballast water transfer. Little benefit given lack of sensitive habitats (shallow water habitats etc.), and potential translocation vectors (static vessels) in Operational Area. Introduction of additional safety risks to personnel during VTVT (vessel to vessel transfer) operations.
Application of new anti-foulant coating to vessels prior to contract commencement	Engineering	×	×	Substantial additional cost, potential delay to production operation. Little benefit given recent anti-fouling treatment history for vessels.
Hull cleaning on every occasion	Engineering	×	×	Additional cost and potential delay to production operation, little benefit since hulls will be inspected and cleaned if required.
Ballast water treatment (e.g. biocide)	Engineering	×	×	Biocide in ballast water may lead to additional environmental impacts (i.e. discharge of toxic ballast), net environmental benefit is considered to be lower. Non-toxic treatment (e.g. UV) constrains vessel selection - see fresh water ballast justification
Fresh water ballast	Engineering	×	×	Requires fresh water on vessels (e.g. tanks, RO plant), which may significantly constrain vessel selection. Given nature and scale of activity, cost is grossly disproportional to environmental benefit

7.1.5 Residual risk

Aspect	Consequence	Likelihood	Residual risk
Introduction of IMS	Serious (3) – serious environmental impact with some on-site impact and recovery work over a few days. Some local media interest, serious, adverse local public or media attention or complaints	B – very unlikely	Medium (6)

7.1.6 Acceptability

Consequence	
Threatened / Migratory / Protected Fauna	IMS have the potential to outcompete native species for food and space. Although this is unlikely to have direct impacts to threatened fauna, IMS may reduce food source quality or quantity, for example, in primary producers, invertebrates or fish.
Physical Environment/ Habitat	IMS have the potential to impact habitats such as coral, seagrass or macroalgae. In the event that an IMS is introduced into the Operational Area, given the lack of diversity and extensiveness of similar benthic habitat in the region, there would only be a minor reduction in the physical environment.
Threatened ecological communities	TECs do not occur in the Operational Area and therefore are unlikely to be exposed to introduce IMS.
Protected Areas	No protected areas occur in the Operational Area and therefore are unlikely to be exposed to introduce IMS.
Socio-economic receptors	Introduction of IMS could result in negative impacts to native fish and invertebrate species (either directly, or indirectly through loss/change in food or habitat) which could pose risk to fisheries. Other socioeconomic receptors are unlikely to be affected. No unresolved stakeholder concerns have been raised regarding this aspect.
Likelihood	
The pathways for IMS introduction are well known, and subsequently standard preventative measures are proposed. The ability for invasive marine species to colonise a habitat is dependent on a number of environmental conditions. It has been found that highly disturbed environments (such as marinas) are more susceptible to colonisation than open water environments where the number of dilutions and the degree of dispersal are high. Given the shallow water depths within the Operational Area, the conditions could be considered more favourable (depending on the IMS introduced). However, the Operational Area is not considered to be similar to that of ports given the low vessel traffic, flushing due to the currents which likely results in low marine pollution levels. With controls in place to reduce the risk of introduction of IMS the likelihood of introducing an IMS is considered very unlikely.	
Acceptability of risk	**In line with industry standards and legislation, vessels and in-sea equipment that are internationally mobilised will meet requirements applied by the WA and Commonwealth government. All vessel sourced will have low IMS risk. Application of the proposed management and adherence to regulations reduces the likelihood of introducing IMS into the Operational Area. It is thought that owing to the low likelihood of an IMS entering the Operational Area, the risk is deemed acceptable in this case.**

7.2 Vessel collision with marine fauna

7.2.1 Description of hazard

Vessels operating in the Operational Area during routine operations and IMR activities, and helicopter movements may present a potential hazard to marine fauna such as cetaceans and avifauna. Vessel movements can result in collisions between the vessel and marine fauna, potentially resulting in injury or mortality. The factors that contribute to the frequency and severity of impacts due to collisions vary greatly due to vessel type, vessel operation (specific activity, speed), physical environment (e.g. water depth) and the type, age and behaviour of the animal present.

During the Non Production Phase, IMR activities will be undertaken intermittently (Section 2.6.1). The number of vessels will become less frequent therefore reducing the risk of marine fauna collision in the Operational Area during non-production compared to the Operations Phase.

7.2.2 Potential impact

The presence of vessels and helicopters has the potential for physical and/or behavioural impact on marine fauna including injury/mortality from vessel strike and/or temporary and localised displacement due to physical presence. Marine fauna that are present in shallow or surface waters are most susceptible to vessel strike due to their proximity to the vessel (hull, propeller or equipment) and their limited ability to avoid vessels (i.e. diving) in shallow waters. The species of marine fauna that are likely to be most susceptible to vessel strike are described below.

7.2.2.1 Marine mammals and sharks

A number of protected species and BIAs are identified as occurring within the Operational Area and wider EMBA (Section 4.6.2). BIAs include humpback whale migration, pygmy blue whale distribution, foraging and migration, Australia sea lion foraging, and white shark foraging. The Conservation Management Plan for the Blue Whale (DoE, 2015) identifies vessel strike as one of the threats to blue whale species. Similarly, vessel strike is also recognised by the Approved Conservation Advice for *Rhincodon typus* (whale shark) (TSSC, 2015) as one of the threats to the recovery of whale sharks.

Cetaceans are naturally inquisitive marine mammals that are often attracted to vessels underway; for example, dolphins commonly ‘bow ride’ with vessels. There have been recorded instances of cetacean deaths as a result of vessel collisions in Australian waters (e.g. a Bryde’s whale in Bass Strait in 1992) (WDCS, 2006), though the data collected indicates this is likely to be associated with container ships and fast ferries. Collisions between vessels and cetaceans are most frequent on continental shelf areas where high vessel traffic and cetacean habitat occur simultaneously (WDCS, 2006).

The reaction of whales to the approach of a ship is quite variable. Some species remain motionless when in the vicinity of a ship while others are known to be curious and often approach ships that have stopped or are slow moving, although they generally do not approach, and sometimes avoid, faster moving ships (Richardson et al., 1995).

Other marine fauna like turtles, Australian sea lions, white sharks and whale sharks that are present in shallow waters or surface waters are also susceptible to vessel strike due to their proximity to the vessel (hull, propeller or equipment) and their limited ability to avoid vessels.

Whale sharks may be vulnerable to boat strike. They spend a significant amount of time feeding in surface waters (DEH, 2005; Norman, 1999) and scars have been observed on several whale sharks that have likely been caused by boat collision (DEH, 2005). There have also been several reports of whale sharks being struck by bows of larger ships in other regions where whale sharks occur (Norman, 1999).

7.2.2.2 Birds

A number of EPBC Act listed seabird and migratory shorebird species have been identified as occurring or having the potential to occur in the Operational Area and wider EMBA, in addition to a number of foraging BIAs (Section 4.6.7). Furthermore, the Approved Wildlife Conservation Plan for Seabirds identifies bird strikes as a contributing factor to threats likely to affect seabird populations adversely (DAWE, 2020).

Seabirds may be attracted to CHA due to increased opportunities to feed on pelagic fish. However, these behavioural changes are unlikely to alter population dynamics or significantly change the habitat use of birds. Whilst helicopter flights required to the facility occur frequently (Section 2.5.1), flights occur in the daylight, thereby reducing potential interactions with birds. The risk of helicopter strike is not high because helicopter noise is expected to elicit a behavioural response in birds to avoid collision and because of the relatively low speeds at which helicopters would be flying during take-off or landing.

7.2.3 Environmental performance

Environmental outcomes, performance standards and measurement criteria for vessel presence are provided in the table below:

Environmental Risk	Vessel presence
Environmental Performance Outcomes	No vessel collision with marine fauna as a result of vessel movements

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Administration	Marine fauna sightings reported to DCCEEW and any vessel strikes reported	Marine Fauna Sighting Datasheets submitted to DCCEEW. Vessel strikes reported to NMMC Death or injury to EPBC Act listed marine fauna (including cetaceans or whale sharks) from vessel collision are recorded/reported to NOPSEMA and DCCEEW in line with regulations	Cetacean Sighting Records maintained; records of transmittal to DCCEEW
Administration	CHA site inductions completed by all personnel to ensure understanding of reporting requirements and EPBC regulations	CHA Site Induction (10SPTRNTM18) carried out for all personnel which requires reporting of any sighting of cetacean and reporting requirements in case of fauna death or injury	CHA Site Induction documentation includes information on sensitive marine fauna. Training records show all personnel travelling offshore have received the CHA Site Induction
Administration	Vessels to maintain bridge watch as per Marine orders 21 to ensure risk of marine fauna collision is minimised	Vessels maintain compliance with Marine Order 21 for the duration of the EP, specifically: • Vessels adhere to minimum safe manning levels • Emergency management plan is on board vessels.	TEO vessel audit or third party inspection document demonstrate that: • All vessels have adhered to minimum safe manning levels, including bridge watch • The emergency management plan was on board all vessels
Administration	Contractor procedures reviewed to ensure	In accordance with Part 8 of EPBC Regulations (Vessels), all vessels	Records demonstrate that contractor procedures are

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
	vessels adhere to EPBC Regulations (Part 8) during activity to reduce potential for impact to cetaceans prior to mobilisation	must travel at less than 6 knots within the caution zone of a cetacean (150 m radius for dolphins, 300 m for whales) known to be in the area.	reviewed to ensure compliance with EPBC regulations prior to mobilisation TEO vessel audit or third party inspection document confirm contractors comply with Cliff Head Marine Operations Procedure (10OPGOPC04) which includes EPBC regulations requirement All incidences of non-compliance with EPBC Regulations 2000 - Part 8 Division 8.1 (interacting with cetaceans) to be recorded Incident report in MyOsh and written notification as per reporting requirements.
Administration	Operation of vessels will be in accordance with Marine Notice 15/2016: Minimising the risk of ships colliding with cetaceans.	Vessels are required to: • maintain a look out for cetaceans, in particular in times and locations identified for five EPBC Act listed whale species warn other vessels in the vicinity, using all appropriate means of communication, if whales have been sighted; • consider reducing vessel speed in areas where whales have been sighted; and • consider modest course alterations away from sightings.	TEO vessel audit or third party inspection document demonstrate that: Conformance checked via vessel logs and completed marine fauna data sheet

7.2.4 ALARP

No alternative options to the use of vessels are possible in order to undertake the activity. If the management controls are adhered to then the risk of marine fauna collisions due to vessel presence will have been reduced to ALARP.

The proposed management controls for vessel presence are considered appropriate to manage the risk to ALARP. Additional controls considered but rejected are detailed below.

Rejected controls	Hierarchy	Practicable	Cost effective	Evaluation
Use of Marine Fauna Observers (MFOs)	Administration	×	×	Additional operation costs ($150-200k per year). Unlikely to increase detection of marine fauna given the platform is unmanned and low frequency of vessels travelling to and from the platform and therefore would not significantly reduce impacts.

Rejected controls	Hierarchy	Practicable	Cost effective	Evaluation
Use of vessels with dynamic positioning (DP) systems	Engineering	×	×	The requirement for DP would significantly constrain vessel selection. DP systems generate high intensity broadband underwater noise, increasing the environmental risks and impacts associated with increased underwater noise. DP thrusters may also resuspend sediments in shallow areas, leading to a temporary, localised decrease in water quality. TEO does not commit to using DP vessels for operational or IMR activities, although retains the option to use DP vessel if required.
Vary the timing of project activities to avoid migration periods.	Eliminate	×	×	Minor benefit in terms of reduced risk to whales, given low frequency of vessel's operations and also the low numbers of whale individuals expected to be encountered within the Operational Area. Would result in 4-5 months where no activities or production could occur leading to losses of >$5m.

7.2.5 Residual risk

Aspect	Consequence	Likelihood	Residual risk
Vessel presence	Moderate (2) – Minor environmental impact, slight or negligible impact, negligible remedial/recovery work	A – extremely unlikely	Low (2)

7.2.6 Acceptability

Consequence	
Threatened / Migratory / Protected Fauna	In the event of a collision with marine fauna, there is the potential for injury or death to an individual. The number of receptors present in the Operational Area are expected to be limited to a small number of transient individuals, no significant areas of habitat are present in the immediate vicinity of the CHA platform although migratory whales and foraging seabirds may be encountered in the Operational Area. Vessel strike is identified as a potential threat to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-6). As such there is the potential for death or injury of EPBC listed individual species, however as they would represent a small proportion of the local population it is not expected that it would result in a decreased population size over what would usually occur due to natural variation, at a local or regional scale, It is expected that the loss of an individual would be a minor consequence.
Physical Environment/ Habitat	Not applicable – relates to marine fauna only No stakeholder concerns have been raised regarding this aspect.
Threatened ecological communities	
Protected Areas	
Socio-economic receptors	
Likelihood	

Consequence	
Given the low number of individuals potentially encountered in the Operational Area, the management controls in place to identify individuals, and the low speed of vessels in the Operational Area, injury or death of an EPBC listed species is low.	
Acceptability of risk	**The likelihood of marine fauna being seriously or fatally harmed is low, and in the unlikely event of a collision occurring, the loss of an individual is unlikely to lead to long term negative impacts to populations or the species. With the control measures in place, including compliance with industry standards and legislation, the risk is considered acceptable.**

Consequence	
Threatened / Migratory / Protected Fauna	In the event of a collision with marine fauna, there is the potential for injury or death to an individual. The number of receptors present in the Operational Area are expected to be limited to a small number of transient individuals, no significant areas of habitat are present in the immediate vicinity of the CHA platform although migratory whales and foraging seabirds may be encountered in the Operational Area. Vessel strike is identified as a potential threat to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-6). As such there is the potential for death or injury of EPBC listed individual species, however as they would represent a small proportion of the local population it is not expected that it would result in a decreased population size over what would usually occur due to natural variation, at a local or regional scale, It is expected that the loss of an individual would be a minor consequence.
Physical Environment/ Habitat	Not applicable – relates to marine fauna only No stakeholder concerns have been raised regarding this aspect.
Threatened ecological communities	
Protected Areas	
Socio-economic receptors	

Likelihood	
Given the low number of individuals potentially encountered in the Operational Area, the management controls in place to identify individuals, and the low speed of vessels in the Operational Area, injury or death of an EPBC listed species is low.	
Acceptability of risk	**The likelihood of marine fauna being seriously or fatally harmed is low, and in the unlikely event of a collision occurring, the loss of an individual is unlikely to lead to long term negative impacts to populations or the species. With the control measures in place, including compliance with industry standards and legislation, the risk is considered acceptable.**

7.3 CHA hydrocarbon and chemical spills

7.3.1 Introduction

Eight potential oil/diesel, chemical spill scenarios, and one PFW scenario have been identified from Cliff Head operational activities, which are provided in Table 7-1 below. The impacts on the environment are discussed below for crude oil, diesel and chemical spills.

Chemicals are used for chemical injection and workover activities, and will be used in the event of sidetrack drilling (see Section 2). Appendix A describes each chemical used during these operations and the potential environmental risk should they be released. It is possible that different chemicals may be used throughout the operational life of CHA; however, these chemicals will be similar to those outlined in Appendix A and will pose similar environmental risks. No planned discharge of these chemicals is to occur during the CHA operations (including workover and sidetrack drilling activities) and IMR activities but may be accidently released via a number of scenarios as summarised in Table 7-1.

The spill scenarios identified in Table 7-1 include a topsides process leak based on an incident that occurred in 2018 which led to a Crude (mixed with water) spill occurred due to a fatigue crack in the discharge line of a Coriolis mass flow meter. This is discussed more in Section 7.3.3.

Table 7-1: Spill Scenarios

Incident	Substance Type	Worst Case Release	Section
CHA hydrocarbon spills			
Pipeline leak (corrosion related) undetected between surveillance programme every 21 days) *	Crude (mixed with water)	Crude: 97.0 m^3 (0.192 m^3/hour over 21 days)	7.3.3
Topside Process leak (from a flowline or from the production header) and leak undetected for 21 days.	Crude (mixed with water)	Crude: 84.3 m^3 (0.136 m^3/hour over 21 days	
On deck spills/leakages	Diesel / lube / hydraulic oil / waste oil	<1.8 m^3 (instantaneous)	7.3.4
Vessel spills			
Vessel tank rupture*	Diesel	500 m^3 (3 hours)	7.4.1
Refuelling Spill	Diesel	~37.5m^3	7.4.2
Leakage / spillage on-board vessel	Diesel	<80 litres (instantaneous)	7.4.3
CHA chemical spills			
Chemical spill	See Appendix A	<190L (instantaneous)	7.3.4
Workover chemical spill		<20L (instantaneous)	7.3.5
Produced formation water spill		6.5m^3 (instantaneous)	7.3.6

*Scenarios with RPS modelling (RPS 2022b)

The four types of oil involved in CHA operations are crude oil, diesel, and lubricating and hydraulic oils which are used on the CHA offshore platform and associated vessels.

Aviation fuel is not considered further as no helicopter refuelling will take place in the Operational Area. Classification of oils and their behaviour at sea are given in Table 7-2.

Table 7-2: Cliff Head Oil Types

Oil	Specific Gravity	API Gravity	Pour Point	Wax Content	Viscosity	Oil Group*
Cliff Head Crude Oil	0.86	33.5	33ºC	High (16.8%)	Solid at 20ºC/13.5 at 50ºC	IV
Marine Diesel Fuel Oil	0.84	55	-50ºC max.	Low to Moderate	4 at 25ºC	II-III
Hydraulic oil	0.85-0.9	50	-100ºC max.	Low	Low	III
Lubricating oil	0.86-0.88	50	-100ºC max.	Low	30-240 at 20ºC	III

*Classified according to International Tanker Owners Pollution Federation (ITOPF)/US Coast Guard.

Out of the four hydrocarbon types used during CHA activities, the two hydrocarbons which have the potential for the greatest spill magnitude in terms of volume, extent and have the potential for shoreline contact are Cliff Head crude and marine diesel.

Therefore, these two hydrocarbon types (Cliff Head Crude and marine diesel), for the identified worst case scenarios (marked * in Table 7-1) were selected for spill trajectory modelling.

It is assumed that any other hydrocarbon spills (smaller crude, diesel, lubricating and hydraulic oils spills) will remain within the worst-case spill trajectory.

7.3.1.1 Loss of well control

All the production wells at the CHA platform utilise artificial lift in the form of ESPs to produce.

Based on field tests and analysis, and at the current water cut and reservoir pressure, none of the production wells will naturally flow to surface. Therefore, a free flow oil spill scenario resulting from a loss of well control is not considered credible. For workovers on the wells, the ESPs will be electrically isolated and/or disconnected.

During routine operation, the ESPs also have inherent auto detection of abnormal power or electrical communication situations and will automatically shut down if an abnormality is detected. Should power or electrical communications between ASP and CHA fail, CHA is designed to fail safe. As such, any failure in the power or control from ASP will be detected as abnormal resulting in the ESPs to stop functioning, or CHA to shut down. Therefore, no scenarios are deemed credible for the ESPs to continue functioning in a loss of well control situation.

The only credible scenario for a loss of well control would be if the CHA platform toppled. It is noted, a major vessel collision (i.e. a large vessel at speed) could potentially cause the CHA to lose stability sufficiently to expose the production well contents to the environment in the event of loss of well pressure containment integrity. However, if this scenario was to occur, power would be cut to the ESPs and they would cease to function. This may result in a very small quantity of oil discharged to the environment, but it would be less than that described below for a pipeline rupture as it would be a small finite amount released. Furthermore, should CHA be impacted the downhole tubing retrievable surface controlled subsurface safety valve (TRSCSSSV) installed in all production wells would close and isolate the wells from the reservoir.

7.3.2 Spill trajectory modelling

7.3.2.1 Stochastic Approach

Stochastic modelling was carried out using an historic sample of wind and current data for the region (RPS, 2022b). For each season, a large number of replicate simulations (100) were modelled, each initialised at different, randomly selected point in time for that seasonal period and hence under a different time series of environmental conditions. This stochastic sampling approach provides an objective measure of the possible outcomes of a spill, because environmental conditions will be selected at a rate that is proportional to the frequency that these conditions occur over the study area. More simulations will tend to use the most commonly occurring conditions, while conditions that are more unusual will be represented less frequently.

Two locations were selected for undertaking spill modelling, one in Commonwealth waters at 18 m water depth along the pipeline (Location 1) and one in State waters (released at 6 m water depth from the pipeline – Location 2). A potential vessel collision scenario resulting a loss of 500 m3 diesel to the marine environment was modelled at the Commonwealth waters location (Location 1); this modelling is highly conservative as project vessels are considered to most likely have a fuel storage capacity of up to approximately 20 m^3.

7.3.2.2 Pipeline Rupture - Seabed Release Behaviour

The modelling incorporated a Cliff Head crude seabed release from a pipeline leak related to a corrosion defect in the pipe wall. This scenario represents a high-pressure jet release of mixed gas, oil and water through a small hole (10 mm, considered indicative of a maximum size of hole where loss would go undetected, see Section 7.3.3.1 for more details) as a result of corrosion or physical damage. The turbulence generated by such discharge will tend to break the oil up into droplets of various size, with the size predicted from characteristics of the discharge, including the release depth (and pressure), the discharge velocity, gas/water/oil ratio and physical oil characteristics (density, viscosity).

The release depth for the pipeline leak was specified as 18 m (greatest possible depth) at Location 1 and 6 m depth at Location 2. The gas released with the oil is forecasted to expand and rise as a cone of rising gas bubbles that would initially entrain the oil droplets and ambient sea water upwards towards the surface. The lift generated by this entrainment is forecast to breach the surface. The rising oil is forecasted to reach the surface as a plume approximately 5 m in diameter at Location 1 and 3 m in diameter at Location 2.

The pressurised droplets have a similar range in size at both locations: ~4.0 – 17.2 mm in size at Location 1, and ~3.7 – 16.0 mm at Location 2. The data indicated that Cliff Head Crude is biodegraded with a high pour point (33 ºC) relative to local water temperatures (12-20 ºC) and is therefore expected to solidify on cooling from the reservoir temperature.

Weathering Characteristics of crude

RPS conducted a series of model weather tests to illustrate the potential behaviour of the oil types (Cliff Head crude and marine diesel) when exposed to idealised and representative environmental conditions (RPS 2022b).. The tests completed for both oil types were:

- Instantaneous release to the surface at the specified rate of discharge under calm wind conditions (constant 5 knots or 2.6 m/s), assuming low seasonal water temperature (19°C) and average air temperature (25°C), providing the worst-case breakdown rates of the crude. The slick also subject to ambient tidal and drift currents.
- Instantaneous release to the surface at the specified rate of discharge under variable wind conditions (4 – 19 knots or 2.1 – 9.8 m/s, drawn from representative data files), assuming low seasonal water temperature (19°C) and average air temperature (25°C), providing the

worst case breakdown rates of the crude. The slick also subject to ambient tidal and drift currents.

In addition, the weathering behaviour of Cliff Head Crude was examined. The first weathering scenario is indicative of cumulative weathering rates under calm conditions that would not generate entrainment, while the second weathering scenario may represent conditions that could cause a minor degree of entrainment. The final test scenario provides an indication of the potential build-up of oil either at the surface or in the water column. These modelling scenarios and hydrocarbon parameters were simulated for annual conditions i.e. transitioning from winter (May – September) to summer (October – April).

7.3.2.3 Contact Thresholds

The following contact threshold concentrations for surface hydrocarbons, entrained hydrocarbons and dissolved aromatic hydrocarbon concentration and dosage used in interpreting the modelling study are summarised in Table 7-3 below.

Table 7-3: Summary of the contact thresholds used to interpret the RPS 2022b modelling study results

Hydrocarbon Type	Threshold	Justification
Surface oil	10 g/m^2 (environmental impact threshold)	Estimate for minimal thickness that may result in harm to seabirds has been estimated between 10 g/m^2 (French 2000) to 25 g/m^2 (Koops et al., 2004).
	1 g/m^2 (socio-economic impact threshold)	1 g/m^2 is a conservative concentration and indicative of the visible area of a spill (Bonn Agreement 2003). Since tourism is important for the region, this threshold was chosen to enable conservative assessment of potential impacts.
Accumulated shoreline oil	100 g/m^2	French-McCay (2009) defines a shoreline oil accumulation threshold of 100 g/m^2, or above, would potentially harm shorebirds and wildlife (fur-bearing aquatic mammals and marine reptiles on or along the shore) based on studies for sub-lethal and lethal impacts. Additionally, a shoreline concentration of 100 g/m^2, or above, is the minimum concentration that the oil can be effectively cleaned according to AMSA (2015).
Entrained oil	100 ppb	Harmful effects of entrained oil are dependent on test organism and oil type. Mortality of molluscs ranges from 500 to 2 ppb with wider exposure sensitivity in crustaceans and fish larvae (NRC 2005). Therefore, the threshold selected above is considered representative in accommodating sensitivities of organisms to entrained hydrocarbons.
Dissolved oil	50 ppb	A review of toxicity tests for water accommodated fraction reported LC_{50} values for PAHs ranging between 6 and 410 ppb (French-McCay 2002). Therefore, the threshold selected above is considered a suitable value in accommodating sensitivities of organisms to dissolved aromatic hydrocarbons.

7.3.2.4 Accumulated hydrocarbons

The stochastic modelling is able to track hydrocarbons at concentrations lower than 1g/m^2. Should hydrocarbons gather at shorelines it is possible for these lower concentrations to accumulate and build up to concentrations greater than 1 g/m^2. This leads the modelling output to report volumes of hydrocarbons at concentrations >1 g/m^2 making contact with shorelines.

Accumulated concentrations are calculated by summing the mass of oil that arrives at any concentrations, including films arriving at lower concentrations than the thresholds applied to calculate surface contact, and subtracting any mass lost through evaporation and washing off where relevant.

Contact Locations

To aid assessment of potential impacts of a spill on the environment, potentially impacted shorelines were split into areas. These are:

- Abrolhos Shoals - submerged shoals to the east of the emergent Abrolhos Islands;
- Abrolhos Islands - exposed shorelines, impacts assessed in three sub-locations; Wallabi Group, Easter Group and Pelsaert group;
- WA coast.

Exposed shorelines along the WA coast, impacts assessed at six sub-locations; Shoal point to Oakabella, Geraldton, Dongara, Leeman, Cervantes, and Lancelin to Ledge point. Note that the sensitive receptor zones were extended from the coastline (0 m) to the 10 m contour line. The release sites are positioned within the Dongara shallows so this site would always receive some oil under each of the scenarios. These locations are shown on Figure 7.1.

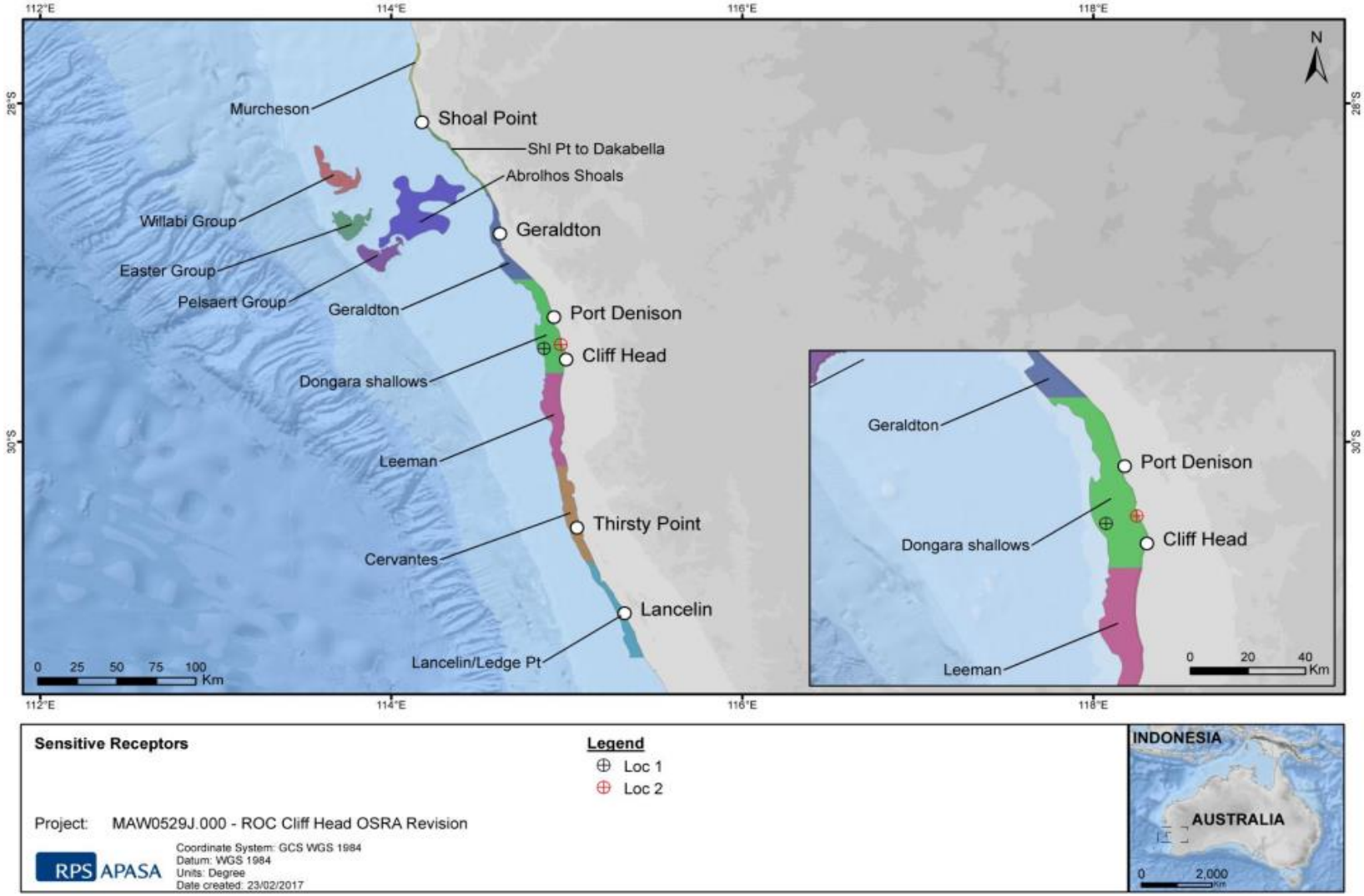


Figure 7.1 : Locations assessed for shoreline contact in the stochastic oil spill trajectory modelling*

***Note that Loc 1 is the location of the CHA platform which was the modelled spill source for the pipeline leak scenarios discussed in the following sections. Loc 2 is the location of a pipeline leak occurring in State waters. Although this is a scenario which is out of the scope of this EP, to account for pipeline leaks occurring closer to the Commonwealth-state boundary, the modelling results of this scenario are considered for conservatism.**

7.3.3 Pipeline and Topside Process leaks

7.3.3.1 Description of Hazard

Pipeline leak

Accidental release of Cliff Head crude from the pipeline could occur due to:

(1) ruptures due to physical damage arising from objects being dropped on the pipeline, vessel interaction (e.g. anchor drag) or equipment (e.g. fishing) being dragged across the pipeline; or
(2) leaks due to corrosion, materials fatigue or physical damage (e.g. during IMR activities).

Pipeline pressure is monitored from the ASP plant onshore. Should a major rupture occur, shut down of the pipeline can be activated remotely (automatically or manually). The amount of crude that can be released into the marine environment can be estimated as the maximum export oil flow rate (10.8 m^3/hour) multiplied by the time taken to identify the loss and shut down the system, 1 minute for automatic, and 1 hour for manual and 10% of the volume of oil in the pipeline lost to sea. It is noted, after shutdown oil will migrate to the high points in the pipeline, i.e., either CHA or ASP, and only limited mixing with seawater will result. This gives a potential release volume of 3.5 m^3 (automatic shutdown) to 14 m^3 (manual shutdown) of Cliff Head crude discharged into the marine environment at a conservative (worst case) rate of 10.8m^3/hr.

However, it is possible a smaller leak may occur below the limit of detection by measuring instruments at ASP; it was estimated that a spill of < 2% of the daily flow would be below the limit of detection. Since the leak might not be detected by measuring instruments, the only method of detection would be a visible sheen observed during aerial surveys of the area, or by a different sea user such as fishermen or an observer from the shoreline. Therefore, the maximum conservative estimated amount of time the spill could go undetected would be 21 days (based on the aerial survey frequency). The hole size assumed was based on a conservative estimate of a corrosion hole and was determined as 10 mm. This hole size is considered large for a corrosion hole (when compared to historic records on pipeline corrosion) and therefore is a conservative estimate. The amount of crude that could be released in the worst case scenario (longest time to detection (21 days) combined with the largest hole size without detection (10 mm)) is estimated as < 2% of daily export fluids flow rate lost from a pin hole leak (4.62 m^3/day) at release pressure of 1,200 KPa multiplied by the time taken to identify the loss and shut down the system (21 days). This gives a potential release volume of 97.0 m^3 of Cliff Head crude into the marine environment at a rate of 0.192m^3/hr.

There is also the same potential risk of a chemical release from the pipeline or umbilical due to loss of integrity. However, due to the nature of the chemicals used, the potential impacts from a crude release are considered of greater consequence and are therefore assessed in this section.

Non Production Phase

During the Non Production Phase there will be no risk of pipeline leak as the pipeline will be flushed of hydrocarbons as part of the cessation of operations (refer Section 2.6).

Topside Process Leak

An accidental release of Cliff Head crude occurred on 24th July 2018. The source of the leak was identified to be a fracture (fatigue crack) in the discharge line of a Coriolis mass flow meter.

Topside process leaks could potentially come from either a flowline (or direct connection) or from the production header. The simulated leak was approximated to be a hole in the line of 10 mm diameter, given the leak cases are intended to simulate a loss of containment that would not be detected by field or office personnel it was decided that should the simulated leak result in a leak rate greater than 10% of the wells nominal flowrate, the leak rate would be adjusted to 10% of that

flowrate (10% perceived to be a highly conservative threshold of detectability). Both wells CH-6 and CH-7H triggered simulated leaks greater than 10% of the nominal flowrate (47% and 16% respectively), all other wells simulated leaks were below the 10% threshold elected.

The calculation is based on Bernoulli principle hence viscous, gravitational and inertial forces are not considered. Fluid densities are calculated as a function of each individual well's produced fluid composition. Tubing head pressure is measured gauge pressure, from recent production data, and atmospheric pressure is taken at 0 kPa. A release co-efficient of 0.61 is taken from literature.

Two cases were considered, a worst-case realistic case wherein a 12-hour leak is experienced prior to detection by field personnel (likely via CCTV footage) and action is taken to immediately control the leak source (emergency shutdown). The second case considered was an extreme worst case, designed to align with the assumptions used in modelling a subsea release, which is only detected during a visit to CHA at the maximum duration of non-attendance of the normally unmanned installation (21 days).

The calculation summary table can be found below:

Flowline Oil release Volume (Sm3)					
Well	CH-6	CH-7H	CH-10	CH-12H	CH-13H
Undetected 12hrs	0.8	2.0	1.1	1.6	1.2
Undetected 21 days	32.2	84.3	44.6	66.9	49.2
Simulated over 10% of nominal flow	✓	✓	✓	×	✓

This gives a potential worst-case release volume of 84.3 m^3 of Cliff Head crude into the marine environment at a rate of 0.136 m^3/hr (the calculation does not consider the effect of secondary containment (bunding etc) on CHA platform).

The worst-case crude release from a pipeline leak is considered of greater consequence (i.e. greater volume) and is therefore assessed in this section.

Non Production Phase

During the Non Production Phase there will be no risk of a topsides leak as hydrocarbons will no longer be flowed from the wells following the cessation of operations.

7.3.3.2 Potential impact

Cliff Head crude cools and solidifies on discharge onto the water surface. This means it would not spread as a film in the way that low viscosity, low pour-point oils would behave. The spatial concentration of Cliff Head crude would therefore be determined by the volume of semi-solid to solid pieces of oil that are present over a given area.

Weathering simulations for Cliff Head crude released at the surface under local temperatures indicates that approximately 21% of the oil volume would evaporate over the first day. Little further evaporation is then expected since the boiling point of compounds remaining in the weathered residue would be too high. Approximately, 55% of the crude oil is considered persistent and will likely solidify over time and turn to wax after weeks in the marine environment.

The modelling demonstrated that the crude has the capacity to entrain into the water column during the presence of moderate winds (>10 knots) and can potentially remain entrained for as long as the winds persist. Hence, the portion of entrained hydrocarbons and in turn evaporative loss varies under moderate and calm wind conditions.

Floating Oil

The environmental threshold of > 10 g/m^2 floating oil is not predicted to occur at any location, regardless of whether the spill occurs in Commonwealth or State waters, or the season in which it

occurs. As the environmental threshold will not be exceeded, it is highly unlikely that environmental effects from floating oil will occur.

The socio-economic threshold of > 1 g/m^2 floating oil will occur around the discharge point, indicating that there would be visible plumes of oil extending from the source, most likely as semi -solid to solid pieces, providing visual warning that the leakage was occurring. For spills in Commonwealth waters, the maximum distance of floating oil above the socio-economic threshold of ≥1 g/m^2 may occur up to 31.6 km south of the spill site during the winter conditions. A spill in State waters could generate floating oil above 1 g/m^2 up to 15.2 km in winter conditions.

Entrained Oil

Oil is forecasted to float to the surface rapidly from a leak at the seabed, and to then resist entrainment once it cools and solidifies. Therefore, the model predicts that a spill at Location 1 in Commonwealth waters will result in no receptors contacting entrained oil above ≥ 100 ppb threshold in summer or winter (Table 7-4). For a spill at Location 2 in state waters, the maximum distance for entrained oil above 100 ppb is predicted to be 0.3 km in both summer and winter conditions.

Dissolved Aromatic Hydrocarbons

Cliff Head Crude has low concentrations of soluble aromatic hydrocarbons (< 1%) and these components are forecasted to preferentially evaporate from the floating oil, with only slow and minor dissolution into the water column. Consequently, spills in either location or season will not result in concentrations of dissolved hydrocarbons ≥10 ppb, which is significantly lower than the environmental threshold of 50 ppb.

A caveat on this forecast is that churning of the floating oil that accumulates in the surf zone might raise the local concentrations of soluble aromatic hydrocarbons within the immediate surf zone.

Shoreline hydrocarbons

A spill in State waters (Location 2) is predicted to result in Dongara shoreline contacting hydrocarbons ≥ 100 g/m^2 in both summer (98% probability) and winter (100% probability) within 0.21 days of the spill occurring (Table 7-4). There is a chance Leeman shoreline will contact hydrocarbons ≥ 100 g/m^2 if the spill in State waters occurs in winter (9% probability) within 17.17 days or summer (3% probability) within 6.92 days. There is also a slight chance (1%) that Cervantes shoreline will contact hydrocarbons ≥ 100 g/m^2 if the State waters spill occurs in winter. However, the contact will take 22.33 days to occur.

A spill in Commonwealth waters (Location 1) is predicted to contact more shoreline receptors compared to a spill in State waters (Table 7-4). For Commonwealth water spills that occur in winter, it is expected that six shorelines will contact hydrocarbons ≥ 100 g/m^2, with Dongara shoreline being the most likely to be contacted (71% probability), within 2.25 days. Geraldton and Leeman shorelines also have a probability of being contacted above the hydrocarbon threshold (12% and 38% probabilities, respectively); if this contact eventuates, it will take 7.25 and 2.08 days, respectively to occur. The Geraldton, Dongara shallows and Leeman shorelines will also likely be contacted with hydrocarbons ≥ 100 g/m^2 if the Commonwealth waters spill (Location 1) occurs during summer (80%, 94% and 12% probabilities, respectively).

Table 7-4: Predicted shoreline accumulation ≥100 g/m² resulting from a 97.0 m³ subsea release of Cliff Head crude from a pipeline leak for 21 days for Location 1 (Commonwealth waters) and Location 2 (State waters)

Shoreline sector	Hydrocarbon component and threshold	Summer (October – April)	Winter (May – September)	Summer (October – April)	Winter (May – September)
		Location 2 (State Waters)		Location 1 (Commonwealth waters)	
		Contact with sensitive receptor (Yes/No*)?		Contact with sensitive receptor (Yes/No*)?	
Pelsaert Group	Accumulated shoreline oil ≥ 100 g/m², Min time to receptor (days)	No, N/A	No, N/A	No, N/A	Yes 1% probability 20.17
	Maximum accumulated volume (m³) along this shoreline, in the worst replicate simulation (m³)	N/A	N/A	N/A	7
	Maximum length of shoreline (km) with concentrations exceeding 100 g/m²	N/A	N/A	N/A	0.4
Wallabi Group	Accumulated shoreline oil ≥ 100 g/m², Min time to receptor (days)	No, N/A	No, N/A	No, N/A	No, N/A
	Maximum accumulated volume (m³) along this shoreline, in the worst replicate simulation (m³)	N/A	N/A	N/A	N/A
	Maximum length of shoreline (km) with concentrations exceeding 100 g/m²	N/A	N/A	N/A	N/A
Easter Group	Accumulated shoreline oil ≥ 100 g/m², Min time to receptor (days)	No, N/A	No, N/A	No, N/A	No, N/A

Shoreline sector	Hydrocarbon component and threshold	Summer (October – April)	Winter (May – September)	Summer (October – April)	Winter (May – September)
		Location 2 (State Waters)		Location 1 (Commonwealth waters)	
		Contact with sensitive receptor (Yes/No*)?		Contact with sensitive receptor (Yes/No*)?	
	Maximum accumulated volume (m^3) along this shoreline, in the worst replicate simulation (m^3)	N/A	N/A	N/A	N/A
	Maximum length of shoreline (km) with concentrations exceeding 100 g/m^2	N/A	N/A	N/A	N/A
Murcheson	Accumulated shoreline oil ≥ 100 g/m^2, Min time to receptor (days)	No, N/A	No, N/A	No, N/A	No, N/A
	Maximum accumulated volume (m^3) along this shoreline, in the worst replicate simulation (m^3)	N/A	N/A	N/A	N/A
	Maximum length of shoreline (km) with concentrations exceeding 100 g/m^2	N/A	N/A	N/A	N/A
Shoal Point to Oakabella	Accumulated shoreline oil ≥ 100 g/m^2, Min time to receptor (days)	No, N/A	No, N/A	No, N/A	Yes 3% probability 22.83 days
	Maximum accumulated volume (m^3) along this shoreline, in the worst replicate simulation (m^3)	N/A	N/A	NA	15.9

Shoreline sector	Hydrocarbon component and threshold	Summer (October – April)	Winter (May – September)	Summer (October – April)	Winter (May – September)
		Location 2 (State Waters)		Location 1 (Commonwealth waters)	
		Contact with sensitive receptor (Yes/No*)?		Contact with sensitive receptor (Yes/No*)?	
	Maximum length of shoreline (km) with concentrations exceeding 100 g/m²	N/A	N/A	NA	4.2
Geraldton	Accumulated shoreline oil ≥ 100 g/m², Min time to receptor (days)	No, N/A	No, N/A	Yes 80% probability 4.17 days	Yes 12% probability 7.25 days
	Maximum accumulated volume (m³) along this shoreline, in the worst replicate simulation (m³)	N/A	N/A	27.5	20.8
	Maximum length of shoreline (km) with concentrations exceeding 100 g/m²	N/A	N/A	13.4	6.5
Dongara	Accumulated shoreline oil ≥ 100 g/m², Min time to receptor (days)	Yes 98% probability 0.21 days	Yes 100% probability 0.21 days	Yes 94% probability 1.96 days	Yes 71% probability 2.25 days
	Maximum accumulated volume (m³) along this shoreline, in the worst replicate simulation (m³)	24	27.5	36.3	35.4
	Maximum length of shoreline (km) with concentrations exceeding 100 g/m²	5.4	7.3	15	13.4

Shoreline sector	Hydrocarbon component and threshold	Summer (October – April)	Winter (May – September)	Summer (October – April)	Winter (May – September)
		Location 2 (State Waters)		Location 1 (Commonwealth waters)	
		Contact with sensitive receptor (Yes/No*)?		Contact with sensitive receptor (Yes/No*)?	
Leeman	Accumulated shoreline oil ≥ 100 g/m^2, Min time to receptor (days)	Yes 3% probability 6.92 days	Yes 9% probability 17.17days	Yes 12% probability 2.5 days	Yes 38% probability 2.08 days
	Maximum accumulated volume (m^3) along this shoreline, in the worst replicate simulation (m^3)	9.2	17.4	12.5	24.6
	Maximum length of shoreline (km) with concentrations exceeding 100 g/m^2	0.8	1.2	2.3	8.5
Cervantes	Accumulated shoreline oil ≥ 100 g/m^2, Min time to receptor (days)	No, N/A	Yes 1% probability 22.33 days	No, N/A	No, N/A
	Maximum accumulated volume (m^3) along this shoreline, in the worst replicate simulation (m^3)	N/A	9.4	N/A	N/A
	Maximum length of shoreline (km) with concentrations exceeding 100 g/m^2	N/A	0.4	N/A	N/A

Shoreline sector	Hydrocarbon component and threshold	Summer (October – April)	Winter (May – September)	Summer (October – April)	Winter (May – September)
		Location 2 (State Waters)		Location 1 (Commonwealth waters)	
		Contact with sensitive receptor (Yes/No*)?		Contact with sensitive receptor (Yes/No*)?	
Lancelin/ Ledge Pt	Accumulated shoreline oil ≥ 100 g/m^2, Min time to receptor (days)	No, N/A	No, N/A	N/A	Yes 1% probability 14.21 days
	Maximum accumulated volume (m^3) along this shoreline, in the worst replicate simulation (m^3)	N/A	N/A	N/A	5.5
	Maximum length of shoreline (km) with concentrations exceeding 100 g/m^2	N/A	N/A	N/A	0.8

** No contact to receptor predicted for specified threshold*

Since the modelling does not predict floating or dissolved hydrocarbons above environmental thresholds at any receptor, the potential impacts of entrained and shoreline Cliff Head crude are considered in the following sections. The potential impacts of entrained and shoreline stranded hydrocarbons on individual sensitive receptors are summarised and assessed in Table 7-5. These sensitive receptors are present at different locations potentially impacted by a spill. Based on the presence of sensitive receptors, the potential impacts of Cliff Head crude on sensitive locations is summarised in Table 7-6.

It should be noted that the identified receptors are split into sections along the coastline, therefore representing large sections of beach (approximately 50 km of coastline). Therefore, when discussing potential contact with these receptors, it is not known from modelling if the oil that accumulates on these shorelines is spread along the entire area or focused in one location.

Table 7-5: Potential impacts of entrained and shoreline accumulated Cliff Head crude on sensitive receptors

Sensitive receptor	Impact description		Impact assessment	
	Entrained oil	Accumulated shoreline oil	Entrained oil	Accumulated shoreline oil
General offshore				
Plankton	There is the potential for localised mortality of plankton due to reduced water quality and toxicity of entrained oil. Due to the viscosity of the crude, it is possible that entrained oil will alter light penetration through the water column, which may potentially reduce photosynthesis close to the source of the spill.	N/A	Due to the small amounts of crude that could be entrained, the effects are likely to be minimal. The area potentially impacted by a spill is characterised by a low standing crop of plankton which is not an important source of primary productivity in the area. Further, the affected area is a relatively small portion of the marine offshore environment, therefore the level of impact consequence has been determined to be low	N/A
Invertebrates	Adult marine invertebrates and larvae usually reside within benthic substrates and pelagic waters, and may be exposed to entrained hydrocarbons.	N/A	Due to low predicted levels of entrained oil, as a result of the Cliff Head crude properties, entrained hydrocarbons are not considered to pose a high risk to marine invertebrates within the spill trajectory area.	N/A
Fish	The variety of benthic habitats in the Perth Basin (reefs, seagrasses and offshore waters) supports a diverse assemblage of fish. Smothering through coating of gills can lead to the lethal and sub-lethal effects of reduced oxygen exchange, and coating of body surfaces may lead to increased incidence of irritation and infection. Fish may also ingest entrained hydrocarbon droplets or contaminated food leading to reduced growth. Due to the tendency of Cliff Head crude to form waxy, solid droplets, ingestion of these by larger predatory fish is possible. There is potential for localised mortality of fish eggs and larva due to reduced water quality and toxicity. Effects will be greatest in the upper 10 m of the water column and areas close to the spill source where hydrocarbon concentrations are likely to be highest.	N/A	Due to the viscosity of the crude, in the event of a spill very little will be become entrained in the water column, where fish are more susceptible to toxic impacts. Due to the low level of entrainment, surface crude is unlikely to impact fish eggs and larvae. As such impacts are likely to be low and short-term in duration.	N/A

Sensitive receptor	Impact description		Impact assessment	
	Entrained oil	Accumulated shoreline oil	Entrained oil	Accumulated shoreline oil
Marine reptiles	Four species of turtle are known to exist with the waters in proximity to the Cliff Head platform. Since marine turtles are not known to breed close to the CHA, hatchling turtles are not expected in great numbers. For adult, juvenile and hatchling turtles, the main pathways for exposure include ingestion, and inhalation of vapours. Adult and juvenile turtles are particularly prone to ingestion of oil, especially where it forms solid masses such as tar balls. The chemical nature of the crude means that entrained oil may form solid balls that can be eaten by turtles. Oil ingested by a turtle does not pass rapidly through its digestive tract. It may be retained for several days, increasing internal contact and the likelihood that toxic compounds will be absorbed. The risk of gut impaction also increases for turtles that have ingested oil.	N/A	Although the impacts of Cliff Head crude on adult turtles can be severe, the low density of turtles expected in the region (due to lack of breeding aggregations) implies that few individuals would be affected. As such the impact has been determined to be moderate.	N/A
Marine mammals	Six species of marine mammal may be present in the waters in proximity of the Cliff Head facilities. Of these, three species are listed as threatened; blue whale, southern right whale and the Australian sea lion. The Operational Area does not include any known blue whale feeding, breeding or resting areas. Humpback whales are frequently sighted in the region as they migrate annually from the cold feeding waters of the Antarctic to the warm water breeding areas in the Kimberley. Peak migratory periods in Cliff Head area for the northbound leg are around mid-June. The location of the Cliff Head platform is at towards the northern limit of the Southern right whale distribution and only occasional sightings have been made as far north as Geraldton indicating few individuals may be present. Australian sea lions forage around the larger reefs in the area. The nearest breeding grounds are on the Beagle Islands (35 km south) and the	N/A	The impacts of Cliff Head crude on marine mammals can result in lethal or sub-lethal impacts on individuals. Although cetaceans are not expected to be present in large numbers, should a spill occur during a migration period large numbers of individuals could potentially be impacted. While sea lions breed asynchronously (i.e. with no peak in breeding activity) they are present year round and could be impacted by a spill. As such the impacts are considered moderate.	N/A

Sensitive receptor	Impact description		Impact assessment	
	Entrained oil	Accumulated shoreline oil	Entrained oil	Accumulated shoreline oil
	Abrolhos Islands (112 km northwest). There is no seasonal peak in breeding, with breeding cycles being asynchronous between colonies. Should pinnipeds come into contact with Cliff Head crude, the crude may stick to the fur and be ingested during grooming incurring the associated toxicological effects. The fur may also become smothered leading to reduced waterproofing and hypothermia.			
Seabirds	Seabirds either pass across the region or use the waters within and near to the permit area as their main habitat, with 16 species of threatened seabird possibly occurring in the area. The nearby Abrolhos AMP and Jurien AMP in particular are important foraging areas for the threatened Australian noddy and soft-plumaged petrel, and other migratory species. As most fish survive beneath floating slicks, they will continue to attract foraging seabirds, which typically do not exhibit avoidance behaviour. Direct contact with hydrocarbons can lead to irritation of skin and eyes. Smothering can lead to reduced water proofing of feathers leading to hyperthermia. Smothering of feathers can also lead to excessive preening, diverting time away from other behaviours, leading to starvation and dehydration. Preening of oiled feathers will also result in ingestion of hydrocarbons and the associated impacts of toxicity and potential illness. Due to the behaviour of Cliff Head crude in water, the potential for smothering is likely to be less than for lighter crudes. However, there is a possibility that ingestion of entrained solid waxy droplets may occur if they are mistaken for prey.	N/A	The impacts of Cliff Head crude on seabirds can result in lethal or sub-lethal impacts on individuals. Since a spill could potentially occur at any time of year there is potential to overlap with peak nesting periods where a large number of seabirds, including those listed as protected (Table 4-5) could potentially be impacted by a spill. As such the impacts are considered moderate.	N/A
Subtidal zone				

Sensitive receptor	Impact description		Impact assessment	
	Entrained oil	Accumulated shoreline oil	Entrained oil	Accumulated shoreline oil
Submerged reefs and shoals	Submerged coral reefs and shoals can be located in areas around the Abrolhos Islands and the nearshore areas of the WA coast. Significant shoals are found to the east of the Abrolhos Islands (Section 4.5.8). Due to the high viscosity of the Cliff Head crude oil, very little will become entrained in the water column. Therefore, entrained crude is unlikely to have any negative impacts on fully submerged features or their associated fauna.	N/A	The impacts of entrained oil in submerged reefs is negligible	N/A
Intertidal zone				
Seagrass	Seagrass habitat is found in areas around the Abrolhos Islands and the nearshore areas of the WA coast. Macrophytes such as seagrasses require light to photosynthesise. The presence of entrained oil at sea, and directly coating of seagrasses, may affect the ability of macrophytes to photosynthesise, potentially reducing primary productivity.	Direct contact with hydrocarbon can smother seagrass leading to toxicity and preventing respiration with lethal and sub-lethal effects (Taylor and Rasheed, 2011). Smothering can also lead to a reduction in photosynthesis as described in the previous column. Stranded oil also has the potential to impact reef fauna (turtles, marine mammals) as outlined in sections above.	Entrained oil could lead to a reduction in primary productivity where there is contact with seagrass habitat. However, due to the high viscosity of the Cliff Head crude oil, very little will become entrained in the water column. Therefore, entrained crude is unlikely to have a significant negative impacts on submerged seagrass habitat.	Accumulated oil can have lethal or sub-lethal effects potentially leading to a reduction in productivity. These impacts combined could result in detrimental effects on the overall ecological community. However, it is unlikely large areas of emergent seagrass habitat will be present and therefore the impacts are considered low.
Rocky shore, intertidal reefs	NA	Due to the composition of Cliff Head crude, it is likely to remain stranded with relatively slow natural recovery (as a result of wave action) compared to light crudes or condensate. Therefore, the stranded crude has potential to persist in the environment for longer periods of time increasing the potential toxic and physical (smothering) effects. Impacts of contact with surface oil can include impaired feeding, fertilisation,	NA	Since stranded oil can have lethal and sub-lethal effects on coral reefs and the associated impacts on fauna and flora. As such the impacts are considered moderate.

Sensitive receptor	Impact description		Impact assessment	
	Entrained oil	Accumulated shoreline oil	Entrained oil	Accumulated shoreline oil
		larval settlement and metamorphosis, larval and tissue death and decreased growth rates (Villanueva et al., 2008). Stranded oil also has the potential to impact reef fauna (turtles, marine mammals) as outlined in sections above.		
Mangroves	Entrained oil is not predicted to make contact with the Abrolhos Islands on which a small amount of mangrove habitat is present.	The impacts of accumulated hydrocarbons on mangroves include damage as a result of smothering of lenticels (mangrove breathing pores) on pneumatophores or prop roots, or by the loss of leaves (defoliation) due to chemical burning (Duke et al., 1999). Thorhaug (1987) concluded that while defoliation of mangroves was a common occurrence when exposed to hydrocarbon slicks, massive mortality was not always the ultimate outcome. Mangrove death is predicted whenever more than 50% of the leaves are lost (Evans, 1985). It is also known that mangroves take up hydrocarbons from contact with leaves, roots or sediments, and it is suspected that this uptake causes defoliation through leaf damage and tree death (Wardrop et al., 1987).	N/A	Since stranded oil can have lethal and sub-lethal effects on mangroves and the associated impacts on fauna and flora, the impacts are considered moderate
Sandy shores/ beaches	N/A	There is the potential for some hydrocarbons to be temporarily stranded on the sandy shores and beaches as the tide ebbs. Due to the composition of Cliff Head crude, it is likely to remain stranded with relatively slow natural recovery compared to light crudes or condensate. Therefore, the stranded crude has potential to persist in the environment for longer periods of time increasing the potential	N/A	Since accumulated shoreline oil may persist on sandy beaches with slow natural degradation, this may result in lethal and sub-lethal effects on associated fauna and flora. As such the impacts are considered moderate.

Sensitive receptor	Impact description		Impact assessment	
	Entrained oil	Accumulated shoreline oil	Entrained oil	Accumulated shoreline oil
		toxic and physical (smothering) effects. Such effects may impact fauna such as polychaetes, molluscs, marine crustaceans, semi-terrestrial crustaceans and insects, and the vertebrates that prey upon them (e.g. shorebirds).		
Saltmarshes	Entrained crude is not expected to make contact with this receptor	Accumulated hydrocarbons are not expected to make contact with this receptor	N/A	N/A
Sublittoral zone				
Seabird breeding, feeding and resting areas	N/A	The Abrolhos Islands are an important breeding, foraging and resting area for various species of seabird and shorebird. Seabirds and shorebirds are also likely to occur along the coastlines of WA albeit in lower numbers. The physical and toxic effects of crude on seabirds are discussed above.	N/A	The impacts of Cliff Head crude on seabirds and shorebirds can result in lethal or sub-lethal impacts on individuals. Since a spill could potential occur at any time of year there is potential to overlap with peak nesting periods where a large number of seabirds could potentially be impacted by a spill. As such the impacts are considered moderate.
Sea lion breeding and resting areas	N/A	Sea lions come ashore to pup, raise their offspring and rest. The nearest breeding and haul out areas are on the Beagle Islands 39 km to the south and the Abrolhos Islands 112 km to the northwest. However, accumulated hydrocarbons are not predicted at these receptors. Sea lions may encounter stranded crude if they haul out at other locations along the coast contacted by accumulated hydrocarbons. The	N/A	The impacts of Cliff Head crude on sea lions can result in lethal or sub-lethal impacts on individuals. While sea lions breed asynchronously they may be present at breeding sites year round. As such the impacts are considered moderate.

Sensitive receptor	Impact description		Impact assessment	
	Entrained oil	Accumulated shoreline oil	Entrained oil	Accumulated shoreline oil
		physical and toxic impacts of crude are described above.		
Socioeconomic				
Fisheries	Entrained oil has the potential to negatively affect fisheries as fishing activity may be excluded from the area of the slick and its proximity. However, due to low predicted levels of entrained oil, as a result of the Cliff Head crude properties, fish are unlikely to be affected, therefore any effect on catch rates are likely to be temporary as a result of loss of access. Further, the most economically important fishery in the area is the West Coast Lobster fishery. Since January 2013, this fishery has been able to operate year round (i.e. there is no closed season) working in a quota system, reducing the impacts of delayed catches.	Accumulated shoreline crude is unlikely to greatly impact fishing activities unless the crude became stranded around fishing ports (e.g. Geraldton Harbour, Port Denison) which could restrict movement of fishing vessels.	Entrained oil may lead to loss of access for commercial fisheries. However, the impact is expected to be temporary with little impact on annual catch rates. As such, impacts are assessed as low.	Accumulated shoreline oil could lead to temporary loss of access for commercial fisheries. It is not expected that this would significantly impact annual catch rates and therefore the impact has been assessed as low.
Tourism and recreation	Entrained oil and surface oil above the socio-economic threshold of 1 g/m^2 has the potential to impact on tourism activities in the area as recreational fishing is popular in and around the Abrolhos Islands. In the event of a crude spill, recreational activities would not be possible in the affected area and its proximity with potential negative effects on local tourism. A longer term reduction in tourism may result due to bad publicity of the local area.	The WA coastline is popular with tourists, with a number of sandy beaches and the fishing town of Port Denison attracting visitors. If crude oil becomes stranded at these locations access will be reduced with negative effects on local tourism. A longer term reduction in tourism may result due to bad publicity of the local area.	Since potential impacts of surface and entrained oil include temporary loss of access for tourism in addition to a longer term effect on reputation, the impacts have been assessed as moderate.	Since potential impacts of stranded oil include temporary loss of access but also a longer term effect on reputation, the impacts have been assessed as moderate.
Defence activities	There is not expected to be high levels of defence activities in the area surrounding the CHA. Entrained oil or surface oil above the socio-economic threshold of 1 g/m^2 is not expected to restrict access for defence activities.	Due to the nature of defence activity in the area (limited to restricted airspace), accumulated shoreline oil is unlikely to have any significant impact on defence activities	Although surface and entrained oil could result in a temporary loss of access, defence activities are not expected to be great in the area and therefore the impacts have been assessed as low.	The impacts of shoreline accumulated oil on defence activities is negligible
Shipping	N/A	Stranded shoreline crude is unlikely to greatly impact shipping activities unless the crude became stranded around Geraldton Port which could restrict movement of shipping vessels	N/A	Stranded oil could lead to temporary loss of access for shipping. The impact is expected to be temporary and therefore the impact has been assessed as low.

Sensitive receptor	Impact description		Impact assessment	
	Entrained oil	Accumulated shoreline oil	Entrained oil	Accumulated shoreline oil
Key Ecological Features:				
Western Rock Lobster	Entrained crude is predicted to overlap with this KEF. However, given the very low predicted concentrations of entrained oil, benthic environments supporting rock Lobsters are unlikely to be significantly affected.	N/A	Potential impacts of entrained crude on this KEF are expected to be low.	N/A
Commonwealth marine environment within and adjacent to the west coast inshore lagoons	Some benthic habitats and associated fauna may encounter very low concentrations of entrained oil. These are discussed above.	N/A	Potential impacts of entrained crude on this KEF are expected to be low.	N/A

Table 7-6: Potential impacts of Cliff Head crude on sensitive locations.

Sensitive locations	Sensitive receptors	Impact description		Impact assessment	
		Surface	Stranded / accumulated shoreline	Surface	Stranded / accumulated shoreline
Shoal point to Oakabella Creek	Sandy beaches Rocky shore Submerged reefs Foraging/nesting shorebirds Tourism Commercial fisheries	At this section of the coastline, no contact from surface hydrocarbons is predicted	Due to the distance from this section of the WA coast with CHA and pipelines, contact of a surface slick with the coast is not expected. However, it is estimated that in the worst case scenario up to 15.9 m^3 of crude may accumulate in winter with the maximum length of shoreline (km) with concentrations exceeding 100 g/m² being 4 km. Individual receptors which may be impacted include sandy beaches, rocky shores, foraging or nesting shorebirds and tourism and commercial fisheries. These are discussed further in Table 7-5	N/a	Although contact by a surface slick is not expected, small amounts of accumulated crude is estimated which could impact sensitive receptors. However, given the small volumes predicted, impacts are considered low.
Around Geraldton	Sandy beaches Submerged reefs Foraging/nesting shorebirds Tourism Shipping Commercial fisheries	At this section of the coastline, no contact from surface hydrocarbons is predicted	Due to the distance from this section of the WA coast with CHA and pipelines, contact of a surface slick with the coast is not expected. However, it is estimated that in the worst case scenario 27.5 m^3 of crude could accumulate in summer with the maximum length of shoreline (km) with concentrations exceeding 100 g/m² being 34.4 m. Individual receptors which may be impacted include sandy beaches and foraging/nesting shorebirds. The accumulated oil may also impact Geraldton Port with knock on consequences on shipping, tourism, commercial and recreational fishing. These are discussed further in Table 7-5.	N/a	Although contact by a surface slick is not expected, small amounts of accumulated crude is estimated. This could impact sensitive receptors. Given the number of sensitive receptors potentially affected, the predicted impacts are considered moderate.
Around Dongara	Sandy beaches Submerged reefs Intertidal reefs Foraging/nesting shorebirds Tourism	At this section of the coastline, surface hydrocarbons may impact marine fauna such as seabirds and cetaceans which may be foraging or transiting close to the coast. Other receptors which may be impacted include intertidal reefs, commercial fisheries and tourism such as surfing and snorkelling.	Due to the distance from this section of the WA coast with CHA and pipelines, contact of a surface slick with the coast is expected. It is estimated that in the worst case scenario 36.3 m^3 of crude will become stranded or accumulate in winter with the maximum length of shoreline (km) with concentrations exceeding 100 g/m² being 5.3 km. Individual receptors which	Due to the volume and probability of surface oil contacting sensitive receptors the impacts are considered moderate	The estimated volume of stranded or accumulated crude, combined with the sensitive receptors potentially affected, the impacts are considered moderate.

Sensitive locations	Sensitive receptors	Impact description		Impact assessment	
		Surface	Stranded / accumulated shoreline	Surface	Stranded / accumulated shoreline
	Commercial fisheries	The surface slick has 95% probability of reaching this receptor at >1 g/m^3 under the worst case scenario. The impacts of such contact are described in the next column.	may be impacted include sandy beaches, intertidal reefs and foraging/nesting shorebirds. The stranded oil may also impact Port Denison with knock on consequences on tourism, in particular recreational fishing and commercial fisheries. These are discussed further in Table 7-5.		
Around Leeman	Sandy beaches Submerged reefs Foraging/nesting shorebirds Tourism	At this section of the coastline, no contact from surface hydrocarbons is predicted	Due to the distance from this section of the WA coast with CHA and pipelines, contact of a surface slick with the coast is expected. It is estimated that in the worst case scenario 24.6 m^3 of crude will become stranded or accumulate in winter with the maximum length of shoreline (km) with concentrations exceeding 100 g/m² being 1.8 km in this scenario. Individual receptors include sandy beaches, foraging/nesting shorebirds and tourism activities. These are discussed further in Table 7-5.	N/a	The estimated volume of stranded or accumulated crude, combined with the sensitive receptors potentially affected, the impacts are considered moderate.
Around Cervantes	Jurien Bay AMP and Marine Park Sandy beaches Submerged reefs and shoals Intertidal reefs Marine mammal breeding (sea lion) Foraging/nesting shorebirds and seabirds	At this section of the coastline, no contact from surface hydrocarbons is predicted	This section of coastline includes the Jurien Bay AMP. Potentially sensitive receptors include sandy beaches, intertidal reefs, foraging /nesting seabird and shorebirds and breeding Australian sea lions. Other marine mammals, such as cetacean species, may transit the nearshore waters. Shoreline contact has been predicted by the simulation modelling. Under the worst case scenario an estimated 13.8 m^3 of Cliff Head crude is stranded or accumulates on the shoreline in winter, in winter with the maximum length of shoreline (km) with concentrations exceeding 100 g/m² being 0.4 km. This will impact sensitive habitats such as sandy beaches and intertidal	N/a	The estimated volume of stranded or accumulated crude, combined with the sensitive receptors potentially affected, the impacts are considered moderate.

Sensitive locations	Sensitive receptors	Impact description		Impact assessment	
		Surface	Stranded / accumulated shoreline	Surface	Stranded / accumulated shoreline
			reefs, and the associated fauna and flora, as discussed Table 7-5.		
Lancelin to Ledge Point	Sandy beaches Submerged reefs Foraging/nesting shorebirds Tourism	At this section of the coastline, no contact from surface hydrocarbons is predicted	Shoreline contact has been predicted by the simulation modelling. Under the worst case scenario an estimated 5.5 m^3 of Cliff Head crude is stranded or accumulates on the shoreline in winter, with the maximum length of shoreline (km) with concentrations exceeding 100 g/m^2 being 0.8 km in this scenario. Individual receptors which may be impacted include sandy beaches, foraging/nesting shorebirds and tourism activities. These are discussed further in Table 7-5.	N/a	Although contact by a surface slick is not expected, small amounts of accumulated crude is estimated with potential impacts to sensitive receptors. However, given the small volumes predicted impacts are considered low.
Abrolhos Islands and AMP	Sandy beaches Rocky shore Intertidal reefs Mangroves Foraging/nesting shorebirds and seabirds Marine mammal breeding (sea lion) Submerged reefs and shoals Seagrass Tourism	The Abrolhos Islands are split into three island groups; Pelsaert, Wallabi and Easter Groups. The surrounding waters include the Abrolhos shoals which contain non emergent features. Surface crude will not make contact with the shoals or any of the shorelines	No stranded or accumulated crude is expected at the Abrolhos Shoals or islands above the 100 g/m^2 threshold.	N/a	N/a

7.3.3.3 Environmental performance

Environmental outcomes, performance standards and measurement criteria for pipeline leaks and topside process leaks are provided in the tables below.

Pipeline Leak

Environmental Risk	A pipeline leak leading to release of Cliff Head crude into the marine environment
Environmental Performance Outcomes	No incidents of release of hydrocarbon to the sea resulting from loss of pipeline integrity

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Administrative	All operational activities are performed to ensure adequate safety and environmental management in accordance with the Cliff Head Pipeline and Umbilical Integrity Management Plan	All operational activities are performed to ensure adequate safety and environmental management in accordance with the Cliff Head Pipeline and Umbilical Integrity Management Plan, specifically: • The recommended inspection, maintenance and monitoring activities are identified and applied to ensure the integrity risk of the system is as ALARP. • Maximum inspection intervals are met based on the risk levels identified. • Acceptance criteria when evaluating the results of the IMR activities are met.	Maintenance/inspection records demonstrate that: • The recommended inspection, maintenance and monitoring activities have been identified and applied to ensure the integrity risk of the system is as ALARP. • Maximum inspection intervals have been met based on the risk levels identified. • Acceptance criteria when evaluating the results of the IMR activities have been met.
Administrative	Pipeline repair conducted as per Cliff Head Offshore Pipeline Repair Plan	Recommended procedures for the repair of the pipeline are performed to ensure safety and environmental management, in accordance with the Cliff Head Offshore Pipeline Repair Plan. As per the Plan, the following methodology will be applied depending on the scenario: • Subsea Clamp Strategy, or • Offshore Welding Strategy.	Records demonstrate that the Cliff Head Offshore Pipeline Repair Plan was followed in the event of a defect or potential pinhole leak.
Engineering	Pipelines designed and installed in accordance with industry standards to ensure integrity is appropriate	A heavy walled pipe (rated to the full well pressure possible for any production wells) carries the hydrocarbons and produced formation water. The pipelines are designed and tested in accordance with the relevant codes and standards for pipelines (i.e. AS 2885 and DNV-OS-F101). Pipeline designed to withstand fishing vessel collisions and accommodate rock lobster fishers.	As-built piping and instrumentation diagrams (P&IDs) verify pipeline design. Pipeline testing records verify pipelines were tested in accordance with the relevant codes and standards for pipelines (AS 2885 and DNV-OS-F101).

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Engineering	Monitoring of flowlines to detect any abnormalities that may be an indicator for loss of well control scenario	Flowlines equipped with a choke valve, oil-water flow meter and sample collection point to allow monitoring	TEO audit or third party inspection document confirm equipment and procedural controls are in place and effective Annual environmental performance reports indicate no release of hydrocarbon to sea during routine operation. Incident report includes volume of hydrocarbons accidentally released to sea during routine operation.
Engineering	Automatic shutdown if low pressure detected	Automatic low-pressure shutdown capability is confirmed on CHA platform	
Engineering	ESPs have automatic shutdown capability if abnormal conditions detected	The ESPs have auto detection of abnormal power or electrical communication situations and will automatically shut down if an abnormality is detected	
Protective/ Mitigate	Corrosion control system in place to prevent corrosion of pipeline and subsequent leaks	A continuous corrosion control system is in place to inhibit the rate of corrosion. The corrosion inhibitor dosage rate is adjusted based on injection outcomes to effectively eliminate corrosion in the pipeline.	As-built P&IDs verify pipeline design. Corrosion monitoring and inspection records demonstrate continuous corrosion control system was in place and functioning.
Protective/ Mitigate	Pipeline is present on marine charts to reduce potential for third party interference	The pipeline route is provided on marine charts.	Marine charts verify pipeline route.
Engineering	Remote shutdown capability in place to limit risk and volume of potential spills	Remote shutdown capability from onshore control room to isolate the wells	TEO audit or third party inspection document confirm equipment and procedural controls are in place and effective. Annual environmental performance reports indicate no release of hydrocarbon due to pipeline leak
Administration	Lifting plan implemented to reduce potential for dropped objects to prevent impact to pipeline	Cliff Head Lift Plan (10HSEQGENPC24FM01) is implemented for all lifting operations detailing load ratings of lifting equipment, intended loads, operational limits (e.g. weather) and procedures	Documented lifting plan verifies all lifting operations considered load ratings of lifting equipment, intended loads and operational limits (e.g. weather).
Engineering	Lifting activities are undertaken in accordance with Cliff Head Lifting Operations and Lifting Equipment Procedure (10HSEQGENPC24)	Lifting activities are undertaken in accordance with Cliff Head Lifting Operations and Lifting Equipment Procedure (10HSEQGENPC24), which requires: • The security of loads to be checked prior to commencing lifts. • Loads to be covered if there is a risk of losing loose materials.	Permit to Work (PTW) and Job Safety Analysis (JSA) records demonstrate that the following requirements were followed: • The security of loads were checked prior to commencing lifts • Loads were covered if there is a risk of losing loose materials. • All lifting equipment was rated for intended

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
		• All lifting equipment is rated for intended activities and maintained	activities and maintained.
Administrative	Personnel involved in lifting operations are competent as per requirements within the Cliff Head Lifting Operations and Lifting Equipment Procedure (10HSEQGENPC24)	Personnel involved in lifting operations are competent as per requirements within the Cliff Head Lifting Operations and Lifting Equipment Procedure (10HSEQGENPC24). • Competency of equipment operators meets Australian legislative standards and all equipment operators hold a Certificate of Competency issued by a recognised State Authority or a National License issued in accordance with the National Standard NOHSC-1006-2001 - Lifting Competency Requirements. • Lifting Equipment Maintenance Personnel hold current Certificates of Competency and Licenses.	Training/certification records demonstrate all personnel involved in lifting operations have the appropriate training/certifications.
Administration	All lifting equipment is rated for intended activities and maintained	CHA crane, rigging and lifting connections (designed, constructed and installed to appropriate standards and codes) are inspected and maintained fit-for-purpose.	Maintenance records verify CHA crane, rigging and lifting connections were inspected and are fit-for-purpose. Certification records have been maintained for lifting equipment.
Administration	Three-monthly leak detection Smartball inspection	Three-monthly leak detection Smartball inspection is performed to ensure the integrity risk of the system is ALARP.	Maintenance/inspection records demonstrate that three -monthly leak detection inspections have been carried out in accordance with Smartball inspection procedure
Engineering	Pipeline wall integrity assessments completed to ensure adequate load strength and reduce potential for pipeline rupture	Assessment of pipeline wall integrity to be carried out prior to maintenance activities to confirm intended loads do not exceed pipeline strength	Inspection of maintenance plan to confirm pipeline wall integrity assessment has been undertaken prior to commencing maintenance
Protective/Mitigate	Pipelines flushed to ensure they are hydrocarbon free prior to undertaking pipeline repair to reduce potential hydrocarbon releases to sea	Pipeline operations will be halted and pipelines flushed prior to commencing pipeline replacement activities	Daily report confirms that production has been halted prior to pipeline section replacement as recorded on daily reports
Engineering	Prior to undertaking high pressure water jetting, the water pressure is assessed to ensure pipeline rupture cannot occur.	Water jet pressure to be insufficient to rupture pipeline	Assessment of water pressure to confirm pressure is insufficient to rupture pipeline

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Engineering	Fluid monitoring is conducted in accordance with recognised Australian/International standards to reduce risk of loss of well control	Fluid monitoring conducted including: • The composition of the workover fluid is constantly monitored to ensure sufficient density to control subsurface pressures; • Blow-out Preventers (BOP) and related well control equipment are installed, operated, maintained and tested in accordance with manufacturer's recommendations and recognised Australian/International standards; and • The wells are designed and constructed in accordance with regulated international standards.	Fluid monitoring records during workovers BOP and well control equipment standards are verified by responsible person during well interventions and documented daily Wells engineering and Management Standard (WEMS) document
Engineering	Appropriate stabilisation materials selected to ensure no damage to pipeline during IMR activities	All stabilisation materials used to be consistent with parameters identified in pipeline integrity assessment Installation of stabilisation material to be lowered to seabed slowly in accordance with activity specific freespan rectification plan	Inspection of span rectification documentation to confirm stabilisation material is consistent with pipeline integrity assessment and installation is in accordance with activity specific freespan rectification plan
Administration	Moorings installed away from the pipeline to reduce potential for dropped objects on the pipeline	All moorings to be installed within the pipeline corridor and/or CHA exclusion zone and avoid subsea infrastructure in accordance with activity specific mooring plan	Inspection during activity to confirm moorings are installed in accordance with activity specific mooring plan
Protective/ Mitigate	NOPSEMA accepted OPEP provides options for controlling the source of any unplanned hydrocarbon/chemical spills and mitigates potential impacts. In all cases, the NEBA of the spill response is considered when implementing the OPEP	Oil pollution emergency plan (OPEP) implemented, with the following potentially applicable strategies: • Monitor and evaluate; • Offshore containment and recovery; • Shoreline protection and deflection; • Shoreline clean-up; and • Oiled wildlife response	Incident reports confirm OPEP and NEBA implemented Incident report includes volume of hydrocarbon release due to pipeline leak Accepted OPEP
Administration	Vessels operation within weather limitations	• Vessel Master to monitor meteorological forecasts at least once daily as per operating conditions in Cliff Head Marine Operations Procedure (10OPGOPC04).	Vessel logs record timing and weather conditions/sea state for operations on a daily basis.
Administration	Dropped object analysis undertaken prior to heavy lifts	A dropped object analysis will assess lifting risk posed by heavy objects. Recommended preventative measures will be implemented. Other SIMOPs activities (e.g. IMR activities) are also considered.	Dropped object analysis and SIMOPs plans

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Protective	Aerial surveys undertaken every 21 days	Helicopters undertake flyover survey every 21 days to observe for sheen in vicinity of Operational Area	Aerial survey reports document surveys undertaken at least every 21 days. Incident report includes observations of any sheens recorded.
Engineering	No anchoring of vessels during routine operations except in case of emergency	Vessels will only anchor in emergency situations	Vessel log records anchoring events
Engineering	Installation of low pressure alarms to identify leaks early in the pipelines	Automatic shut down capability if low-pressure detected	TEO audit or third party inspection document confirm equipment and procedural controls are in place and effective
Administration	Maintenance of safety exclusion zone around CHA to prevent potential snagging/ damaging with subsea pipelines, unless users are signatory to MoU	500 m radius safety exclusion zone around the Cliff Head platform maintained, with the exception of Zone B Commercial Western Rock Lobster fishermen, as gazetted under Chapter 6 of the OPGGS Act 2006	Exclusion zone gazetted Signed MoU with DPFA in place

Topsides Process Leak

Environmental Risk	Topside process leaks leading to release of Cliff Head crude into the marine environment
Environmental Performance Outcomes	No incidents of release of hydrocarbon to the sea resulting from topside process leaks

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Engineering	Piping designed and installed in accordance with industry standards to ensure integrity is appropriate	A heavy walled pipe (rated to the full well pressure possible for any production wells) carries the hydrocarbons and produced formation water. The pipelines are designed and tested in accordance with the relevant codes and standards for pipelines (i.e. AS 2885 and DNV-OS-F101). Pipeline designed to withstand fishing vessel collisions and accommodate rock lobster fishers.	As-built piping and instrumentation diagrams (P&IDs) verify pipeline design. Pipeline testing records verify pipelines were tested in accordance with the relevant codes and standards for pipelines (AS 2885 and DNV-OS-F101).
Engineering	Monitoring of flowlines to detect any abnormalities that may be an indicator for loss of well control scenario	Flowlines equipped with a choke valve, oil-water flow meter, sample collection point and pressure instrumentation to allow monitoring	TEO audit or third party inspection document confirm equipment and procedural controls are in place and effective Annual environmental performance reports indicate no release of hydrocarbon to sea during routine operation. Incident report includes volume of hydrocarbons accidentally released to sea during routine operation.
Engineering	Automatic shutdown if low pressure detected	Automatic low-pressure shutdown capability is confirmed on CHA platform	
Engineering	ESPs have automatic shutdown capability if abnormal conditions detected	The ESPs have auto detection of abnormal power or electrical communication situations and will automatically shut down if an abnormality is detected	
Protective/ Mitigate	Corrosion control system in place to prevent corrosion of piping and subsequent leaks	A continuous corrosion control system is in place to inhibit the rate of corrosion. The corrosion inhibitor dosage rate is adjusted based on injection outcomes to effectively eliminate corrosion in the piping.	As-built P&IDs Corrosion monitoring and inspection records demonstrate continuous corrosion control system was in place and functioning.
Engineering	Remote shutdown capability in place to limit risk and volume of potential spills	Remote shutdown capability from onshore control room to isolate the wells	TEO audit or third party inspection document confirm equipment and procedural controls are in place and effective. Annual environmental performance reports indicate no release of hydrocarbon due to pipeline leak

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Administration	All lifting equipment is rated for intended activities and maintained	CHA crane, rigging and lifting connections (designed, constructed and installed to appropriate standards and codes) are inspected and maintained fit-for-purpose;	Maintenance records verify CHA crane, rigging and lifting connections were inspected and are fit-for-purpose. Certification records have been maintained for lifting equipment.
Engineering	Lifting plan implemented to reduce potential for dropped objects to prevent impact to pipeline	Cliff Head Lift Plan (10HSEQGENPC24FM01) is implemented for all lifting operations detailing load ratings of lifting equipment, intended loads, operational limits (e.g. weather) and procedures	Documented lifting plan verifies all lifting operations considered load ratings of lifting equipment, intended loads and operational limits (e.g. weather).
Engineering	Lifting activities are undertaken in accordance with Cliff Head Lifting Operations and Lifting Equipment Procedure (10HSEQGENPC24)	Lifting activities are undertaken in accordance with Cliff Head Lifting Operations and Lifting Equipment Procedure (10HSEQGENPC24), which requires: • The security of loads to be checked prior to commencing lifts. • Loads to be covered if there is a risk of losing loose materials. • All lifting equipment is rated for intended activities and maintained	Permit to Work (PTW) and Job Safety Analysis (JSA) records demonstrate that the following requirements were followed: • The security of loads were checked prior to commencing lifts • Loads were covered if there is a risk of losing loose materials. • All lifting equipment was rated for intended activities and maintained.
Engineering	Piping wall integrity assessments completed to ensure adequate load strength and reduce potential for pipe rupture	Assessment of piping wall integrity to be carried out prior to maintenance activities to confirm intended loads do not exceed pipe strength	Inspection of maintenance plan to confirm pipe wall integrity assessment has been undertaken prior to commencing maintenance
Protective/Mitigate	Pipes flushed to ensure they are hydrocarbon free prior to undertaking pipe repair to reduce potential hydrocarbon releases to sea	Pipe operations will be halted and pipes flushed prior to commencing pipe replacement activities	Daily report confirms that production has been halted prior to pipe section replacement as recorded on daily reports. Work instructions will document any pipe repair work.
Engineering	Prior to undertaking high pressure water jetting, the water pressure is assessed to ensure pipe rupture cannot occur.	Water jet pressure to be insufficient to rupture pipe	Assessment of water pressure to confirm pressure is insufficient to rupture pipe.

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Engineering	Fluid monitoring is conducted in accordance with recognised Australian/International standards to reduce risk of loss of well control	Fluid monitoring conducted including: • The composition of the workover fluid is constantly monitored to ensure sufficient density to control subsurface pressures; • Blow-out Preventers (BOP) and related well control equipment are installed, operated, maintained and tested in accordance with manufacturer's recommendations and recognised Australian/International standards; and • The wells are designed and constructed in accordance with regulated international standards.	Fluid monitoring records during workovers BOP and well control equipment standards are verified by responsible person during well interventions and documented daily Wells engineering and Management Standard (WEMS) document
Protective/ Mitigate	NOPSEMA accepted OPEP provides options for controlling the source of any unplanned hydrocarbon/chemical spills and mitigates potential impacts. In all cases, the NEBA of the spill response is considered when implementing the OPEP	Oil pollution emergency plan (OPEP) implemented, with the following potentially applicable strategies: • Monitor and evaluate; • Offshore containment and recovery; • Shoreline protection and deflection; • Shoreline clean-up; and • Oiled wildlife response	Incident reports confirm OPEP and NEBA implemented Incident report includes volume of hydrocarbon release due to pipe leak Accepted OPEP
Administration	Vessels operation within weather limitations	Vessel Master to monitor meteorological forecasts at least once daily as per operating conditions in Cliff Head Marine Operations Procedure (10OPGOPC04).	Vessel logs record timing and weather conditions/sea state for operations on a daily basis
Administration	Production shut in during Class 4 (Complex) lifts to reduce potential losses to the marine environment if a dropped object was to rupture the pipeline.	During Class 4 (Complex) heavy lifts, production will be shut-in to minimise losses should an incident occur;	TEO audit or third party inspection document Audit reports confirm equipment and procedural controls are in place and effective
Administration	Dropped object analysis undertaken prior to heavy lifts	A dropped object analysis will assess lifting risk posed by heavy objects. Recommended preventative measures will be implemented. Other SIMOPs activities (e.g. IMR activities) are also considered.	Dropped object analysis and SIMOPs plans
Protective	CCTV reviewed by panel operator to ensure no loss of containment is visible.	Remote shutdown capability from onshore control room to isolate the wells	CCTV footage
Engineering	Installation of low pressure alarms to identify leaks early in the pipe	Automatic shutdown capability if low-pressure detected	TEO audit or third party inspection document confirm equipment and procedural controls are in place and effective
Protective/Mitigate	Bunding on cellar deck	Bunding effective while personnel on board (i.e. before any maintenance work is completed)	Inspection of bunding before maintenance work and prior to departure. Drain system operation First/last on board checklist

7.3.3.4 ALARP

Topside processing is necessary for production of hydrocarbons from the Cliff Head field, there are no suitable alternatives to allow production. It is considered that the improved control measures and industry standards in place reduce the likelihood and potential impacts of a topside process leak to ALARP.

The use of pipelines to transfer hydrocarbons from the Cliff Head field to the ASP is necessary for the production of hydrocarbons from the Cliff Head field, there are no suitable alternatives to allow production. It is considered that the control measures and industry standards in place reduce the likelihood and potential impacts of a pipeline leak are ALARP. Additional control measures were considered but rejected on the basis as not being practicable as described below.

Rejected controls	Hierarchy	Practicable	Cost effective	Evaluation
Eliminate lifting in field	Eliminate	×	×	Not considered practicable as CHA cannot store all the required materials, supplies etc. to sustain normal and safe operation including maintenance.
Use of vessels to transfer crude to the ASP rather than pipeline	Eliminate	×	×	Costs of using vessels grossly disproportionate to benefits given the additional vessel presence and associated risks and impacts to safety, the environment and other sea users. Pipelines would require to remain in place for the transfer of chemical and PFW to and from the platform.
No installation of stabilisation materials	Eliminate	×	×	Introduces unacceptable risk to the safe operation of the pipeline. Stabilisation materials are required to maintain the structural integrity of the pipeline.
All maintenance activities will be carried out during daylight hours	Administration	×	×	Daylight operations considered to introduce unnecessary cost (i.e. 12 vs 24 hr ops.), whilst delivering little / no environmental benefit given distance to nearest sensitive receptors and the negligible impact of light during planned activities. 24 hr ops reduces length of activities.
No removal of marine growth	Eliminate	×	×	Introduces unacceptable risk to the safe operation of the pipeline. Removal of marine growth is considered necessary to reduce the drag the pipeline is subjected to in order to maintain the structural integrity of the pipeline

7.3.3.5 Residual risk

Aspect	Consequence	Likelihood	Residual risk
Pipeline leak	Major (4) – Significant environmental impact with offsite impact and recovery work over a few weeks. Some local and regional media interest	A – Extremely unlikely	Medium (4)
Topside Process leak	Major (4) – Significant environmental impact with offsite impact and recovery work over a few weeks. Some local and regional media interest	B – Very unlikely	Medium (8)

7.3.3.6 Acceptability

Consequence	
Threatened / Migratory / Protected Fauna	The susceptibility of marine fauna to hydrocarbons is dependent on hydrocarbon type and exposure duration however given that exposures would be limited in extent and duration, exposure to marine fauna from this hazard is not expected to result in a fatality. The potential sensitive receptors in the surrounding areas of the spill will include fish, marine mammals, marine reptiles and seabirds at the sea surface. Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-6). However, the nature of the crude results in very little entrainment in the water column and therefore long term decline in water quality is unlikely. Marine pollution in the event of a pipeline leak could result in impacts to marine fauna as discussed above, however it is not expected that a release of crude due to a pipeline leak would result in a decreased population size at a local or regional scale, it is expected that a spill of this nature would result in a major consequence given the potential fauna that may be present in the area and potential impacts to shorelines, and recovery over a few weeks.
Physical Environment/ Habitat	Shoreline accumulation of hydrocarbons may occur at some locations along the WA coast resulting in maximum possible shoreline accumulation of ~36 m^3 around Dongara. As such, marine and shoreline habitats may also be impacted. The nature of the crude is such that it will form waxy semi-solid to solid droplets and will clump together on the shorelines rather than forming a slick along coastlines. The maximum accumulation around Dongara of 36 m^3 would be along a stretch of coastline, therefore the crude is expected to be in clumps in small localised areas along the coastline rather than distributed all along the shoreline as the crude does not form slicks. As the crude does not entrain very much in the water column, impacts to the marine environment will be of lower consequence as concentrations are unlikely to be above thresholds of significance.
Threatened ecological communities	No TECs are expected to be impacted in the unlikely event of a pipeline or topside process leak.
Protected Areas	There is no predicted potential for crude to enter protected areas above impact threshold concentrations.
Socio-economic receptors	Socioeconomic receptors may be impacted by a pipeline leak. However, given the potential volumes released, impacts are not considered significant. No stakeholder concerns have been raised regarding this aspect.

Likelihood – Pipeline Leak	
The pipeline route is marked on marine charts and fishermen frequenting the area have been extensively consulted and are aware of the pipeline presence. A number of controls are in place to prevent and detect corrosion in the pipeline, maintaining its integrity. Given the control measures in place, a pipeline leak from damage to the pipeline or through corrosion of the pipeline itself is considered to be extremely unlikely.	
Acceptability of risk	**No stakeholder issues have arisen regarding the presence of the pipeline. Furthermore, given the management controls in place, including compliance with industry standards and legislation, to prevent damage to or corrosion of the pipeline and the small volumes potentially released, the risk is considered acceptable. The likelihood of a pipeline rupture is extremely unlikely when considering industry statistics and the track record of TEO's operations in WA. The potential volume released and the resulting relatively small accumulations along shorelines, and weathering on the sea surface results in the formation of waxy sheets or clumps on the sea surface with little entrainment, and relatively small volumes arriving at shorelines. Mitigation measures implemented in the event of a spill would further reduce the volume of crude within the marine environment.**
Likelihood – Topside Process Leak	
A number of controls are in place to prevent and detect a topside process leak. Controls that prevent this risk include: the corrosion management plan, piping inspection and maintenance (such as chemical injection of corrosion inhibitor), NDT wall thickness measurements, corrosion coupon inspections and fluid and gas sampling and analysis. Improvements to the controls that prevent or mitigate this risk since the July 2018 incident include: procedural changes to improve monitoring from the onshore control room, adjustment of the low-pressure alarm, upgrading of the CCTV displays in the control room and a review of first-on-board and last-on-board check lists along with improved design of the instrumentation with reduced susceptibility to fatigue and improved conductor centralisers to prevent movement of pipework. Given the control measures in place, a topside process leak is considered to be very unlikely.	
Acceptability of risk	**The likelihood of a topside process leak is very unlikely.** **The potential volume released and weathering on the sea surface results in the formation of waxy sheets or clumps on the sea surface with little entrainment.** **Mitigation measures implemented in the event of a spill would further reduce the volume of crude within the marine environment.**

7.3.4 Chemical/hydrocarbon Spills/leaks

7.3.4.1 Description of Hazard

There may be accidental releases / discharges to the marine environment of a variety of potentially hazardous materials which are stored and utilised on the CHA deck. The main sources of hazardous liquids are:

- Bulk diesel storage tank, 1.8 m^3
- CHA crane diesel fuel tank, 1.1 m^3
- HWU hydraulic power unit diesel engine, 0.4 m^3
- Small amounts of lubrication, hydraulic and waste oils within equipment e.g. hydraulic oil in CTU reel, <50L (0.05 m^3).

Non Production Phase

During the Non Production Phase, IMR activities at the CHA will be undertaken intermittently (as described in Section 2.6). Activities will be managed the same as during the Operations Phase and therefore the potential risk of a chemical/hydrocarbon spill/leak will be similar.

7.3.4.2 Chemicals

Fuel transfer from the storage tank to individual equipment will be carried out on CHA. Accidental releases may occur due to hose failure or damage during fuel transfer from CHA to individual equipment, or through damaged or poorly maintained equipment.

The chemical injection package is located at ASP, and comprises pumps, tanks and control devices. The chemicals are supplied to CHA via four stainless steel tubes (encapsulated in a flat pack), one is blocked and is out of service, one is dedicated to a mixture of scale inhibitor and corrosion inhibitor, and the other two allocated as spares.

Chemical spills may result from the accidental leakage of process chemicals used for injection into the wells and pipeline on the CHA platform or through loss of integrity of the chemical umbilical or at CHA from a failure at the chemical injection unit. The chemical injection unit has three break tanks each of approximately 190 L, therefore, 190 L is the largest credible spill scenario. Potential impacts as a result of pipeline integrity loss are discussed in Section 7.3.3.

7.3.4.3 Potential impact

The impacts associated with the accidental discharge of liquid hazardous materials is related to the nature of the material spilled, the volume and its behaviour in the marine environment (sink/ float/ disperse etc.). In the event of a spill from CHA to the marine environment the liquids would be subjected to rapid dispersion and dilution by the open ocean water conditions and prevailing currents.

If hazardous liquids are accidentally lost overboard or due to a loss of pipeline integrity, potential impacts will include a temporary and highly localised decline in water quality with limited potential for toxicity to marine fauna due to the temporary exposure and low toxicity resulting from the rapid dilution and evaporation in the marine environment. Potential impacts are likely to be limited to the immediate vicinity, with no shoreline contact likely, and unlikely to affect overall population viability.

7.3.4.4 Environmental performance

Environmental outcomes, performance standards and measurement criteria for chemical spills/leakages are provided in the table below:

Environmental Risk	Hydrocarbon or chemical spills or leakages from the CHA platform deck or chemical umbilical into the marine environment
Environmental Performance Outcomes	No unplanned discharges of hydrocarbon or chemical to sea

Hierarchy	Control Measures	Performance Standards	Measurement Criteria
Engineering	Any equipment or machinery with the potential to leak oil will be enclosed in continuous bunding.	The platform has been designed with bunding that has a volume of 19.6m^3, meaning that a maximum spill would be contained in the bunded area. Fuel transfer from storage tank to individual equipment will be carried out within bunding.	TEO audit or third party inspection document confirm equipment and procedural controls are in place and effective Annual environmental performance reports indicate no unplanned discharge of hydrocarbon and chemicals to sea
Engineering	Deck of CHA is bunded to contain spills	CHA has been designed with deck drains, which collect and route liquids to deck drainage boxes. The main and cellar decks on the platform are designed with plating and perimeter bunds (inverted half-pipe or kick-plate) to contain spillage and wash water with containment of 19.6 m^3.	

Hierarchy	Control Measures	Performance Standards	Measurement Criteria
Protective/ Mitigate	Suitable spill kits in accessible locations to be used immediately in the event of a spill to reduce potential for overboard discharge	Spill response bins/ kits will be located in close proximity to hydrocarbon/chemical storage areas for prompt response in the event of a spill or leak. The kits will be checked for their adequacy and replenished as necessary prior to the commencement of activities and on a regular basis thereafter.	
Protective/ Mitigate	Suitable spill kits in accessible locations to be used immediately in the event of a spill. Contaminated wastes are contained and shipped to shore for disposal and not discharged to sea to minimise impacts to water quality	Chemical and hydrocarbon spills will be immediately cleaned up and contaminated material will be contained for onshore disposal.	
Administration	All chemicals (environmentally hazardous) and hydrocarbons will be stored in appropriately bunded areas in accordance with MARPOL 73/78	Chemicals and hydrocarbons will be packaged, marked, labelled and stowed in accordance with MARPOL 73/98 Annex I, II and III regulations. Specifically, all chemicals (environmentally hazardous) and hydrocarbons will be stored in appropriately bunded areas which drain to large capacity tanks with a design capacity exceeding the volume of the stored chemicals.	
Protective/ Mitigate	Chemical storage and handling areas are routinely inspected	On CHA, chemical storage and handling areas are routinely inspected for leaks and spills and if detected, are cleaned-up immediately	PIC confirms platform controls are in place and effective during routine visits Quarterly workplace inspection
Protective/ Mitigate	CCTV on platform to ensure any visible leaks are observed whilst platform is unmanned	CCTV on CHA can detect disturbances that could lead to significant leaks while the platform is unmanned	CCTV footage monitored
Protective/ Mitigate	Implementation of Controlled Use of Drains on CHA Platform Procedure (10HSEQENVPC02) to ensure no unplanned discharges via drains to sea	Upon arrival at the CHA platform, the drainage system is isolated so as to not allow any liquids to be discharged overboard, this shall be achieved by closing the two valves located on the drain lines that direct liquids overboard	Standards are verified by PIC during activity; First/last on board checklist
	Implementation of Controlled Use of Drains on CHA Platform Procedure (10HSEQENVPC02) to allow rainwater to be discharged overboard	Following flushing and prior to departure, drain line valves that were shut during work are opened to allow rainwater to discharge overboard	Standards are verified by PIC during activity; First/last on board checklist
Protective/ Mitigate	Drainage system is cleaned following a spill or leak with liquids retained for onshore disposal	If required (e.g. a spill or leak has occurred), the drainage system is flushed clean to ensure no residual chemicals or hydrocarbons are left in the drainage pipe work with liquid directed to a temporary storage tank located on the cellar deck, which is transferred to a vessel for onshore disposal	Standards are verified by PIC during activity; First/last on board checklist

Hierarchy	Control Measures	Performance Standards	Measurement Criteria
Administration	All personnel received the CHA Site Induction (10SPTRNTM18) which includes hydrocarbon and chemical management requirements	All crew will be required to complete the CHA Site Induction containing basic information on chemical and hydrocarbon management (good housekeeping), as well as spill prevention and response measures.	Training records show all personnel travelling offshore have received the CHA Site Induction
Administration	All lifting equipment is rated for intended activities and maintained	CHA crane, rigging and lifting connections (designed, constructed and installed to appropriate standards and codes) are inspected and maintained fit-for-purpose;	Maintenance records verify CHA crane, rigging and lifting connections were inspected and are fit-for-purpose. Certification records have been maintained for lifting equipment.
Engineering	Lifting plan implemented to reduce potential for dropped objects to prevent impact to pipeline	Cliff Head Lift Plan (10HSEQGENPC24FM01) is implemented for all lifting operations detailing load ratings of lifting equipment, intended loads, operational limits (e.g. weather) and procedures	Documented lifting plan verifies all lifting operations considered load ratings of lifting equipment, intended loads and operational limits (e.g. weather).
Administration	Contaminated wastes are contained and shipped to shore for disposal and not discharged to sea to minimise impacts to water quality	Hazardous waste are managed in accordance with TEO's Prescribed Waste Management, specifically: • Containers used to transport the waste are fit for the transport of that particular prescribed waste • Spills are contained with the use of an absorbent material and contaminated materials are stored appropriately. • All liquid waste oils and glycols that are able to be contained and stored in its liquid state are stored in a 205 L drum. • Transport Waste Certificates are in place for each consignment of waste transported.	TEO audit or third party inspection document demonstrate compliance TEO's Prescribed Waste Management, specifically: • Containers used to transport the waste were fit for the transport of that particular prescribed waste • Spills were contained with the use of an absorbent material and contaminated materials are stored appropriately. • All liquid waste oils and glycols that were able to be contained and stored in its liquid state were stored in a 205 L drum. • Transport Waste Certificates were in place for each consignment of waste transported.
Administration	SDS available on board CHA for all chemicals	A Safety Data Sheet (SDS) will be available for all onboard chemicals and hydrocarbons.	Environmentally hazardous chemical storage areas inspected during visits to CHA. Inspection records demonstrate SDS were available are available
Administration	Any accidental discharges of hazardous waste are recorded and reported	Detailed records of hazardous waste accidentally discharged will	Incident reports detail volume of hazardous waste

Hierarchy	Control Measures	Performance Standards	Measurement Criteria
		be maintained and reported appropriately.	released to the marine environment
Administration	Machinery and equipment containing hydrocarbons maintained to reduce potential for leaks	All machinery and equipment containing hydrocarbons are maintained in accordance with manufacturer's maintenance specifications.	Equipment maintenance records demonstrate that equipment is maintained in accordance with vendor recommendations
Administration	Chemicals used are assessed for environmental impact prior to purchase (refer Appendix A); 10OPGOPC06	Chemicals used are assessed for environmental impact prior to purchase (refer Appendix A). 10OPGOPC06 Chemical Management are used to inform selection. Chemical substitutes will be assessed prior to service and only those with an equivalent or better environmental performance selected.	Chemical assessment records verify chemicals are assessed prior to purchase and substitutes only selected if they have an equivalent or better environmental performance.
Engineering	Automatic shutdown if low pressure detected	Automatic low-pressure shutdown capability on CHA is confirmed	TEO audit or third party inspection confirm equipment and procedural controls are in place and effective.

7.3.4.5 ALARP

Operation of machinery is required to ensure the safe and efficient operation of the CHA platform, which requires the use of hydrocarbons such as diesel, lubrication and hydraulic fluids. Options to eliminate the use of these hydrocarbons or the machinery are not available. The use of chemicals at the Cliff Head field is necessary for the production of hydrocarbons, there are no suitable alternatives to allow production. It is considered that the control measures and industry standards in place reduce the likelihood and potential impacts of a loss of well control are ALARP. Additional control measures were considered but rejected on the basis as not being practicable, as described below.

Rejected controls	Hierarchy	Practicable	Cost effective	Evaluation
No hazardous materials will be used	Eliminate	×	×	Hazardous materials (e.g. hydraulic fluid, lubricating oils, cleaning chemicals, paints, solvents, batteries) are required routinely for safe and efficient operation of the platform. Potential introduction of additional safety risks to personnel (e.g. inability to clean up spills, maintain platform decks in good working order). Suitable cost-effective non-hazardous alternatives are not known to be available.
Deck drains plugged at all times; entire platform bunded	Eliminate	×	×	Platform deck could be flooded during rainy weather leading to unsafe working conditions. Given the small volumes of spills that could be expected and the spill response measures in place, it is not considered practicable to plug all drains or bund the entire platform deck. In addition, the low volumes would have a minimal impact on the marine environment and be quickly dispersed in the surrounding waters.

7.3.4.6 Residual risk

Aspect	Consequence	Likelihood	Residual risk
Deck spills	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)

7.3.4.7 Acceptability

Consequence	
Threatened / Migratory / Protected Fauna	A release of hazardous liquid waste could have detrimental effects to marine fauna or habitats. These are expected to be similar or less than those described Sections 7.3.3.1 and 7.3.3.2; however, given the small volumes potentially released (<2 m^3), the low likelihood of any leaks occurring that would reach the marine environment, and given the offshore location of the CHA platform, impacts to marine habitats are not expected. Impacts to marine fauna would only occur if an individual was immediately adjacent to the spill source, which is possible for fish species in the vicinity of the CHA. However, the spill would rapidly disperse throughout the water column diluting the spill and reducing its toxicity and potential impacts to receptors. Although deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-6), given the low likelihood of a spill or leak, and the small volumes, long term or permanent decline in water quality is not expected and therefore potential impacts to marine fauna in the immediate vicinity are considered acceptable.
Physical Environment/ Habitat	
Threatened ecological communities	N/A - No TECs are expected to be impacted in the unlikely event of a deck spill.
Protected Areas	No protected areas are expected to be impacted in the unlikely event of a deck spill given the distance to the nearest protected area is >53 km away.
Socio-economic receptors	Given the small volumes potentially leaked, and the lack of significant impact to fauna or habitats, socioeconomic receptors are unlikely to be impacted. No stakeholder concerns have been raised regarding this aspect.
Likelihood	
A number of controls are in place to prevent the leakage of these hazardous liquids from machinery and containers. Should this occur, secondary containment, such as bunding, is in place to prevent discharge to the sea in addition to clean up procedures. Given the control measures in place, a hazardous liquid spill or leak on the CHA deck entering the marine environment is considered to be extremely unlikely.	
Acceptability of risk	**With the control measures in place, including compliance with industry standards and legislation, to prevent and contain small spills and leakages, and the small volumes potentially released, potential impacts to the marine environment and marine fauna would be limited to temporary impacts in the immediate vicinity of a leak and the risk is considered acceptable.**

7.3.5 Workover chemical spills

7.3.5.1 Description of hazard

Chemicals, such as wash chemicals, cleaning chemicals, maintenance and solvents, are generally held onboard in low quantities (typically < 20 L containers) and are located within chemical cabinets or bunded storage areas on the vessels and CHA. Non-process chemical spills may result from human error or damage to a chemical container during handling. Spills are generally captured by the drain system and routed to a holding tank for treatment or disposal onshore. In the event that a spill is not contained on deck or within a bunded area, there would be a release to the marine environment of up to 20 L.

The main fluid to be utilised in workover activities will be a KCL brine containing additives as detailed in Appendix A. KCL is listed as a PLONOR substance. This fluid is handled via the HWU/CTU circulation system which processes fluid returns and incorporates a degasser/vent system. The HWU also has a shale-shaker system (for any milling operations). KCL brine is recycled in the workover program wherever possible.

Workover operations may also require the use of flush and wash chemicals such as the organic acid blend (acid wash solution), as described in Section 2.3.2. Nitrogen is also often used as a means to perform pressure tests, diagnostic and potentially wellbore cleanout for both CTU and HWU operations.

The preferred disposal method of the brine (and other workover chemicals including acid wash chemicals) is either injection into an offshore well, reprocessing via the CHA production system or collection in tanks for onshore disposal at ASP. Reprocessed or tank collected workover fluids will be separated onshore at ASP and then pumped from shore via subsea chemical pipeline for reinjection into the reservoir via the water re-injection wells.

There is potential that a small amount (<20 L) of workover chemicals could be released to the marine environment via a leak in the CHA production system.

7.3.5.2 Potential impact

Unplanned discharges of non-process chemicals may decrease the water quality in the immediate vicinity of the release. Only small volumes (< 20 L) are anticipated, resulting in very short-term impacts to water quality, and limited to the immediate release location.

Given the occasional nature of unplanned chemical discharge, the small volumes, and the offshore location of the Operational Area, the change to water quality resulting from unplanned discharge of chemicals will be minor.

As a result of a change in water quality, further impacts to receptors may occur, which include injury or mortality to marine fauna resulting from exposure to toxins in the released chemicals. Given that surface discharges are rapidly dispersed, and would be of very small volumes, potential impacts would be highly localised and temporary.

7.3.5.3 Environmental performance

Environmental outcomes, performance standards and measurement criteria for workover spills are provided in the table below:

Environmental Risk	Reduction in water quality due to release of fluid to the marine environment during workover activities		
Environmental Performance Outcomes	No unplanned discharges of chemicals to sea during workover activity		
Hierarchy	**Control Measures**	**Environmental Performance Standards**	**Measurement Criteria**
Administration	Brine utilised in workovers is reprocessed or returned to shore for downhole injection – no discharge to sea	No discharge of brine to sea during workover activity	Waste transfer documentation Annual environmental performance reports indicate no unplanned discharge of brine to sea during workover activities
Administration	Equipment utilised for workovers is maintained to ensure maximum efficiencies	Workover equipment maintained in accordance with manufacturer's specifications	Equipment maintenance records demonstrate that equipment is maintained in accordance with vendor recommendations

Administration	Chemicals used are assessed for environmental impact prior to purchase (refer Appendix A); 10OPGOPC06	Chemicals used are assessed for environmental impact prior to purchase (refer Appendix A). 10OPGOPC06 Chemical Management are used to inform selection. Chemical substitutes will be assessed prior to service and only those with an equivalent or better environmental performance selected.	Chemical assessment records verify chemicals are assessed prior to purchase and substitutes only selected if they have an equivalent or better environmental performance.
Administration	Chemical volumes are calculated to avoid excessive usage	Workover fluid additives are monitored	Well fluid monitoring records
Administration	Workover fluid use and disposal route is recorded	Workover fluid releases will be minimised and recorded where they do occur.	Incident report includes volume of chemicals accidentally released to sea

7.3.5.4 ALARP

The use of chemicals at the Cliff Head field is necessary for the production of hydrocarbons, there are no suitable alternatives to allow production. It is considered that the control measures and industry standards in place reduce the likelihood and potential impacts of a chemical spill are ALARP. Additional control measures were considered but rejected on the basis as not being practicable as described below.

Additional controls considered but not adopted.	Hierarchy	Practicable	Cost effective	Evaluation
No hazardous materials will be used	Eliminate	×	×	Hazardous materials (including chemicals) are required routinely for safe and efficient operation of the platform. Potential introduction of additional safety risks to personnel (e.g. inability to clean up spills, maintain platform decks in good working order). Suitable cost-effective non-hazardous alternatives are not known to be available.

7.3.5.5 Residual risk

Aspect	Consequence	Likelihood	Residual risk
Workover chemical spill	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)

7.3.5.6 Acceptability

Consequence	
Threatened / Migratory / Protected Fauna	A release of chemicals could have detrimental effects to marine fauna or habitats. However, these impacts are as a result of neat chemicals being released into the marine environment, whereas chemicals which may be accidentally released would be rapidly diluted in the marine environment. Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-6). Given the small volumes and chemical selection process for chemical use ensuring that environmentally acceptable chemicals are favoured, water quality impacts are expected to be temporary and would not result in significant impacts to marine fauna.

Consequence	
	Impacts to marine fauna would only occur if an individual was immediately adjacent to the spill source, which is unlikely. The spill would rapidly disperse throughout the water column diluting the spill and reducing its toxicity and potential impacts to receptors.
Physical Environment/ Habitat	Given the small volumes potentially released (<20 L) impacts to marine habitats are not expected, the spill would rapidly disperse returning the surrounding water column to its previous state within minutes.
Threatened ecological communities	No TECs are expected to be impacted in the unlikely event of a workover spill.
Protected Areas	Given the distance of protected areas from CHA (>53 km away), and the potential spill sizes no protected areas are expected to be impacted in the unlikely event of a workover spill.
Socio-economic receptors	Given the small volumes potentially leaked, and the lack of significant impact to fauna or habitats, socioeconomic receptors are unlikely to be impacted. No stakeholder concerns have been raised regarding this aspect.
Likelihood	
Controls are in place to prevent discharge of workover fluid to the marine environment and to reduce the toxicity of fluid in the unlikely event of a discharge to sea. Given the control measures in place, a leak of workover fluid to the marine environment causing environmental harm is considered to be very unlikely.	
Acceptability of risk	**With the control measures in place, including compliance with industry standards and legislation, to prevent and contain workover spills, and the small volumes potentially released, potential impacts to the marine environment and marine fauna would be limited to temporary impacts in the immediate vicinity of a leak and the risk is considered acceptable.**

7.3.6 Produced formation water spills

7.3.6.1 Description of Hazard

PFW is formation water (derived from a water reservoir below the hydrocarbon formation). The PFW recovered from the wells is transported in the production pipeline to the ASP where it is separated from the oil stream. The PFW is disposed of via deep well disposal offshore through the water reinjection pipeline. No PFW will be discharged into the marine environment from the Cliff Head oil field. A pipeline leak or operator error could result in approximately 6.5 m^3 of PFW released into the marine environment, based on the release rate and shutdown time frame.

7.3.6.2 Potential impact

PFW typically contains low concentrations of:

- Petroleum hydrocarbons
- Phenols
- Organic acids
- Metals
- Radioisotopes
- Residual process chemicals.

Petroleum hydrocarbons are the organic components of greatest environmental concern in PFW. PFW may also contain residues from scale and corrosion inhibitors, biocides and process chemicals added from various stages of the extraction and production process.

Impacts associated with the unplanned release of PFW discharge may include:

- Changes to water quality
- Toxicity to biota / marine fauna

- Changes to sediment quality.

In the event there is an unplanned release of PFW, the discharge will most likely be instantaneous and of short duration, and will be rapidly dispersed and diluted. Therefore impacts to water quality is expected to be minor.

Impacts to biota and marine fauna would only occur if an individual was immediately adjacent to the spill source, which is unlikely. Due to the small volume (~6.5 m^3) the spill would rapidly disperse throughout the water column diluting the spill and reducing its toxicity and potential impacts to receptors. Deteriorating water quality and marine pollution may impact marine fauna species, however given the small volumes potentially released, and the dilution of hydrocarbons or chemicals within the PFW already prior to discharge (i.e. not concentrated releases of hydrocarbons or chemicals) impacts to water quality would be minor and no long term impacts are expected.

7.3.6.3 Environmental performance

Environmental outcomes, performance standards and measurement criteria for PFW spills are provided in the table below:

Environmental Risk	PFW spills due to pipeline leaks resulting from corrosion and/or damage to pipeline.
Environmental Performance Outcomes	No unplanned discharge of PFW to sea due to pipeline leaks

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Engineering	Pipelines designed and installed in accordance with industry standards to ensure integrity is appropriate	A heavy walled pipe (rated to the full well pressure possible for any production wells) carries the hydrocarbons and produced formation water. The pipelines are designed and tested in accordance with the relevant codes and standards for pipelines (i.e. AS 2885 and DNV-OS-F101). Pipeline designed to withstand fishing vessel collisions and accommodate rock lobster fishers.	As-built piping and instrumentation diagrams (P&IDs) verify pipeline design. Pipeline testing records verify pipelines were tested in accordance with the relevant codes and standards for pipelines (AS 2885 and DNV-OS-F101).
Administration	Corrosion control system in place to prevent corrosion of pipeline and subsequent leaks	A continuous corrosion control system is in place to monitor the rate of corrosion. The corrosion inhibitor dosage rate is adjusted based on monitoring outcomes to effectively eliminate corrosion in the pipeline.	As-built P&IDs verify pipeline design. Corrosion monitoring and inspection records demonstrate continuous corrosion control system was in place and functioning.
Administration	Pipeline is present on marine charts to reduce potential for third party interference	The pipeline route is provided on marine charts.	Marine charts show pipeline route
Engineering	Remote shutdown capability in place to limit risk and volume of potential spills	Capacity to onshore shutdown reinjection water to CHA.	TEO audit or third party inspection document confirm equipment and procedural controls are in place and effective.

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
			Annual environmental performance reports indicate no release of hydrocarbon due to pipeline leak
Engineering	Automatic shutdown if low pressure detected	Low pressure alarm in onshore control room.	TEO audit or third party inspection document confirm equipment and procedural controls are in place and effective Annual environmental performance reports indicate no unplanned discharge of PFW to sea during routine operation Incident report includes volume of PFW accidentally released to sea during routine operation
Administration	Production shut in during Class 4 (Complex) heavy lifts to reduce potential losses to the marine environment if a dropped object was to rupture the pipeline	During Class 4 (Complex) heavy lifts production will be shut-in to minimise losses should an incident occur.	TEO audit or third party inspection document confirm equipment and procedural controls are in place and effective.
Administration	All lifting equipment is rated for intended activities and maintained	CHA crane, rigging and lifting connections (designed, constructed and installed to appropriate standards and codes) are inspected and maintained fit-for-purpose.	Maintenance records verify CHA crane, rigging and lifting connections were inspected and are fit-for-purpose. Certification records have been maintained for lifting equipment.
Engineering	Lifting activities are undertaken in accordance with Cliff Head Lifting Operations and Lifting Equipment Procedure (10HSEQGENPC24)	Lifting activities are undertaken in accordance with Cliff Head Lifting Operations and Lifting Equipment Procedure (10HSEQGENPC24), which requires: • The security of loads to be checked prior to commencing lifts. • Loads to be covered if there is a risk of losing loose materials. • All lifting equipment is rated for intended activities and maintained	Permit to Work (PTW) and Job Safety Analysis (JSA) records demonstrate that the following requirements were followed: • The security of loads were checked prior to commencing lifts • Loads were covered if there is a risk of losing loose materials. • All lifting equipment was rated for intended activities and maintained.
Engineering	Lifting plan implemented to reduce potential for dropped objects to prevent impact to pipeline	Cliff Head Lift Plan (10HSEQGENPC24FM01) is implemented for all lifting operations detailing load ratings of lifting equipment, intended loads, operational limits (e.g. weather) and procedures	Documented lifting plan verifies all lifting operations considered load ratings of lifting equipment, intended loads and operational limits (e.g. weather).

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Administrative	Personnel involved in lifting operations are competent as per requirements within the Cliff Head Lifting Operations and Lifting Equipment Procedure (10HSEQGENPC24)	Personnel involved in lifting operations are competent as per requirements within the Cliff Head Lifting Operations and Lifting Equipment Procedure (10HSEQGENPC24). • Competency of equipment operators meets Australian legislative standards and all equipment operators hold a Certificate of Competency issued by a recognised State Authority or a National License issued in accordance with the National Standard NOHSC-1006-2001 - Lifting Competency Requirements. • Lifting Equipment Maintenance Personnel hold current Certificates of Competency and Licenses.	Training/certification records demonstrate all personnel involved in lifting operations have the appropriate training/certifications.
Administration	Dropped object analysis undertaken prior to heavy lifts	A dropped object analysis will assess lifting risk posed by heavy objects. Recommended preventative measures will be implemented. Other SIMOPs activities (e.g. IMR activities) are also considered.	Dropped object analyses and SIMOPs plans

7.3.6.4 ALARP

The production of PFW is necessary for use the production of hydrocarbons from the Cliff Head field. Transferring PFW to ASP is environmentally more beneficial than discharging to the environment. It is considered that the control measures and industry standards in place reduce the likelihood and potential impacts of a PFW leak are ALARP. Additional control measures were considered but rejected on the basis as not being practicable as described below.

Additional controls considered but not adopted	Hierarchy	Practicable	Cost effective	Evaluation
Additional vessel permanently required on site to minimise collision of fishing vessel with pipelines	Eliminate	×	×	Additional operational cost and HSE risks for an additional vessel. Minimal benefits given that the CHA and its subsea facilities have been marked on marine charts and communicated to fishermen.
Conduct pipeline maintenance at a more frequent interval than the current plan to identify potential damage to pipeline	Administration	×	×	Additional operational cost and increased operation downtime as well as safety exposure.

7.3.6.5 Residual risk

Aspect	Consequence	Likelihood	Residual risk
Produced Water spill	Moderate (2) – Moderate or slight environmental impact, negligible remedial/recovery work	B – very unlikely	Low (4)

7.3.6.6 Acceptability

Consequence	
Threatened / Migratory / Protected Fauna	Impacts to marine fauna would only occur if an individual was immediately adjacent to the spill source, which is unlikely. Due to the small volume (~6.5 m^3) the spill would rapidly disperse throughout the water column diluting the spill and reducing its toxicity and potential impacts to receptors. Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-6), however given the small volumes potentially released, and the dilution of hydrocarbons or chemicals within the PFW already prior to discharge (i.e. not concentrated releases of hydrocarbons or chemicals) impacts to water quality would be minor and no long term impacts are expected.
Physical Environment/ Habitat	Given the small volumes potentially released (~6.5 m^3) impacts to marine habitats are not expected the spill would rapidly disperse returning the surrounding water column to its previous state within minutes to hours.
Threatened ecological communities	No TECs are expected to be impacted in the unlikely event of a PFW spill.
Protected Areas	Given the distance of protected areas (>53 km away) from the Operational Area, no protected areas are expected to be impacted in the unlikely event of a PFW spill.
Socio-economic receptors	Given the small volumes potentially leaked, and the lack of significant impact to fauna or habitats, socioeconomic receptors are unlikely to be impacted. No stakeholder concerns have been raised regarding this aspect.
Likelihood	
The pipeline route is marked on marine charts and fishermen frequenting the area have been extensively consulted and are aware of the pipeline presence. A number of controls are in place to prevent and detect corrosion in the pipeline, maintaining its integrity. Given the control measures in place, a PFW leak from the pipeline is considered to be very unlikely.	
Acceptability of risk	**With the control measures in place, including compliance with industry standards and legislation, prevent and contain workover spills, and the small volumes potentially released, potential impacts to the marine environment and marine fauna would be limited to temporary impacts in the immediate vicinity of a leak and the risk is considered acceptable.**

7.3.7 Unauthorised access

7.3.7.1 Description of hazard

Unauthorised access to CHA at any time poses a risk to platform infrastructure from damage due to sabotage by activists/terrorists. As the platform is unmanned there are only vessels in the vicinity during regular visits to the CHA or during IMR activities.

7.3.7.2 Potential impact

Worst case scenario would involve the loss of well control or pipeline leak due to intentional damage. The impacts of such a situation would equal those of the largest spill scenario as outlined in Section 7.3.

7.3.7.3 Environmental performance

Environmental outcomes, performance standards and measurement criteria for unauthorised access are provided in the table below:

Environmental Risk	Unauthorised access to platform posing a risk to platform infrastructure from damage due to sabotage resulting in spills (activists/terrorists)		
Environmental Performance Outcomes	No unauthorised access to CHA platform		
Hierarchy	**Control Measures**	**Environmental Performance Standards**	**Measurement Criteria**
Engineering	Gates are provided that will prevent unauthorised access	Gates in place on CHA and locked when platform is unmanned	TEO audit or third party inspection document confirm equipment and procedural controls are in place and effective Annual environmental performance reports indicate no unauthorised access to CHA platform First last onboard checklist confirms controls in place Quarterly workplace inspections
Engineering	Closed circuit TV security cameras are provided to enable the onshore control room operators to monitor petroleum activities	CCTV in place and regularly monitored to detect any unauthorised access	
Administration	Warning signs in place on CHA advising that unauthorised access is prohibited	Appropriate warning notices/signage erected	
Engineering	In event of unauthorised access, remote shutdown is possible to prevent potential impacts due to interference or sabotage	Remote well shut-down capability on CHA is confirmed	

7.3.7.4 ALARP

The presence and operation of the CHA platform is necessary for the production of hydrocarbons from the Cliff Head field, there are no suitable alternatives to allow production. It is considered that the control measures and industry standards in place reduce the risk of unauthorised access to the CHA platform to ALARP. Furthermore, the control measures in place to reduce risks of a loss of well control to ALARP are discussed in Section 7.3.3. Additional control measures were considered but rejected on the basis as not being practicable as described below.

Additional controls considered but not adopted	Hierarchy	Practicable	Cost effective	Evaluation
Additional vessel permanently required onsite to prevent unauthorised access to the CHA platform.	Eliminate	×	×	Additional operational cost and HSE risks for an additional vessel. Minimal benefits given the inherent design, CCTV equipment and remote distance of the CHA.

7.3.7.5 Residual risk

Aspect	Consequence	Likelihood	Residual risk
Unauthorised access	Severe (5) – Major environmental impact with significant site impact and recovery work over a few months. Regional/national media interest	A – extremely unlikely	Medium (5)

7.3.7.6 Acceptability

Consequence	
Unauthorised access to the platform could lead to loss of well control in the worst case scenario, the consequence of which is assessed in Section 7.3.3. No stakeholder concerns have been raised regarding this aspect.	
Likelihood	
Control measures in place prevent unauthorised access to the platform and allow for rapid detection in the unlikely event of access being made. Combined with the offshore location of CHA, the likelihood of unauthorised access leading to the worst case scenario is considered extremely unlikely.	
Acceptability of risk	**With the control measures in place, including compliance with industry standards and legislation, to prevent unauthorised access to the CHA platform and the small volumes of hydrocarbons entering the marine environment in the worst case scenario (loss of well control), the risk is considered acceptable.**

7.4 Vessel spills

7.4.1 Vessel tank rupture

7.4.1.1 Description of Hazard

Vessels are used to support the operations of CHA as described in Section 2.5. Any vessel at sea presents a possible collision hazard to other vessels at sea. A collision capable of causing a hydrocarbon spill requires a scenario whereby a vessel collides with one of the vessels with enough force to cause a hydrocarbon release. No additional surface hazards, such as infrastructure (e.g. platforms, aside from CHA), with which collision with a vessel has potential to cause a rupture of a fuel tank have been identified within the Operational Area.

The greatest risk is a vessel to vessel collision causing sufficient damage such that a fuel tank is ruptured, releasing diesel to the marine environment.

Vessel collisions may be caused by poor navigation, vessel equipment failure, adverse weather conditions, or human error.

The worst credible scenario for loss of diesel would be an incident whereby all diesel located in the vessel's tanks was released into the marine environment, it is not expected that any vessel with a fuel capacity greater than 500 m^3 would be used for CHA operations. Vessels used for day to day support and supply have vessel tank sizes of approximately 20 m^3, and vessels used for IMR type activities typically have vessel tank size of approximately <200 m^3. It is possible that a large pipelay or construction vessel, if required, may have a single tank volume of up to 500 m^3. Therefore, this has been assessed as the worst-case potential spill resulting from vessel collision.

It is noted that a vessel of this size has only been used once in the history of the field when undertaking HWU workover activities and there are no plans for future use of vessels of this size, therefore assuring conservatism in the spill modelling and spill response assessment.

During the Non Production Phase, IMR activities will be undertaken intermittently (Section 2.6.1). The number of vessel movements will become less frequent therefore reducing the risk of vessel collision and potential diesel spill in the Operational Area during non-production compared to the Operations Phase.

7.4.1.2 Potential impact

In the marine environment diesel will behave as follows:

- Diesel will spread rapidly in the direction of the prevailing wind and waves;
- Evaporation is the dominant process contributing to the fate of spilled diesel from the sea surface and will account for >50% reduction of net hydrocarbon balance within several hours of discharge;
- Diesel will also entrain under the water surface particularly when wind speed and resultant wave action increase;
- The evaporation rate of diesel will increase in warmer air and sea temperatures; and
- Diesel residues usually consist of heavy compounds that may persist longer and will tend to disperse as oil droplets into the upper layers of the water column.
- Floating film concentrations exceeding 1 g/m^2 would appear as a rainbow sheen.

Spill Modelling

This scenario represented the progressive discharge of diesel onto the water surface over a 3-hour period (approximately 167 m ^{3}/hr assumed). Diesel is forecast to spread rapidly out to a thin film and evaporation is forecasted to remove approximately 50% of the released volume from the surface within several hours of discharge. The weathered mixture will consist of hydrocarbons with higher boiling points that will resist evaporation. Diesel oil also has a propensity to entrain into the water column due to mixing by wave action, which will decrease the mass and concentrations of diesel that are on the water surface but increase the mass and concentration that are underwater. The rate of entrainment will be higher if sea conditions were more energetic at the time of the spill and lower if conditions were calm.

Floating Oil

Floating film concentrations exceeding the socio-economic threshold of 1 g/m^2 are forecasted to potentially occur up to 60 km from the release site during cooler winter conditions, if conditions are relatively calm, but will generally not occur more than 20-30 km from the release site under summer conditions or if sea conditions are energetic. Forecasts for the distributions of floating oil exceeding 1 g/m^2 or higher indicate a strong response by the surface slicks and sheens to wind driven currents and to the wind itself acting on the surface of the oil, with a distinctive seasonal trend. The influence of the persistent winds from the southerly sector during the summer months is reflected in higher forecasts of exposure over the water surface to the north and north-north-east of the hypothetical spill site, influenced by the prevailing wind and by current flow in these directions, following the bathymetric contours.

In contrast, there is a higher probability of slick and sheen trajectories towards the north-west and east indicated from simulations using metocean data representing winter conditions, reflecting weaker and more variable influences of an inshore, north-directed current, the increased frequency of eddies impinging inshore from the Leeuwin Current, and the higher frequency of wind directions from both the eastern and western sectors. Around these major trends, wide variation in the potential direction of movement is indicated, for at least portions of the slicks and exposure to the mainland shore is indicated to be highly probable, irrespective of the season the spill occurs.

The environmental threshold of floating oil > 10 g/m^2 is predicted be exceeded in summer and winter around Dongara and Leeman (Table 7-7). The probabilities are slightly higher in summer and will be discussed here. There is a 90% probability that the waters around Dongara will contact floating oil > 10 g/m^2 because the location of the spill release is within this area. Whilst there would be immediate contact to the waters of this receptor, it will take at least 1 hour for the spilled diesel to reach the shorelines around Dongara. There is a remote (2%) probability of the > 10 g/m^2 floating oil threshold being exceeded around Leeman after diesel had been on the water for over 17 hours.

Entrained Oil

The modelling indicated that entrained diesel would be distributed close to the water surface (< 3 m) with higher concentrations towards the surface, and subject to re-floating as patches. The stochastic analysis indicated that entrained oil > 100 ppb could occur within the buffer zone of the shoreline around Dongara, with 68% probability if this spill scenario occurred during summer and 36% probability if it occurred in the winter. There is a seasonal trend indicated in the likely transport of entrained plumes with a trend for transport to the north for a spill occurring in summer and increased likelihood of exposure to the south for a spill occurring in winter.

The Geraldton receptor is estimated to have 32% probability of entrained oil concentrations > 100 ppb in summer but this is estimated to reduce to 2% for a spill in winter. By contrast, the probability of concentrations > 100 ppb reaching the Leeman section is indicated at 10% for a spill in summer, rising to 21% for a spill in winter. At the higher threshold of 500 ppb, the probability of occurrence is estimated at 28% for the buffer zone around Dongara but is of the order of 1-2% for the adjacent zones if the spill scenario occurred during summer. Lower probability of occurrence (10%) is

indicated for the zone around Dongara if the spill occurred in winter. This result is attributed to the reduced frequency of strong southerly winds that would generate breaking waves. The zone offshore from Leeman is forecasted to have 5% probability of receiving concentrations > 500 ppb for a spill in winter.

Dissolved Aromatic Hydrocarbons

The simulations indicated that dissolved aromatic hydrocarbons exceeding 50 ppb could be generated from the slicks and entrained oil, with these tending to drift and disperse with the prevailing current. There is approximately 50% probability that concentrations > 6 ppb would occur within the 0-20m waters around Dongara and 6% probability that concentration > 50 ppb would occur in this zone. In winter the forecast is for 21% probability at > 6 ppb and 2% probability at > 50 ppb. Concentrations are forecasted to decrease over distances of several kilometres but the probability contours indicate that concentrations > 6 ppb could persist over the reefs running parallel with the coastline within the zone around Dongara and could extend into the zones around Geraldton and Leeman at reduced probability.

Shoreline accumulation of hydrocarbons

The environmental threshold for shoreline hydrocarbon accumulation is ≥ 100 g/m^2. However, the vessel collision modelling (APASA, 2017), was conducted against the more conservative threshold of ≥ 25 g/m^2 (Table 7-7).

Shoreline oil ≥ 25 g/m^2 is predicted to occur around Dongara with a probability ≤ 7% in summer, and ≤ 24 % in winter.

If the vessel collision were to occur in winter, there is ≤ 13% and ≤ 6% probability of oil accumulating ≥ 25 g/m^2 on Leeman and Cervantes shorelines, respectively.

It is possible that a diesel spill due to vessel collision could occur at any point along the pipeline, given the potential presence of vessels carrying out IMR activities. Should a spill occur closer to the WA coast, the time to shoreline contact may be reduced and the accumulated volume may increase. However, given the total volume potential spilled, and the difference in time and accumulation of crude oil from a pipeline leak modelled at location 1 and 2, the difference is not expected to be significant. Furthermore, the extent of the spill is not expected to change since the diesel has greatest potential to spread the further the source is from the coast. It is therefore considered that the results of the modelling at CHA platform is indicative of the level of impact expected of a 500 m^3 diesel release at any point along the pipeline.

Table 7-7: Modelling results for a 500 m^3 surface release of marine diesel at CHA for 3 hours

Sensitive Receptor Location	Spill Trajectory Area – Potential for shoreline contact at defined impact thresholds		
	Hydrocarbon component and threshold	Summer (October – April)	Winter (May – September)
		Contact with sensitive receptor (Yes/No*)?	
Abrolhos Shoals	Floating oil > 1 g/m^2 probability (%), Min time to receptor (hours)	No, NA	
	Floating oil > 10 g/m^2 probability (%), Min time to receptor (hours)	No, NA	
	Accumulated shoreline oil ≥25 g/m^2 probability (%), Min time to receptor (hours)	No, NA	
	Maximum accumulated volume (m^3) along this shoreline, in the worst replicate simulation (m^3)	NA	
	Maximum length of shoreline (km) with concentrations exceeding 25 g/m^2, averaged over all replicate simulations	NA	

Sensitive Receptor Location	Spill Trajectory Area – Potential for shoreline contact at defined impact thresholds		
	Hydrocarbon component and threshold	Summer (October – April)	Winter (May – September)
		Contact with sensitive receptor (Yes/No*)?	
	Entrained oil > 100 ppb, probability (%), minimum time to receptor waters (hours)	Yes 3% probability 99 hours	No, NA
	Dissolved aromatics probability (%) of > 50 ppb	No	
Around Geraldton	Floating oil > 1 g/m^2 probability (%), Min time to receptor (hours)	No, NA	
	Floating oil > 10 g/m^2 probability (%), Min time to receptor (hours)	No, NA	
	Accumulated shoreline oil ≥25 g/m^2 probability (%), Min time to receptor (hours)	No, NA	
	Maximum accumulated volume (m^3) along this shoreline, in the worst replicate simulation (m^3)	N/A	
	Maximum length of shoreline (km) with concentrations exceeding 25 g/m^2, averaged over all replicate simulations	N/A	
	Entrained oil > 100 ppb, probability (%), minimum time to receptor waters (hours)	Yes 30% probability 39 hours	Yes 2% probability 60 hours
	Dissolved aromatics probability (%) of > 50 ppb	No	
Around Dongara	Floating oil > 1 g/m^2 probability (%), Min time to receptor (hours)	Yes 93% probability 1 hour	Yes 89% probability 1 hour
	Floating oil > 10 g/m^2 probability (%), Min time to receptor (hours)	Yes 90% probability 1 hour	Yes 86% probability 1 hour
	Accumulated shoreline oil ≥25 g/m^2 probability (%), Min time to receptor (hours)	Yes 7% probability 18 hours	Yes 24% probability 10 hours
	Maximum accumulated volume (m^3) along this shoreline, in the worst replicate simulation (m^3)	166	195
	Maximum length of shoreline (km) with concentrations exceeding 25 g/m^2, averaged over all replicate simulations	31	32
	Entrained oil > 100 ppb, probability (%), minimum time to receptor waters (hours)	Yes 68% probability 1 hour	Yes 38% probability 1 hour
	Dissolved aromatics probability (%) of > 50 ppb	Yes 4% probability	Yes 1% probability
Around Leeman	Floating oil > 1 g/m^2 probability (%), Min time to receptor (hours)	Yes 3% probability 17 hours	Yes – 10%, 12 hours
	Floating oil > 10 g/m^2 probability (%), Min time to receptor (hours)	Yes 2% probability 21 hours	Yes 5% probability 15 hours

Sensitive Receptor Location	Spill Trajectory Area – Potential for shoreline contact at defined impact thresholds		
	Hydrocarbon component and threshold	Summer (October – April)	Winter (May – September)
		Contact with sensitive receptor (Yes/No*)?	
	Accumulated shoreline oil ≥25 g/m^2 probability (%), Min time to receptor (hours)	No, NA	Yes 13% probability 12 hours
	Maximum accumulated volume (m^3) along this shoreline, in the worst replicate simulation (m^3)	NA	93
	Maximum length of shoreline (km) with concentrations exceeding 25 g/m^2, averaged over all replicate simulations	NA	34
	Entrained oil > 100 ppb, probability (%), minimum time to receptor waters (hours)	Yes 9% probability 25 hours	Yes 23% probability 12 hours
	Dissolved aromatics probability (%) of > 50 ppb	No	
Around Cervantes	Floating oil > 1 g/m^2 probability (%), Min time to receptor (hours)	No, NA	Yes 1% probability 64 hours
	Floating oil > 10 g/m^2 probability (%), Min time to receptor (hours)	No, NA	
	Accumulated shoreline oil ≥25 g/m^2 probability (%), Min time to receptor (hours)	No, NA	Yes 6% probability 72 hours
	Maximum accumulated volume (m^3) along this shoreline, in the worst replicate simulation (m^3)	No	18
	Maximum length of shoreline (km) with concentrations exceeding 25 g/m^2, averaged over all replicate simulations	No	24
	Entrained oil > 100 ppb, probability (%), minimum time to receptor waters (hours)	Yes 2% probability 194 hours	Yes 9% probability 53 hours
	Dissolved aromatics probability (%) of > 50 ppb	No	
Lancelin/Ledge Point	Floating oil > 1 g/m^2 probability (%), Min time to receptor (hours)	No, NA	
	Floating oil > 10 g/m^2 probability (%), Min time to receptor (hours)	No, NA	
	Accumulated shoreline oil ≥25 g/m^2 probability (%), Min time to receptor (hours)	No, NA	
	Maximum accumulated volume (m^3) along this shoreline, in the worst replicate simulation (m^3)	NA	
	Maximum length of shoreline (km) with concentrations exceeding 25 g/m^2, averaged over all replicate simulations	NA	
	Entrained oil > 100 ppb, probability (%), minimum time to receptor waters (hours)	No	Yes 1 % probability 130 hours
	Dissolved aromatics probability (%) of > 50 ppb	No	

**No contact to receptor predicted for specified threshold.*

Diesel spills can cause chemical (e.g. toxic) and physical (e.g. coating of emergent habitats, oiling of wildlife at sea surface) impacts to marine species and a decline in water quality. Also a hydrocarbon spill could cause a disruption to other marine users, in particular commercial fisheries. The severity of the impact of a hydrocarbon spill depends on the magnitude of the hydrocarbon spill (i.e. extent, duration) and sensitivity of the receptor. Due to the nature of marine diesel, evaporation occurs at a much greater rate than Cliff Head crude leading to a shorter duration in the potential impacts described in Table 7-8, compared to those discussed in Table 7-5.

Potential sensitive receptors include:

- Plankton;
- Intertidal and shoreline habitats;
- Fish (including those targeted by commercial and recreational fishers);
- Marine mammals;
- Marine reptiles;
- Seabirds;
- Commercial and recreational fisheries;
- Tourism;
- Key ecological features (KEFs); and
- Australian Marine Parks and State marine reserves.

Table 7-8: Potential impacts of marine diesel on sensitive receptors

Sensitive receptor	Impact description		Impact assessment	
	Floating/ shoreline accumulated	Entrained/ dissolved aromatics	Floating/ shoreline accumulated	Entrained/ dissolved aromatics
General offshore				
Plankton	There is the potential for localised mortality of plankton due to reduced water quality and toxicity, as described for entrained diesel in the next column. Plankton will not be impacted by stranded diesel	Hydrocarbons can potentially interfere with swimming or feeding structures of plankton and planktonic invertebrates and direct coating or ingestion could occur. It should be noted, however, that the primary pathway for impacts to plankton and pelagic invertebrates is likely to be through exposure to aromatic hydrocarbons dissolved within the water column.	The area potentially impacted by a diesel spill is characterised by a low standing crop of plankton which is not an important source of primary productivity in the area. Further, the affected area is a relatively small portion of the marine offshore environment, therefore the level of impact consequence has been determined to be low	
Invertebrates	Adult marine invertebrates and larvae usually reside within benthic substrates and pelagic waters, rarely reaching the water's surface in their life cycle (to breed, breathe and feed). Therefore, surface hydrocarbons are not considered to pose a high risk to marine invertebrates within the spill trajectory area.	Acute or chronic exposure, through surface contact, and/or ingestion can result in toxicological risks. However, the presence of an exoskeleton, for example with rock lobsters will reduce the impact of hydrocarbon absorption through the surface membrane. Other invertebrates with no exoskeleton and larval forms may be more prone to impacts from pelagic hydrocarbons. Furthermore, the concentration of entrained and dissolved hydrocarbons at or above thresholds of concern will be less in any one location in comparison to surface oil because of the effects of dilution with seawater.	Since marine invertebrates, specifically rock lobsters, do not generally reside at the sea surface, the impacts of surface hydrocarbons are unlikely to occur.	Although entrained and dissolved hydrocarbons can have negative impacts on marine invertebrates and associated larval forms, impacts to adult species is considered reduced as a result of the exoskeleton. Considering the large extent of suitable marine habitat (and potential spawning areas), the impact on marine invertebrates, specifically rock lobsters, the impact is considered minor.
Fish	Surface diesel will have minimal impacts on fish with the exception of species found in the upper section of the water column	The variety of benthic habitats in the Perth Basin (reefs, seagrasses and offshore waters) supports a diverse assemblage of fish. Smothering through coating of gills can lead to the lethal and sub-lethal effects of reduced oxygen exchange, and coating of body surfaces may lead to increased incidence of irritation and infection. Fish may also ingest hydrocarbon droplets or contaminated food leading to reduced growth. There is potential for localised mortality of fish eggs and larva due to reduced water quality and toxicity. Effects will be greatest in the upper 10 m of the water column and areas close to the spill source where hydrocarbon concentrations are likely to be highest.	Impacts of surface diesel on fish are considered low.	While negative impacts to fish and fish eggs/larvae, due to the rapid dispersion of diesel in the water column any impacts are likely to be localised and short-term in duration. As such the overall impact is considered low.

Sensitive receptor	Impact description		Impact assessment	
	Floating/ shoreline accumulated	Entrained/ dissolved aromatics	Floating/ shoreline accumulated	Entrained/ dissolved aromatics
Marine reptiles	Four species of turtle are known to exist with the waters in proximity to the Cliff Head platform. Since marine turtles are not known to breed close to the CHA, hatchling turtles are not expected in great numbers. For adult and hatchling turtles, the main pathways for exposure include ingestion and inhalation of vapours. Since marine diesel does not tend to form solid massess such as tar balls, ingestion of diesel is not considered as great an impact compared to more viscous hydrrocarbons. Sea turtles' diving behavior also puts them at risk. They rapidly inhale a large volume of air before diving and continually resurface over time. Adults doing this in an oil spill would experience both extended physical exposure to the oil and prolonged exposure to hydrocarbon vapors.	Marine turtles may come into contact with entrained diesel while diving. Impacts are similar to those described for surface diesel.	Although the impacts of diesel on turtles can be severe, the low density of turtles expected in the region (due to lack of breeding aggregations) implies that few individuals would be affected. As such the impact has been determined to be moderated.	Although impacts of entrained diesel on turtles can be severe, due to the rapid dispersion of diesel within the water column, combined with the low density of turtles expected in the area, potential impacts are considered low.
Marine mammals	Seven species of marine mammal may be present in the waters in proximity of the Cliff Head facilities. Of these, three species are listed as threatened; blue whale, southern right whale and the Australian sea lion. The Operational Area does not include any known blue whale feeding, breeding or resting areas. Humpback whales are frequently sighted in the region as they migrate annually from the cold feeding waters of the Antarctic to the warm water breeding areas in the Kimberley. Peak migratory periods in Cliff Head area for the northbound leg are around mid-June. The location of the Cliff Head platform is at towards the northern limit of the Southern right whale distribution and only occasional sightings have been made as far north as Geraldton indicating few individuals may be present. Australian sea lions forage around the larger reefs in the area. The nearest breeding grounds are on the Beagle Islands	Marine mammals may come into contact with entrained diesel while diving and foraging. Impacts are similar to those described for surface diesel	The impacts of diesel on marine mammals can result in lethal or sub-lethal impacts on individuals. Although cetaceans are not expected to be present in large numbers, should a spill occur during a migration period large numbers of individuals could potentially be impacted. While sea lions breed asynchronously (i.e. with no peak in breeding activity) they are present year-round and could be impacted by a spill. As such the impacts are considered moderate.	The impacts of entrained diesel on marine mammals can be severe. However, due to the rapid dispersion of diesel within the water column, potential impacts are considered low.

Sensitive receptor	Impact description		Impact assessment	
	Floating/ shoreline accumulated	Entrained/ dissolved aromatics	Floating/ shoreline accumulated	Entrained/ dissolved aromatics
	(35 km south) and the Abrolhos Islands (112 km northwest). There is no seasonal peak in breeding, with breeding cycles being asynchronous between colonies. Surfacing within a hydrocarbon slick may lead to a toxic level of exposure. However, cetaceans have a thickened epidermis that greatly reduces the likelihood of hydrocarbon toxicity from skin contact with oiled waters (Geraci, 1990; O'Shea and Aguilar, 2001). Should pinnipeds come into contact with diesel, the diesel may stick to the fur and be ingested during grooming incurring the associated toxicological effects. The fur may also become smothered leading to reduced waterproofing and hypothermia. For surface oil, inhalation of vapors at the water's surface and ingestion of hydrocarbons during feeding are often more likely pathways of exposure.			
Seabirds	Seabirds either pass across the region or use the waters within and near to the permit area as their main habitat, with 16 species of threatened seabird possibly occurring in the area. The Abrolhos AMP and Jurien AMP in particular are important foraging areas for the threatened Australian noddy and soft-plumaged petrel, and other migratory species. As most fish survive beneath floating slicks, they will continue to attract foraging seabirds, which typically do not exhibit avoidance behaviour. Direct contact with surface hydrocarbons can lead to irritation of skin and eyes. Smothering can lead to reduced water proofing of feathers leading to hyperthermia. Smothering of feathers can also lead to excessive preening, diverting time away from other behaviours, leading to starvation and dehaydration. Preening of	Seabirds may come into contact with entrained diesel while diving and foraging. This may result in irritation of skin and eyes, and ingestion and associated impacts of toxicity and potential illness.	The impacts of diesel on seabirds can result in lethal or sub-lethal impacts on individuals. Since a spill could potentially occur at any time of year there is potential to overlap with peak nesting periods where a large number of seabirds, including those listed as protected (Table 4-5) could potentially be impacted by a spill. As such the impacts are considered moderate.	The impacts of entrained diesel on seabirds can be severe. However, due to the rapid dispersion of diesel within the water column, potential impacts are considered low.

Sensitive receptor	Impact description		Impact assessment	
	Floating/ shoreline accumulated	Entrained/ dissolved aromatics	Floating/ shoreline accumulated	Entrained/ dissolved aromatics
	oiled feathers will also result in to ingestion of hydrocarbons and the associated impacts of toxicity and potential illness.			
Subtidal zone				
Submerged reefs and shoals	Submerged coral reefs and shoals can be located in areas around the Abrolhos Islands and the nearshore areas of the WA coast. Significant shoals are found to the east of the Abrolhos Islands (Section 4.5.8). Due to the distance between the sea surface and fully submerged features impacts on such features or their associated flora and fauna are unlikely.	Direct contact of entrained diesel with hard corals can lead to reduced capacity for photosynthesis or chemical toxicity across cellular structures leading to coral bleaching or colony death. Sub-lethal impacts could include reduced growth of coral colonies and reduced reproductive output/success. Physical effects from entrained oil have the potential to coat contacted coral reefs. The phenomena of smothering of exposed coral surfaces or polyps by oil spills has only been reported where very large oil spill quantities, or very sticky oil slicks, have been encountered. Response to hydrocarbon exposure can include impaired feeding, fertilisation, larval settlement and metamorphosis, larval and tissue death and decreased growth rates (Villanueva et al., 2008).	The impacts of surface diesel on submerged reefs are predicted from the modelling to be negligible	The impacts of entrained diesel on submerged reefs and shoals can lead to lethal and sub-lethal effects reducing quality and extent of important habitats. As such the impacts are considered moderate.
Intertidal zone				
Seagrass	Seagrass habitat is found in areas around the Abrolhos Islands and the nearshore areas of the WA coast. Macrophytes such as seagrasses require light to photosynthesise. The presence of surface oil at sea, and directly coating of seagrasses, can affect the ability of macrophytes to photosynthesise, potentially reducing primary productivity. Direct contact with hydrocarbon can smother seagrass leading to toxicity and preventing respiration with lethal and sub-lethal effects (Taylor and Rasheed 2011). Smothering can also lead to a reduction in	Direct contact with hydrocarbon can smother seagrass leading to toxicity and preventing respiration with lethal and sub-lethal effects (Taylor and Rasheed, 2011). Smothering can also lead to a reduction in photosynthesis as described in the previous column.	Surface or stranded diesel can have lethal or sub-lethal effects potentially leading to a reduction in productivity. These impacts combined could result in detrimental effects on the overall ecological community. However, it is unlikely large areas of emergent seagrass habitat will be present and therefore the impacts are considered low.	The impacts of entrained diesel on seagrasses can lead to lethal and sub-lethal effects reducing quality and extent of important habitats. As such the impacts are considered moderate.

Sensitive receptor	Impact description		Impact assessment	
	Floating/ shoreline accumulated	Entrained/ dissolved aromatics	Floating/ shoreline accumulated	Entrained/ dissolved aromatics
	photosynthesis as described in the previous column. Surface and stranded oil also has the potential to impact reef fauna (turtles, marine mammals) as outlined in sections above.			
Rocky shore, intertidal reefs	Rocky shore and intertidal habitats are found intermittently along the WA coast and around the Abrolhos Islands. Surface diesel is unlikely to have any negative impacts on fully submerged features. If the feature is emergent, impacts can include impaired feeding, fertilisation, larval settlement and metamorphosis, larval and tissue death and decreased growth rates (Villanueva et al., 2008). Surface and stranded oil also has the potential to impact reef fauna (turtles, marine mammals) as outlined in sections above.	Physical effects from entrained oil have the potential to coat contacted coral reefs and rocky shore fauna such as filter feeders. Response to hydrocarbon exposure can include impaired feeding, fertilisation, larval settlement and metamorphosis, larval and tissue death and decreased growth rates (Villanueva et al., 2008).	Since surface and stranded diesel can have lethal and sub-lethal effects on coral reefs and the associated impacts on fauna and flora. As such the impacts are considered moderate.	Since entrained diesel can have lethal and sub-lethal effects on coral reefs and the associated impacts on fauna and flora. As such the impacts are considered moderate.
Mangroves	The impacts of surface hydrocarbons on mangroves include damage as a result of smothering of lenticels (mangrove breathing pores) on pneumatophores or prop roots, or by the loss of leaves (defoliation) due to chemical burning (Duke et al., 1999). Thorhaug (1987) concluded that while defoliation of mangroves was a common occurrence when exposed to hydrocarbon slicks, massive mortality was not always the ultimate outcome. Mangrove death is predicted whenever more than 50% of the leaves are lost (Evans, 1985). It is also known that mangroves take up hydrocarbons from contact with leaves, roots or sediments, and it is suspected that this uptake causes defoliation through leaf damage and tree death (Wardrop et al., 1987).	Entrained hydrocarbons may potentially impact mangrove communities through the sediment/mangrove root interface. Entrained hydrocarbons contain contaminants that may become persistent in the sediments (e.g. trace metals, PAHs), leading to direct effects on mangroves due to direct uptake, or indirect effects due to impacts on benthic infauna leading to reduced rates of bioturbation and subsequent oxygen stress on the plants' root systems.	Since surface and stranded diesel can have lethal and sub-lethal effects on mangroves and the associated impacts on fauna and flora, the impacts are considered moderate	Since entrained diesel can have lethal and sub-lethal effects on mangroves and the associated impacts on fauna and flora, the impacts are considered moderate

Sensitive receptor	Impact description		Impact assessment	
	Floating/ shoreline accumulated	Entrained/ dissolved aromatics	Floating/ shoreline accumulated	Entrained/ dissolved aromatics
Sandy shores/beaches	A number of sandy beaches are found along the WA coast and around the Abrolhos Islands. There is the potential for some diesel to be temporarily stranded on the sandy shores and beaches as the tide ebbs. Stranded crude has potential to persist in the environment for longer periods of time increasing the potential toxic and physical (smothering) effects. Such effects may impact fauna such as polychaetes, molluscs, marine crustaceans, semi-terrestrial crustaceans and insects, and the vertebrates that prey upon them (e.g. shorebirds).	Entrained diesel will have negligible impacts on sandy beaches.	Impacts of stranded diesel include lethal and sub-lethal effects on associated fauna and flora. As such the impacts are considered moderate	Not applicable
Sublittoral zone				
Seabird breeding, feeding and resting areas	The Abrolhos Islands are an important breeding, foraging and resting area for various species of seabird and shorebird. Seabirds and shorebirds are also likely to occur along the coastlines of WA albeit in lower numbers. The physical and toxic effects of diesel on seabirds are discussed above.	Entrained diesel will have negligible impacts on seabird breeding, feeding and resting areas.	The impacts of diesel on seabirds and shorebirds can result in lethal or sub-lethal impacts on individuals. Since a spill could potential occur at any time of year there is potential to overlap with peak nesting periods where a large number of seabirds could potentially be impacted by a spill. As such the impacts are considered moderate.	Not applicable
Sea lion breeding and resting areas	Sea lions come ashore to pup, raise their offspring and rest. The nearest breeding and haul out areas are on the Beagle Islands 39 km to the south and the Abrolhos Islands 112 km to the northwest. Sea lions may encounter stranded diesel as they haul out. Pups in particular are quite immobile, being restricted to breeding grounds until weaning and may therefore be affected by stranded diesel more in comparison to adults. The physical and toxic impacts of crude are described above.	Entrained diesel will have negligible impacts on sea lion breeding and resting areas	The impacts of diesel on sea lions can result in lethal or sub-lethal impacts on individuals. While sea lions breed asynchronously they may be present at breeding sites year round. As such the impacts are considered moderate.	Not applicable

Sensitive receptor	Impact description		Impact assessment	
	Floating/ shoreline accumulated	**Entrained/ dissolved aromatics**	**Floating/ shoreline accumulated**	**Entrained/ dissolved aromatics**
Saltmarshes	Surface hydrocarbons may coat saltmarsh flora reducing photosynthesis and can lead to toxic effects, both negatively impacting vegetation growth. Associated fauna (including birds) also has potential to be impacted and has been assessed above.	Entrained hydrocarbons may be absorbed through the roots of saltmarsh flora which may cause defoliation through leaf damage. Associated fauna (including birds) also has potential to be impacted and has been assessed above.	Stranded oil may have toxic effects on flora species that comprise saltmarsh habitats and also on the species which inhabit and forage upon them. However, given the location of the saltmarshes and the sand banks providing protection, the impacts are considered low.	Although entrained diesel can have toxic impacts to salt, marsh flora, given the location of the saltmarshes and the sand banks providing protection, the impacts are considered low.
Socioeconomic				
Fisheries	Surface diesel has the potential to negatively affect fisheries as fishing activity may be excluded from the area of the slick and its proximity. However, the most economically important fishery in the area is the West Coast Lobster fishery. Since January 2013, this fishery has been able to operate year-round (i.e. there is no closed season) working in a quota system, reducing the impacts of delayed catches. Stranded shoreline diesel is unlikely to greatly impact fishing activities unless it became stranded around fishing ports (e.g. Geraldton Harbour, Port Denison) which could restrict movement of fishing vessels.	Entrained diesel may impact fish and invertebrate species as described above leading to a reduction in annual catch rate.	Surface and stranded diesel may lead to loss of access for commercial fisheries. However, the impact is expected to be temporary with little impact on annual catch rates. As such, impacts are assessed as low.	The impact of entrained diesel on fish is considered low and therefore the indirect impact on fisheries is also considered low.
Tourism and recreation	Surface and stranded diesel has the potential to impact on tourism activities in the area as recreational fishing and wildlife watching are popular in and around the Abrolhos Islands. In the event of a diesel spill, recreational activities would not be possible in the affected area and its proximity with potential negative effects on local tourism. A longer-term reduction in tourism may result due to bad publicity of the local area.	Entrained diesel may impact fauna associated with tourism, such as cetaceans and fish species targeted by recreational fishers. However, entrained diesel will unlikely lead to the same level of disruption as stranded or surface diesel.	Since potential impacts of surface and stranded include temporary loss of access for tourism in addition to a longer-term effect on reputation, the impacts have been assessed as moderate.	Although entrained diesel may impact some tourism activities, it will unlikely lead to the level of disturbance stranded or surface diesel could result in. As such impacts are considered low.
Defence activities	There is not expected to be high levels of defence activities in the area surrounding the CHA. Surface or stranded diesel may lead to restricted access for defence activities.	Entrained diesel will have negligible impacts on defence activities	Although surface or stranded diesel could result in a temporary loss of access, defence activities are not expected to be great in the	Not applicable.

Sensitive receptor	Impact description		Impact assessment	
	Floating/ shoreline accumulated	Entrained/ dissolved aromatics	Floating/ shoreline accumulated	Entrained/ dissolved aromatics
			area and therefore the impacts have been assessed as low.	
Shipping	Shipping vessels may need to change course to avoid surface slicks leading to delays. Stranded diesel is unlikely to greatly impact shipping activities unless the crude became stranded around Geraldton Port which could restrict movement of shipping vessels	Entrained diesel will have negligible impacts on shipping	Surface oil may lead to loss of access for shipping. However, the impact is expected to be temporary. As such, impacts are assessed as low. Stranded oil could lead to temporary loss of access for shipping. The impact is expected to be temporary and therefore the impact has been assessed as low.	Not applicable
Key Ecological Features:				
Commonwealth marine environment surrounding the Houtman Abrolhos Islands	Surface diesel could potentially overlap with this KEF. While surface diesel is unlikely to impact benthic and pelagic habitats, foraging seabirds are sensitive to the effects of surface diesel as discussed above	Entrained diesel has potential to impact habitats and associated fauna in this KEF as described above	Due to the potential impacts of surface diesel on foraging seabirds (described above) the impacts are assessed as moderate	Due to the potential impacts of entrained diesel on marine habitats (described above) the impacts are assessed as moderate
Western Rock Lobster	Surface diesel could potentially overlap with this KEF. However, since the western rock lobster is a benthic species, they are unlikely to be affected by surface diesel.	Since the western rock lobster is a benthic species, they are unlikely to be affected by entrained diesel which is unlikely to be in high concentrations at the seafloor.	The impacts of surface diesel on this KEF is negligible	The impacts of entrained diesel on this KEF is negligible
Ancient Coastline	Given that this KEF is located on the seafloor, impacts due to surface crude are not expected	N/A	N/A	N/A
Commonwealth marine environment within and adjacent to the west coast inshore lagoons	While benthic habitats and associated fauna are not susceptible to the effects of surface crude (see above), some emergent habitats may occur such as reefs and seagrasses. Associated fauna include fish, marine reptiles, mammals, birds and invertebrates. These are discussed in more detail above.	Entrained diesel has the potential to impact benthic habitats and associated fauna such as fish, marine reptiles, mammals, birds and invertebrates, impacts to which are discussed in more detail above.	The impacts of surface oil benthic habitats is negligible	Due to the variety of receptors potentially impacted, the impacts are considered moderate.

Sensitive receptor	Impact description		Impact assessment	
	Floating/ shoreline accumulated	Entrained/ dissolved aromatics	Floating/ shoreline accumulated	Entrained/ dissolved aromatics
Western demersal slope and associated fish communities	Impacts to fish are discussed in 'Fish' above	Impacts to fish are discussed in 'Fish' above	Impacts of surface diesel on fish are considered low.	While negative impacts to fish and fish eggs/larvae, due to the rapid dispersion of diesel in the water column any impacts are likely to be localised and short-term in duration. As such the overall impact is considered low.
Protected areas				
Abrolhos Islands' Fish Habitat Protection Area	There is a low probability of surface diesel entering this protected area. Small amounts of accumulated diesel may gather at this protected area. The protected area is important for the conservation of fish, fish breeding areas and associated aquatic ecosystem, and are popular for aquatic tourism and recreational activities. The impacts of surface and stranded diesel on fish, fisheries and tourism are discussed above.	There is a low probability of entrained diesel entering this protected area. Small amounts of accumulated diesel may gather at this protected area. The protected area is important for the conservation of fish, fish breeding areas and associated aquatic ecosystem, and are popular for aquatic tourism and recreational activities. The impacts of entrained on fish, fisheries and tourism are discussed above.	Due to the low probability of contact, impacts to this protected area are considered low	Due to the low probability of contact, impacts to this protected area are considered low
Abrolhos AMP	There is a low probability of surface diesel entering this protected area. The area is important for marine fauna such as seabirds and cetaceans, impacts to which are discussed above. Since this protected area is located offshore stranded or accumulated diesel are unlikely to impact sensitivities.	There is a low probability of entrained diesel entering this protected area. The area is important for marine fauna such as fish, marine mammals and sensitive habitats, impacts to which are discussed above.	Due to the low probability of contact, impacts to this protected area are considered low.	Due to the low probability of contact, impacts to this protected area are considered low
Jurien Marine Park	There is a low chance surface diesel will enter this protected area with small volumes of accumulated diesel predicted. Potential sensitivities that may be impacted by surface oil include seabirds and sea mammals. Impacts on these receptors are discussed above.	There is a moderate chance entrained diesel will enter this protected area with small volumes of accumulated diesel predicted. Potential sensitivities that may be impacted by entrained oil include fish, marine mammals and sensitive habitats (e.g. coral, seagrass). Impacts on these receptors are discussed above.	Due to the potential impacts of surface and stranded diesel on fish, marine mammals and sensitive habitats (described above) the impacts are assessed as moderate	Due to the potential impacts of entrained diesel on fish, marine mammals and sensitive habitats (described above) the impacts are assessed as moderate
Jurien AMP	There is low chance surface diesel will enter this protected area. Potential sensitivities that may be impacted by surface diesel include seabirds and sea mammals.	There is a moderate chance entrained diesel will enter this protected area with small volumes of accumulated diesel predicted. Potential sensitivities that may be impacted by	Due to the potential impacts of surface diesel on seabirds and sea	Due to the potential impacts of entrained diesel on fish, marine mammals and sensitive habitats

Sensitive receptor	Impact description		Impact assessment	
	Floating/ shoreline accumulated	Entrained/ dissolved aromatics	Floating/ shoreline accumulated	Entrained/ dissolved aromatics
	Impacts on these receptors are discussed above. Since this protected area is located offshore stranded or accumulated diesel is unlikely to impact sensitivities.	entrained oil include fish, marine mammals and sensitive habitats (e.g. coral, seagrass). Impacts on these receptors are discussed above.	mammals (described above) the impacts are assessed as moderate	(described above) the impacts are assessed as moderate

Table 7-9: Potential impacts of marine diesel on sensitive locations

Sensitive locations	Sensitive receptors	Impact description		Impact assessment	
		Surface/ stranded	Entrained	Surface/ stranded	Entrained
Shoal point to Oakabella Creek	Sandy beaches Rocky shore Submerged reefs Foraging/nesting shorebirds Tourism Commercial fisheries	There is a low probability of surface diesel making contact at this location with negligible volumes expected to make contact. Therefore, it is unlikely that impacts to receptors at this location would occur.	There is a low probability of entrained diesel making contact at this location. Therefore, it is unlikely that impacts to receptors at this location would occur.	Although some sensitive receptors may be affected by surface diesel at this location, given the low probability of contact with a surface slick, the potential impacts are considered low	Although some sensitive receptors may be affected by entrained diesel at this location, given the low probability of contact with entrained diesel, the potential impacts are considered low
Around Geraldton	Sandy beaches Submerged reefs Foraging/nesting shorebirds Tourism Shipping Commercial fisheries	There is a low probability of surface diesel making contact at this location with small volumes expected to make contact. Therefore, it is unlikely that impacts to receptors at this location would occur	There is a moderate probability of entrained diesel making contact at this location. Therefore, it is possible that impacts to receptors in particular, submerged reefs at this location would occur. Individual receptors are discussed in Table 7-8.	Although some sensitive receptors may be affected by surface diesel at this location, given the low probability of contact with a surface slick, the potential impacts are considered low	Sensitive receptors may be affected by entrained diesel at this location with a moderate probability of contact with entrained diesel. Given the moderate concentrations receptors may be exposed to, the potential impacts are considered moderate
Around Dongara	Sandy beaches Submerged reefs Intertidal reefs Foraging/nesting shorebirds Tourism	There is a high probability that surface diesel will make contact at this location with moderate volumes of diesel potentially becoming stranded with potential to impact individual sensitive receptors, in particular tourisms, sandy beaches, seabirds and commercial fisheries.	There is a high probability of entrained diesel making contact at this location. Therefore, it is possible that impacts to receptors in particular, submerged and intertidal reefs at this location would occur. Individual receptors are discussed in Table 7-8.	Sensitive receptors may be present within the area potentially coming into contact with a surface slick. However, given the small volumes potentially encountered at this location, the impacts are considered moderate.	Sensitive receptors may be affected by entrained diesel at this location with a moderate probability of contact with entrained diesel. Given the moderate concentrations receptors may be exposed to, the potential impacts are considered moderate.

Sensitive locations	Sensitive receptors	Impact description		Impact assessment	
		Surface/ stranded	Entrained	Surface/ stranded	Entrained
	Commercial fisheries	Individual receptors are discussed in Table 7-8.			
Around Leeman	Sandy beaches Submerged reefs Foraging/nesting shorebirds Tourism	There is a moderate probability of surface diesel making contact with this location with moderate volumes of diesel predicted in the worst case scenario. This volume of diesel has potential to impact individual sensitive receptors, in particular tourisms, sandy beaches and seabirds. Individual receptors are discussed in Table 7-8	There is a moderate probability of entrained diesel making contact at this location. Therefore, it is possible that impacts to receptors in particular, submerged reefs at this location would occur. Individual receptors are discussed in Table 7-8	Although some sensitive receptors may be affected by surface diesel at this location, given the low probability of contact and maximum volume spilled, the potential impacts are considered low	Sensitive receptors may be affected by entrained diesel at this location, given the moderate probability of contact with entrained diesel and potential concentrations, the potential impacts are considered moderate.
Around Cervantes	Jurien Bay AMP and Marine Park Sandy beaches Submerged reefs and shoals Intertidal reefs Marine mammal breeding (sea lion) Foraging/nesting shorebirds and seabirds	There is a low probability of surface diesel making contact at this location with small volumes expected to make contact. This volume of diesel has potential to lead to a low level of impact to a large number of individual sensitive receptors, including sandy beaches, intertidal reefs, marine mammals and seabirds. Individual receptors are discussed in Table 7-8	There is a moderate probability of entrained diesel making contact at this location. Therefore, it is possible that impacts to receptors in particular, submerged reefs at this location would occur. Individual receptors are discussed in Table 7-8.	Although some sensitive receptors may be affected by surface diesel at this location, given the low probability of contact and maximum volume spilled, the potential impacts are considered low	Sensitive receptors may be affected by entrained diesel at this location, given the moderate probability of contact with entrained diesel and potential concentrations, the potential impacts are considered moderate.

Sensitive locations	Sensitive receptors	Impact description		Impact assessment	
		Surface/ stranded	Entrained	Surface/ stranded	Entrained
Lancelin to Ledge Point	Sandy beaches Submerged reefs Foraging/nesting shorebirds Tourism	There is a low probability of surface diesel making contact at this location with small volumes expected to make contact. Therefore, it is unlikely that impacts to receptors at this location would occur.	There is a low probability of entrained diesel making contact at this location. Therefore, it is unlikely that impacts to receptors at this location would occur.	Although some sensitive receptors may be affected by surface diesel at this location, given the low probability of contact with a surface slick, the potential impacts are considered low	Although some sensitive receptors may be affected by entrained diesel at this location, given the low probability of contact with entrained diesel, the potential impacts are considered low
Abrolhos Islands and AMP	Sandy beaches Rocky shore Intertidal reefs Mangroves Foraging/nesting shorebirds and seabirds Fish Marine mammal breeding (sea lion) Submerged reefs and shoals Seagrass Tourism	There is a low probability of surface diesel making contact at this location with very small volumes expected to make contact. While a number of sensitive receptors are present, it is unlikely that impacts to these receptors at this location would occur	There is a low probability of entrained diesel making contact at this location. Therefore, it is unlikely that impacts to receptors at this location would occur.	Although some sensitive receptors may be affected by surface diesel at this location, given the low probability of contact with a surface slick, the potential impacts are considered low	Although some sensitive receptors may be affected by entrained diesel at this location, given the low probability of contact with entrained diesel, the potential impacts are considered low
Abrolhos shoals	Submerged reefs and shoals Marine mammals Marine reptiles Seabirds Fish Commercial fisheries Tourism	There is a low probability of surface diesel making contact at this location with negligible volumes expected to make contact. Therefore, it is unlikely that impacts to receptors at this location would occur.	There is a low probability of entrained diesel making contact at this location. Therefore, it is unlikely that impacts to receptors at this location would occur.	Although some sensitive receptors may be affected by surface diesel at this location, given the low probability of contact with a surface slick, the potential impacts are considered low	Although some sensitive receptors may be affected by entrained diesel at this location, given the low probability of contact with entrained diesel, the potential impacts are considered low

7.4.1.3 Environmental Performance

Environmental outcomes, performance standards and measurement criteria for vessel tank rupture are provided in the table below:

Environmental Risk	Release of marine diesel into the marine environment due to fuel tank rupture
Environmental Performance Outcomes	No unplanned release of marine diesel to sea as a result of vessel collision

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Administration	Vessels operation within weather limitations	Vessel Master to monitor meteorological forecasts at least once daily as per operating conditions in Cliff Head Marine Operations Procedure (10OPGOPC04).	Vessel logs record timing and weather conditions/sea state for operations on a daily basis.
Administration	Vessels maintain compliance with Marine Order 21	Vessels maintain compliance with Marine Order 21 for the duration of the EP, specifically: • Vessels adhere to minimum safe manning levels • Emergency management plan is on board vessels.	TEO vessel audit or third party inspection document demonstrate that: • All vessels have adhered to minimum safe manning levels. • The emergency management plan was on board all vessels
Administration	Vessels maintain compliance with Marine Order 27	Vessels maintain compliance with Marine Order 27 for the duration of the EP, specifically: • Radio and navigational systems of project vessels are in accordance with Regulations 7 to 11, 19 and 20 of SOLAS • AIS is in place and functioning • Radio navigation equipment is maintained in efficient working order (compass/radar)	TEO vessel audit or third party inspection document demonstrate that: • Radio and navigational systems of project vessels are in accordance with Regulations 7 to 11, 19 and 20 of SOLAS • AIS was in place and functioning on all relevant project vessels. • Maintenance of radio navigation equipment completed.
Administration	Support vessel in place during activity to reduce potential for collision	At least one support vessel on standby at all times to monitor the exclusion zone to identify approaching third-party vessels and communicate with the vessels.	TEO vessel audit or third party inspection document confirms vessel logs and completed operational report
Administration	Vessels to display appropriate navigation aids, bridge watch and communication to prevent collision	All vessels to maintain appropriate navigation aids (light shapes etc.) in accordance with Marine Orders 21 (Safety of navigation and emergency procedures) and 30 (Prevention of collisions) as required in the Cliff Head Marine Operations Procedure (10OPGOPC04)	TEO vessel audit or third party inspection document confirm all project vessels maintain appropriate navigation aids.

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Administration	Oil record book or equivalent is maintained to record all oil waste management to ensure compliance with EP	Vessels to maintain an Oil Record Book, as appropriate for vessel class	TEO vessel audit or third party inspection document demonstrate an oil record book is maintained showing dates, volumes and oil concentration and fate of oil waste
Protective/ Mitigate	Vessels have spill response plan in place specific to vessel	All project vessels maintain SOPEP/ SMPEP (as appropriate to vessel class), as per Marine Order 91 for the duration of the EP. Appropriate initial responses prearranged and drilled in case of a hydrocarbon spill, as appropriate to vessel class.	TEO vessel audit or third party inspection document demonstrate current SOPEP/ SMPEP in place and available. Drill records verify timing and completion of hydrocarbon spill exercises.
Protective/ Mitigate	Spill response exercises on vessels undertaken at regular intervals	Spill response exercises conducted not less often than every three months to ensure personnel are prepared.	Spill response exercise records documenting timing and completion of exercises.
Administration	All personnel received the CHA Site induction (10SPTRNTM18)which includes hydrocarbon management requirements	All crew will be required to complete the CHA Site induction containing basic information on chemical and hydrocarbon management (good housekeeping), as well as spill prevention and response measures.	Training records show all vessel-based personnel travelling offshore have received the CHA Site induction
Protective/ Mitigate	NO HFO or IFO used during activity to minimise potential impacts to sea	No Heavy or intermediate fuels (HFO/IFO) to be used on vessels	Fuel records demonstrate no HFO/IFO was used on vessels.
Protective/ Mitigate	NOPSEMA accepted OPEP provides options for controlling the source of any unplanned hydrocarbon/chemical spills and mitigates potential impacts. In all cases, the NEBA of the spill response is considered when implementing the OPEP	Oil pollution emergency plan (OPEP) implemented, with the following potentially applicable strategies: • Monitor and evaluate; • Offshore containment and recovery; • Shoreline protection and deflection; • Shoreline clean-up; and • Oiled wildlife response	Incident reports confirm OPEP and NEBA implemented Incident report includes volume of hydrocarbon release to sea due to vessel collision Accepted OPEP
Administrative	Notifications to AUSCOAST issued prior to any IMR activity to ensure other sea users aware of activity and reduce potential for 3rd party collision	Notifications to AUSCOAST, via JRCC, to ensure radio navigation warnings for maintenance activities conducted on pipeline or other offshore infrastructure that fall outside the NOPSEMA gazetted Petroleum Safety Zone Information provided should include: • vessel details • satellite communication details	Notification records to AMSA JRCC demonstrate radio navigation warnings for inspection, maintenance and repair activities conducted on pipelines or other offshore infrastructure that fall outside the NOPSEMA gazetted PSZ were conducted.

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
		• area of operation • start and end dates	
Administrative	Notifications to AHS issued prior to any IMR using vessels to ensure other sea users aware of activity and reduce potential for 3rd party vessel interference	Notice to Mariners, via notification of AHS no less than 4 weeks prior to activity commencing, to be issued for maintenance activities conducted on pipeline or other offshore infrastructure that fall outside the NOPSEMA gazetted Petroleum Safety Zone	Notification records to AHS demonstrate Notice to Mariners issued for inspection, maintenance and repair activities conducted on pipeline or other offshore infrastructure that fall outside the NOPSEMA gazetted PSZ via notification of AHS was conducted no less than 4 weeks prior to activity commencing.
Administrative	Ongoing consultation with other sea users undertaken prior to any activity (that uses a vessel) to ensure other sea users aware of activity and reduce potential for 3rd party vessel interference	In accordance with the rock lobster MoU, prior to any maintenance activities, TEO is required to • advise the President of the DPFA in sufficient time • mark the area of use with marine buoys	Consultation records with DPFA Signed and valid MoU with DPFA in place

7.4.1.4 ALARP

There are no possible alternative options to the use of vessels or presence and operation of the CHA platform. If the control measures are adhered to then the risk of vessel collision will have been reduced to ALARP.

The proposed control measures for vessel collisions leading to fuel tank rupture considered appropriate to manage the risk to ALARP. Additional controls considered but rejected are detailed below.

Rejected controls	Hierarchy	Practicable	Cost effective	Evaluation
Use of vessels to manage interactions	Engineering	×	×	Additional operational cost and HSE risks for an additional vessel. Minimal benefits given that the CHA and use of vessels have been communicated to fishermen and other sea users.
Use of vessels with smaller tank sizes	Substitute	×	×	More refuelling would be needed, introducing additional risk. Delays to activities caused by delays to contracting vessel.

7.4.1.5 Residual Risk

Aspect	Consequence	Likelihood	Residual risk
Diesel spill from vessel	Major (4) – Significant environmental impact with offsite impact and recovery work over a few weeks. Some local and regional media interest	A – extremely unlikely	Medium (4)

7.4.1.6 Acceptability

Consequence	
Threatened / Migratory / Protected Fauna	The susceptibility of marine fauna to hydrocarbons is dependent on hydrocarbon type and exposure duration however given that exposures would be limited in extent and duration, exposure to marine fauna from this hazard is not expected to result in a fatality. The potential sensitive receptors in the surrounding areas of the spill will include fish, marine mammals, marine reptiles and seabirds at the sea surface. Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-6). However, the diesel is expected to evaporate quickly given the volatility of it with >50% evaporating within several hours. Entrainment of the hydrocarbon is likely resulting in temporary decline in water quality. Given the nature and scale of the spill, a significant decline in water quality as a result of a diesel spill is not expected, and therefore impacts to marine fauna in the vicinity are expected to be temporary. It is not expected that a release of diesel would result in a decreased population size at a local or regional scale, it is expected that a spill of this nature would result in a major consequence.
Physical Environment/ Habitat	Accumulation of hydrocarbons may occur at some locations, although there is a low % probability of entrained oil above thresholds of significance at protected areas such as the Abrolhos Islands. Accumulations along the WA coast of up to 195m^3 are possible in the Dongara shallows area, and entrained diesel within the water column. (Table 7-7). As such, marine and shoreline habitats may also be impacted. However, the weathering of diesel indicates that it will not be persistent in the marine environment, therefore potential impacts are considered to be temporary.
Threatened ecological communities	Subtropical and Temperate Coastal Saltmarsh TEC may be contacted by entrained diesel in the event of a 500 m^3 release of marine diesel. Impacts to this TEC are unlikely given the volumes potentially encountered and the natural protection offered by the shape of the coastline where this community is found.
Protected Areas	There is potential for entrained diesel to enter protected areas (3% probability after 99 hours, Abrolhos islands). Given the potential volumes released, and the distance of the operational to these areas, impacts are not expected to be significant.
Socio-economic receptors	Socioeconomic receptors may be impacted by a fuel tank rupture. However, given the potential volumes released, and the low level of impacts to fauna and habitats, impacts are not considered significant. No stakeholder concerns have been raised regarding this aspect.

Likelihood	
A hydrocarbon release resulting from a vessel collision is unlikely to have widespread ecological effects given the nature of the hydrocarbons on-board, the small volumes that could be released, the depth and transient nature of marine fauna in this area. The likelihood of a hydrocarbon release occurring due to a vessel collision is negligible given the set of mitigation and management controls in place. Subsequently the likelihood of a vessel collision releasing hydrocarbons to the environment which results in a major consequence is considered to be extremely unlikely.	
Acceptability of risk	**The risks of collision around the facilities are considered no higher, or less than, those in a typical port or harbour, due to the slow speeds and small maximum number of vessels operating at any one time.** **In the unlikely event that a significant marine diesel spill did occur within the Operational Area, the potential impacts to the environment would be greatest within a few kilometres of the spill when the toxic aromatic components of the diesel fuel would be at their highest concentration and the slick is at its thickest on the surface of the receiving waters. The potential sensitive receptors in the surrounding areas of the spill would include pelagic fish, marine mammals, marine reptiles and seabirds at the sea surface, which may ingest the diesel or become coated. The number of receptors present at the immediate spill location within the Operational Area are expected to be limited to a small number of transient individuals, given the distance from the nearest shoreline, lack of protected areas and no significant areas of habitat are present in the immediate vicinity of the Operational Area.** **As marine diesel is a highly volatile substance the impacts to receptors would decline rapidly with time and distance thus the residual volumes of diesel that would reach shorelines would not be expected to pose significant threats to sensitive habitats, having likely lost the majority of toxicity by the time shorelines are reached. In addition, diesel spill contact at these locations is predicted to have a low probability of occurrence.** **An extensive suite of management controls will be implemented to safeguard against accidental loss of diesel due to a vessel tank rupture including consultation with 3rd party vessels, and the low number and frequency of vessels used in the field. In the event of a spill occurring, the OPEP will deal with the impacts of an emergency situation in this scenario in conjunction with vessel SOPEPs.** **Given the management controls in place to prevent a vessel collision and the low frequency of significant volume spills that occur in the industry, the risk of either event occurring is considered acceptable.**

7.4.2 Diesel spill during refuelling

7.4.2.1 Description of hazard

Vessels are used to support the operations of CHA as described in Section 2.5. Refuelling of vessels at sea is considered an unlikely occurrence given the distance to the nearest port for refuelling, however it is retained as a contingency option. A minor spill (~37.5 m^3) of marine diesel could occur during refuelling resulting in a loss of hydrocarbons to the marine environment at sea surface. Spills during refuelling can occur through several pathways, including fuel hose breaks, coupling failure or tank overfilling.

Spills resulting from overfilling will be contained within the vessel drains and slops tank system. In the event that the refuelling hose is ruptured, the fuel bunkering activity will cease by turning off the pump; the fuel remaining in the transfer line will escape to the environment as well as fuel released prior to the transfer operation being stopped. The AMSA (2013) *Technical Guideline for the Preparation of Marine Pollution Contingency Plans for Marine and Coastal Facilities* provides guidance for calculating a maximum credible spill volume for a refuelling spill. The guidance provided by AMSA (2015) for a refuelling spill under continuous supervision is considered appropriate given refuelling would be constantly supervised. The maximum credible spill volume during refuelling is calculated as: transfer rate x 15 minutes of flow. The detection time of 15 minutes is seen as conservative but applicable following failure of multiple barriers followed by manual detection and isolation of the fuel supply. Based on a worst-case transfer rate of 150 m^3/ hr, a marine diesel spill of 37.5 m^3 was calculated as the maximum credible volume of marine diesel that could be released into the marine environment during refuelling.

7.4.2.2 Potential Impact

Spills of marine diesel during refuelling events have the potential to cause impacts to the marine environment through a reduction in water quality and marine fauna exposure. Marine diesel at the sea surface will spread rapidly in the direction of the prevailing wind and surface currents as described in Section 7.4.1.2. Diesel spills can cause chemical (e.g. toxic) and physical (e.g. coating of emergent habitats, oiling of wildlife at sea surface) impacts to marine species and a decline in water quality. Potential impacts of marine diesel have already been described for a much larger spill of 500m^3 due to a vessel collision, therefore impacts from a refuelling spill would be much less. Refer to Table 7-8 for further impact description.

7.4.2.3 Environmental Performance

Environmental outcomes, performance standards and measurement criteria for loss of diesel during refuelling are provided in the table below.

Environmental Risk	Release of marine diesel into the marine environment during refuelling		
Environmental Performance Outcomes	No release of marine diesel to sea during refuelling		
Hierarchy	**Control Measures**	**Environmental Performance Standards**	**Measurement Criteria**
Administration	Refuelling operations undertaken within weather limits	Vessel Master to monitor meteorological forecasts prior and during refuelling operations as per operating conditions in Cliff Head Marine Operations Procedure (10OPGOPC04). Refuelling undertaken in daylight hours only	Vessel logs record timing and weather conditions/sea state for operations on a daily basis.
Protective/ Mitigate	Vessels have spill response plan in place specific to vessel	All project vessels maintain SOPEP/ SMPEP (as appropriate to vessel class), as per Marine Order 91 for the duration of the EP. Appropriate initial responses prearranged and drilled in case of a hydrocarbon spill, as appropriate to vessel class.	TEO vessel audit or third party inspection document demonstrate current SOPEP/ SMPEP in place and available. Drill records verify timing and completion of hydrocarbon spill exercises.
Protective/ Mitigate	Spill response exercises on vessels undertaken at regular intervals	Spill response exercises conducted not less often than every three months to ensure personnel are prepared.	Spill response exercise records documenting timing and completion of exercises.
Protective/ Mitigate	NO HFO or IFO used during activity to minimise potential impacts to sea	No Heavy or intermediate fuels (HFO/IFO) to be used on vessels	Fuel records demonstrate no HFO/IFO was used on vessels.

Environmental Risk	Release of marine diesel into the marine environment during refuelling		
Environmental Performance Outcomes	No release of marine diesel to sea during refuelling		
Hierarchy	**Control Measures**	**Environmental Performance Standards**	**Measurement Criteria**
Administrative	Bulk liquid transfer procedures reduce potential for accidental overboard release	Bulk liquid transfer procedures implemented to ensure: • Hose integrity checked prior to use • Certified hoses used for refuelling • Dedicated personnel on hose watch during refuelling (i.e. operation is supervised) • Emergency shutdown in event of hose integrity failure • - Constant communication between refuelling vessels • Emergency shutdown: vessel emergency pumping stop tested before each transfer operation.	TEO vessel audit or third party inspection document confirm that refuelling procedures were in place
Protective/ Mitigate	NOPSEMA-accepted OPEP provides options for controlling the source of any unplanned hydrocarbon spills and mitigates potential impacts. In all cases, the NEBA of the spill response is considered when implementing the OPEP	Oil pollution emergency plan (OPEP) implemented, with Monitor and evaluate the only potentially applicable strategy	Incident reports confirm OPEP and NEBA implemented Incident report includes volume of hydrocarbon release to sea during refuelling NOPSEMA-accepted OPEP
Administration	All personnel received the CHA Site induction (10SPTRNTM18) which includes hydrocarbon management requirements	All crew will be required to complete the CHA Site induction containing basic information on chemical and hydrocarbon management (good housekeeping), as well as spill prevention and response measures.	Training records show all vessel based personnel travelling offshore have received the CHA Site induction

7.4.2.4 ALARP

There are no possible alternative options to the use of vessels during the activity and therefore at sea refuelling remains a possibility. Offshore refuelling is standard industry practice and oil pollution legislations (Protection of the Sea (Prevention of Pollution from Ships) Act 1983 and MARPOL Annex I) have been developed to safeguard against the risk of an unplanned hydrocarbon spill occurring during refuelling. If the control measures are adhered to then the risk of a loss of diesel during refuelling will have been reduced to ALARP.

The proposed control measures for vessel collisions leading to fuel tank rupture considered appropriate to manage the risk to ALARP. Additional controls considered but rejected are detailed below.

Rejected controls	Hierarchy	Practicable	Cost effective	Evaluation
No at sea refuelling	Engineering	×	×	Although it is not planned due to the distance to port for refuelling, it remains a possibility and therefore is included. Cost associated with vessel transits and risk transfer to Health and Safety issues with multiple trips to port instead to refuel. Would significantly increase the schedule to include multiple trips.
Use of vessels with larger tank sizes to reduce possibility of refuelling	Substitute	×	×	Less refuelling would be needed, but the additional risk associated with a larger vessel include larger tank sizes therefore the potential for impact in the event of a vessel collision would be greater. Typically, small support vessels are used for these activities and given the distance to shore, are more cost effective than larger vessels. Delays to activities caused by delays to contracting vessel.
No marine diesel will be used	Eliminate	×	×	Marine diesel is required to operate the vessel.

7.4.2.5 Residual Risk

Aspect	Consequence	Likelihood	Residual risk
Leak or spill from vessel during refuelling	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)

7.4.2.6 Acceptability

Consequence	
Threatened / Migratory / Protected Fauna	A release of hydrocarbons could have detrimental effects to marine fauna or habitats. These are expected to be similar or less than those described in sections 7.3.3 and 7.4.1. Given the small volumes potentially released (~37.5m^3) significant, long-lasting or widespread impacts to marine habitats are not expected. Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-6). However, the diesel is expected to evaporate quickly given the volatility of it with >50% evaporating within several hours. Entrainment of the hydrocarbon will likely result in temporary decline in water quality. Given the nature and scale of the spill, a significant decline in water quality as a result of a diesel spill during refuelling is not expected, and therefore impacts to marine fauna in the vicinity are expected to be temporary. Impacts to marine fauna would only occur if an individual was immediately adjacent to the spill source, which is unlikely due to the vessel activity that would be occurring during refuelling, and the low frequency of refuelling required in the field (given the close proximity to port). The spill would rapidly disperse throughout the water column diluting the spill and reducing its toxicity and potential impacts to receptors.
Physical Environment/ Habitat	
Threatened ecological communities	No TECs are expected to be impacted in the unlikely event of a deck spill.
Protected Areas	No protected areas are expected to be impacted in the unlikely event of a refuelling spill given the distance to the nearest protected area and evaporative nature of diesel.
Socio-economic receptors	Given the small volumes potentially leaked, and the lack of significant impact to fauna or habitats, socioeconomic receptors are unlikely to be impacted. No stakeholder concerns have been raised regarding this aspect.
Likelihood	
A number of controls are in place to prevent the leakage of these hydrocarbons. Should a spill occur clean up procedures will reduce the likelihood and volume of hydrocarbons entering the marine environment. Given the control measures in place, a small hydrocarbon spill or leak from the vessel during refuelling entering the marine environment is considered to be very unlikely.	
Acceptability of risk	**With the control measures in place, including compliance with industry standards and legislation, to prevent refuelling spills, and the small volumes potentially released, the risk is considered acceptable.**

7.4.3 Leakage or spillage on-board vessel

7.4.3.1 Description of hazard

There may be accidental releases / discharges to the marine environment of a variety of potentially hazardous materials and chemicals (liquid) which are stored and utilised on the vessel decks. Such releases will generally be small (<80 L) and may include diesel lubrication oils, hydraulic oil and waste oil.

7.4.3.2 Potential impact

The impacts associated with the accidental discharge of liquid hazardous materials is related to the nature of the material spilled, the volume and its behaviour in the marine environment (sink/ float/ disperse etc.). In the event of a spill from the vessel to the marine environment, the hydrocarbons and chemicals would be subjected to rapid dispersion and dilution by the open ocean water conditions and prevailing currents.

If hydrocarbons are accidentally lost overboard, potential impacts will include a temporary and highly localised decline in water quality with limited potential for toxicity to marine fauna due to the temporary exposure and low toxicity resulting from the rapid dilution in the marine environment.

Potential impacts are likely to be limited to the immediate vicinity and unlikely to affect overall population viability.

7.4.3.3 Environmental performance

Environmental outcomes, performance standards and measurement criteria for small leakage or spillages on-board vessels are provided in the table below:

Environmental Risk	Release of marine diesel or chemicals into the marine environment due to leakages or spills on-board vessels
Environmental Performance Outcomes	No unplanned liquid discharges from vessel to sea

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
Protective/ Mitigate	Vessels have spill response plan in place specific to vessel	All project vessels maintain SOPEP/ SMPEP (as appropriate to vessel class), as per Marine Order 91 for the duration of the EP. Appropriate initial responses prearranged and drilled in case of a hydrocarbon spill, as appropriate to vessel class.	TEO vessel audit or third party inspection document demonstrate current SOPEP/ SMPEP in place and available. Drill records verify timing and completion of hydrocarbon spill exercises.
Protective/ Mitigate	Spill response exercises on vessels undertaken at regular intervals	Spill response exercises conducted at least every three months to ensure personnel are prepared.	Spill response exercise records documenting timing and completion of exercises.
Administration	SDS available onboard vessels for all chemicals that could potentially be discharged to sea	SDS are available for all chemicals used on vessels (which includes spill response requirements)	TEO vessel audit or third party inspection document confirm contractors comply with Cliff Head Marine Operations Procedure which includes chemical handling requirements
Administration	Chemicals used are assessed for environmental impact prior to purchase (refer Appendix A); 10OPGOPC06	Chemicals used are assessed for environmental impact prior to purchase (refer Appendix A). 10OPGOPC06 Chemical Management are used to inform selection. Chemical substitutes will be assessed prior to service and only those with an equivalent or better environmental performance selected.	Chemical assessment records verify chemicals are assessed prior to purchase and substitutes only selected if they have an equivalent or better environmental performance.
Administration	Bunkering procedure implemented for all transfers	All bunkering operations to be conducted in accordance with bunkering procedure	TEO vessel audit or third party inspection document confirm equipment and procedural controls are in place and effective Annual environmental performance reports indicate no unplanned release of hydrocarbon or chemicals from vessel Incident report includes volume of hydrocarbon or chemical release to sea from vessel
Protective/ Mitigate	Temporary containers are stored in secondary containment to ensure proper bunding	Secondary containment of temporary containers	
Protective/ Mitigate	Suitable spill kits in accessible locations to be used immediately in the event of a spill to reduce potential for overboard discharge	Spill response bins/kits will be located in close proximity to hydrocarbon storage areas for prompt response in the event of a spill or leak. The kits will be checked for their adequacy and replenished as necessary prior to the commencement of	

Hierarchy	Control Measures	Environmental Performance Standards	Measurement Criteria
		activities and on a regular basis thereafter. Identified personnel will be trained in use of this equipment.	
Protective/ Mitigate	Spill clean-up kits contain absorbents for clean-up and are used in preference to deck washing to minimise impacts to water quality	In the event of a chemical or oil spill, absorbents are used to remove spill materials prior to any washing activities	
Protective/ Mitigate	Suitable spill kits in accessible locations to be used immediately in the event of a spill. Contaminated wastes are contained and shipped to shore for disposal and not discharged to sea to minimise impacts to water quality	Chemical and hydrocarbon spills will be immediately cleaned up and contaminated material will be contained for onshore disposal.	
Administration	All personnel received the CHA Site induction (10SPTRNTM18) which includes hydrocarbon management requirements	All crew will be required to complete the CHA Site induction containing basic information on chemical and hydrocarbon management (good housekeeping), as well as spill prevention and response measures.	Training records of vessel crew completing the CHA Site induction

7.4.3.4 ALARP

There are no possible alternative options to the use of vessels to support CHA operations or conduct the IMR activities. Control measures in place reduce the likelihood and consequence of a leakage or spill on-board the support/vessels from occurring or preventing the spill from entering the marine environment.

The proposed control measures for leaks or spills from vessels are considered appropriate to manage the risk to ALARP. Additional controls considered but rejected are detailed below

Rejected controls	Hierarchy	Practicable	Cost effective	Evaluation
No marine diesel will be used	Eliminate	×	×	Marine diesel is required to operate the vessel.
Elimination of portable containers of chemicals and oils from vessels	Eliminate	×	×	Vessels would be required to return to port each time replenishment is required. This would decrease the amount of time vessels can work before returning to port, increasing the duration of activities, which may prevent some activities from being completed.

7.4.3.5 Residual Risk

Aspect	Consequence	Likelihood	Residual risk
Small leak or spill from vessel	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)

7.4.3.6 Acceptability

Consequence	
Threatened / Migratory / Protected Fauna	A release of hydrocarbons and chemicals could have detrimental effects to marine fauna or habitats. These are expected to be similar or less than those described in 7.3.3.1. Given the small volumes potentially released (<80 L) impacts to marine habitats are not expected. Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-6), however the small volumes potentially released and the rapid dispersion of spills within the water column is not considered to result in long term impacts to water quality and impacts to receptors would therefore be temporary and in a small area Impacts to marine fauna would only occur if an individual was immediately adjacent to the spill source, which is unlikely. The spill would rapidly disperse throughout the water column diluting the spill and reducing its toxicity and potential impacts to receptors.
Physical Environment/ Habitat	
Threatened ecological communities	No TECs are expected to be impacted in the unlikely event of a deck spill.
Protected Areas	No protected areas are expected to be impacted in the unlikely event of an on-board spill given the distance to the nearest protected areas.
Socio-economic receptors	Given the small volumes potentially leaked, and the lack of significant impact to fauna or habitats, socioeconomic receptors are unlikely to be impacted. No stakeholder concerns have been raised regarding this aspect.
Likelihood	
A number of controls are in place to prevent the leakage of these hydrocarbons. Should a spill occur clean up procedures will reduce the likelihood of hazardous liquids entering the marine environment. Given the control measures in place, a small hydrocarbon or chemical spill or leak from the support/project entering the marine environment is considered to be very unlikely.	
Acceptability of risk	**With the control measures in place, including compliance with industry standards and legislation, to prevent and contain small spills and leakages, and the small volumes potentially released, the risk is considered acceptable.**

7.5 Oil spill response

7.5.1.1 Description of hazard

While spill response activities are intended to reduce the potential environmental consequences of a hydrocarbon spill, response activities can exacerbate or cause further environmental harm. Poorly planned and coordinated response activities can result in a lack of, or inadequate, information and poor decisions made during incident response.

After source control, there are six operational oil spill response options:

- Monitoring and evaluation (including natural recovery);
- Chemical dispersants;
- Offshore containment and recovery;
- Shoreline protection and deflection;
- Shoreline clean-up; and
- Oiled Wildlife Response: this will not remove oil from the environment but will mitigate the impact of the spill by rehabilitating oiled wildlife.

These response options are described in detail in the accompanying Cliff Head OPEP (10HSEQENVPL15).

During the Non Production Phase, IMR activities will be undertaken intermittently (Section 2.6.1). The pipeline will be flushed of hydrocarbons and the number of vessel movements will become less frequent therefore reducing the risk of oil spill in the Operational Area during non-production compared to the Operations Phase.

7.5.1.2 Potential impact

Response activities can result in:

- Disturbance to marine fauna and flora from increased vessel and / or helicopter movements;
- Spreading of hydrocarbons further beyond the zone of contamination (e.g. secondary contamination due to hull contamination of response vessels);
- Inadequate surveillance leading to poor information and unforeseen impacts;
- Unnecessary application of chemical dispersants causing reduced water quality and impact to sensitive receptors; or
- Inappropriate response implemented and additional sensitive receptors impacted (e.g. use of dispersants when containment and recovery would have been of greater benefit).

Preliminary Net Environmental Benefit Analysis

In order to assess the potential impacts of each response strategy on the environment with regards to the effect of the hydrocarbon spill on the environment, a Net Environmental Benefit Analysis (NEBA) procedure was developed. The NEBA procedure comprises the following steps:

(1) Identify sensitive receptors and locations:

a) Assess consequence of hydrocarbon spill on sensitive receptors; and

b) Determine which receptors are at which location potentially impacted.

c) Prioritise sensitive locations based on receptors present and time to hydrocarbon contact.

d) Assess the response strategies for:

(i) Positive and negative environmental impacts for each response strategy and identify receptors potentially impacted; and
(ii) Assess the key operability and safety constraints for each response strategy for each spill scenario.

(2) Summarise the NEBA analysis of operationally viable strategies for each sensitive receptor.

(3) Produce a preliminary NEBA of operationally viable strategies for each spill scenario for sensitive locations, identified through stochastic trajectory modelling, based on presence of sensitive receptors.

The NEBA procedure is outlined in Figure 7.2 and will be adopted in the highly unlikely event of a spill, as outlined in the Cliff Head OPEP for the operational NEBA assessment.

A preliminary NEBA, based on the spill trajectory modelling for the credible spill scenarios, as an output of the analysis carried out in Sections 7.3.3, 7.3.4, 7.3.5 and 7.4.1, and summarised in Table 7-13 is provided in Table 7-14.

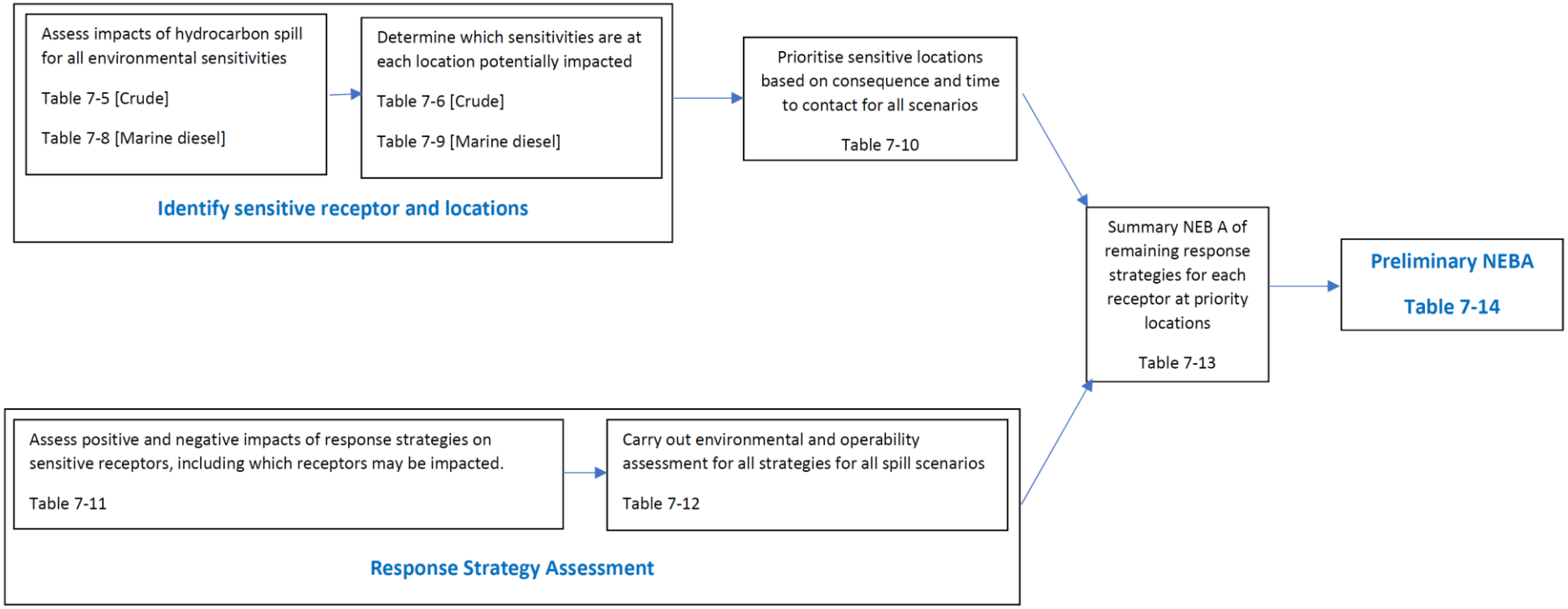


Figure 7.2: NEBA procedure

Prioritisation of sensitive locations

The potential impacts of a release of Cliff Head crude and marine diesel on sensitive receptors is assessed in Section 7.3 and 7.4. In line with response strategy priorities (Section 7.2 Cliff Head OPEP) sensitive receptors were prioritised in the following order:

- Environmentally sensitive locations (habitat, cultural, flora/fauna);
- Commercial/ industrial resources/ properties/ and assets; and
- Recreational and human amenity resources.

The most sensitive receptors are deemed to be:

- Sandy beaches;
- Intertidal reefs;
- Foraging/nesting seabirds/shorebirds;
- Breeding marine mammals;
- Mangroves; and
- Tourism.

Based on the volumes of Cliff Head crude predicted to exceed environmental thresholds for shoreline (≥100 g/m^2), floating (≥10 g/ m^2), entrained (≥100 ppb) and dissolved (≥50 ppb) oil concentrations at sensitive locations (Sections 7.3.2, 7.3.3) and the presence of sensitive receptors at these locations, the impact of a hydrocarbon spill on sensitive locations was assessed in Table 7-6. Based on this assessment, the impact consequence of hydrocarbon contact at each location was determined as outlined in Figure 7.3.

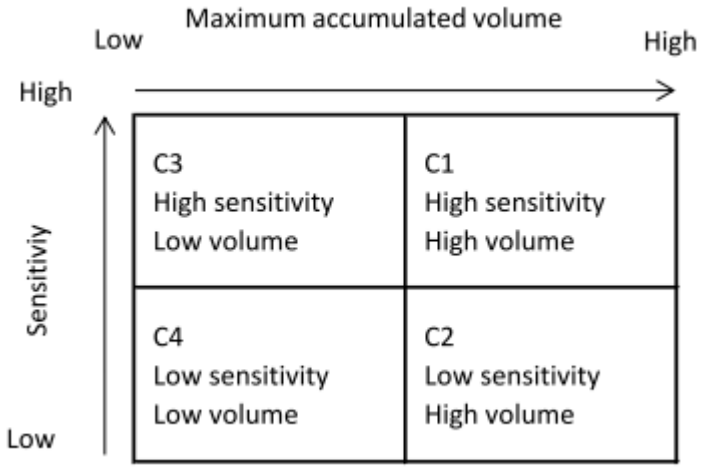


Figure 7.3: Location consequence matrix

C1 – high consequences: a high volume (approximately >50% of the largest predicted volume) of hydrocarbons is predicted to make contact with a highly sensitive location (e.g. Cervantes and the Abrolhos).

C2 – high consequence: a high volume (approximately >50% of the largest predicted volume) of hydrocarbons is predicted to make contact with a less sensitive location (e.g. Dongara, Leeman, Geraldton and Lancelin).

C3 – low consequence: a low volume (approximately <50% of the largest predicted volume) of hydrocarbons is predicted to make contact with a highly sensitive location e.g. Cervantes and the Abrolhos).

C4 – low consequence: a low volume (approximately <50% of the largest predicted volume) of hydrocarbons is predicted to make contact with a less sensitive location (e.g. Dongara, Leeman, Geraldton and Lancelin).

Locations were prioritised in order of response effort taking into account the impact consequence at the location, and the time to contact as outlined in Figure 7.4 and presented in Table 7-10. Although tourism was identified as a sensitive receptor, protection of the other receptors listed will result in protection of tourism interests. Due to the seasonal differences in wind direction and current behaviour, locations vary in both impact consequence and response priority ranking between summer and winter.

These features, whilst not discounting other sensitivities, have been used as the basis for prioritising sensitivities for protection in the event of an oil spill (as per the *Cliff Head OPEP*).

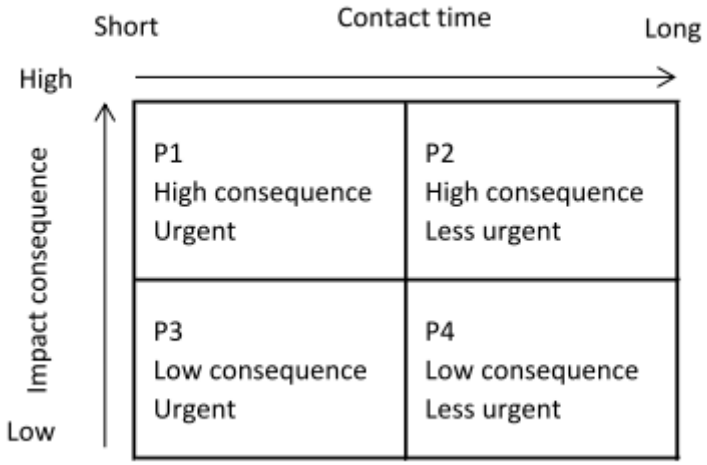


Figure 7.4: Location prioritisation matrix

P1: contact with spill hydrocarbons at high consequence locations is predicted to occur within a very short time scale. Resources should be preferentially deployed to reduce potential contact as quickly as possible.

P2: contact with spilled hydrocarbon at high consequence locations is predicted to occur over a longer time scale than for P1 locations. This may provide time to address issues with P3 locations before needing to preferentially deploy resources to the P2 locations.

P3: Contact with spilled hydrocarbons at low consequence locations is predicted to occur within a very short time scale. This does not mean those locations are not important but this prioritisation provides guidance in balancing the deployment of limited resources between competing priorities.

P4: Contact with spilled hydrocarbons at low consequence locations over longer time scales. This does not mean those locations are not important but this prioritisation provides guidance in balancing the deployment of limited resources between competing priorities.

Table 7-10: Sensitive locations and the priority ranking and order of priority for response based on amount of accumulated shoreline hydrocarbon ≥100g/m^2, time to contact, sensitive receptors present and consequence ranking for each spill scenario (W=winter; S=summer)

Sensitive Location	Sensitive receptors (sensitivity ranking, 1=lowest)		Time to contact (hours) at 1g/m^2		Maximum accumulated volume (m^3)		Consequence ranking (Figure 7-7)		Priority ranking (Figure 7-8)		Order of priority (1= highest priority 8= lowest priority)	
			W	S	W	S	W	S	W	S	W	S
Level 2: pipeline leak – 97.0 m^3 Cliff Head crude (worst case results presented therefore location of release differs shown as Loc 1= Cwlth, Loc 2 – State))												
Dongara	Sandy beaches Intertidal reefs Foraging/nesting shorebirds	4	5 (Loc 1)	5 (Loc 2)	35.4 (Loc 1)	36.3 (Loc 1)	C2	C2	P1	P1	1	1
Leeman	Sandy beaches Foraging/nesting shorebirds	1	25 (Loc 1)	60 (Loc 1)	24.6 (Loc 1)	12.5 (Loc 1)	C2	C2	P1	P2	2	2
Cervantes	Sandy beaches Intertidal reefs Marine mammal breeding (sea lion) Foraging/nesting shorebirds and seabirds	6	547 (Loc 2)	NC	13.8 (Loc 1)	8.3 (Loc 1)	C3	C3	P2	P4	6	5
Shoal Point to Oakabella Creek	Sandy beaches Rocky shore Submerged reefs Foraging/nesting shorebirds	5	548 (Loc 1)	NC	15.9 (Loc 1)	10.3 (Loc 1)	C3	C3	P2	P4	7	4
Abrolhos – Pelsaert Group	Sandy beaches Intertidal reefs Mangroves Foraging/nesting shorebirds and seabirds Marine mammal breeding (sea lion)	7	484 (Loc 1)	NC	7 (Loc 1)	2.5 (Loc 1)	C3	C3	P2	P4	5	8
Abrolhos – Easter Group			NC	NC	3.8 (Loc 1)	5 (Loc 1)	C3	C3	P4	P4	8	6
Abrolhos – Wallabi Group			NC	NC	3.1 (Loc 1)	3.2 (Loc 1)	C3	C3	P4	P4	8	7
Geraldton	Sandy beaches Intertidal reefs Foraging/nesting shorebirds	3	174 (Loc 1)	100 (Loc 1)	20.8 (Loc 1)	20 (Loc 1)	C2	C2	P2	P2	4	3

Sensitive Location	Sensitive receptors (sensitivity ranking, 1=lowest)		Time to contact (hours) at 1g/m^2		Maximum accumulated volume (m^3)		Consequence ranking (Figure 7-7)		Priority ranking (Figure 7-8)		Order of priority (1= highest priority 8= lowest priority)	
			W	S	W	S	W	S	W	S	W	S
Lancelin/Ledge Point	Sandy beaches Submerged reefs Foraging/nesting shorebirds	2	24 (Loc 1)	NC	5.5 (Loc 1)	0.9 (Loc 1)	C4	C4	P1	P4	3	8
Level 2: diesel spill – 500 m^3 marine diesel												
Dongara	Sandy beaches Intertidal reefs Foraging/nesting shorebirds	4	1	1	195	166	C2	C2	P1	P1	1	1
Leeman	Sandy beaches Foraging/nesting shorebirds	1	12	17	93	154	C2	C2	P1	P1	2	2
Cervantes	Sandy beaches Intertidal reefs Marine mammal breeding (sea lion) Foraging/nesting shorebirds and seabirds	5	64	NC	18	NC	C3	C3	P2	P4	3	4
Abrolhos – Pelsaert Group	Sandy beaches Intertidal reefs Mangroves Foraging/nesting shorebirds and seabirds Marine mammal breeding (sea lion)	6	NC	NC	NC	NC	C3	C3	P4	P4	6	5
Abrolhos – Easter Group			NC	NC	NC	NC	C3	C3	P4	P4	7	6
Abrolhos – Wallabi Group			NC	NC	NC	NC	C3	C3	P4	P4	8	7
Geraldton	Sandy beaches Intertidal reefs Foraging/nesting shorebirds	3	NC	NC	NC	5	C4	C4	P4	P4	5	3
Lancelin	Sandy beaches Submerged reefs Foraging/nesting shorebirds	2	NC	NC	2	NC	C4	C4	P4	P4	4	8

7.5.1.3 Response strategy assessment

A summary of the available spill response strategies and potential positive and negative impacts to the relevant sensitive receptors are summarised in Table 7-11, and the potential environmental impacts and operational considerations of response strategies for CHA credible spill scenarios discussed in Sections 7.3 and 7.4.

Table 7-11: Summary of potential environmental impacts of spill response strategies[3]

Response strategy	Negative		Positive		Relevant controls to manage impacts and risks of the strategy
	Impacts	Impacted receptors	Impacts	Impacted receptors	
Source control	Can lead to increased disturbance due to additional vessels	Marine mammals Marine reptiles Fish	Release of hydrocarbons to sea is stopped	All receptors	Implementation of the OPEP ensures the selection of source control to reduce the potential impact to the environment to ALARP
Monitor and evaluate	Acute and chronic toxicity effects of surface oil on organisms Physical effects e.g. smothering Potential long-term impacts to water, water column and inter-tidal resources Increased vessel movement increase chance of disturbance/collision with marine fauna	All receptors	No harm caused from potentially damaging clean up actions Identify and prevent emerging risks to sensitive areas	All receptors	The use of vessels and aircraft to undertake surveillance can result in environmental impacts as described in this EP. Through the adherence to control measures in the EP for vessels and aircraft secondary impacts (e.g. noise, light, planned discharges) the potential impacts will be reduced to ALARP
Dispersant application	Can increase concentration of dissolved and entrained hydrocarbons in water column Can have toxic effects on organisms in upper water column May reduce effectiveness of oleophilic skimmers.	Marine mammals Marine reptiles Birds Fish invertebrates Coral reefs Seagrass	Prevents and reduces oiling of wildlife Enhances natural degradation process Inhibits sedimentation of hydrocarbons	Marine mammals Marine reptiles Birds Emergent and intertidal habitats Shoreline habitats	Dispersants will not be used during spill response operations
Containment and recovery	Increased vessel movement increase chance of disturbance/collision with marine fauna Generation of oily waste requiring disposal.	Marine mammals Marine reptiles Fish	Oil/spill materials recovered and stored until appropriate disposal can be arranged Can reduce volume of surface slick Prevent or reduce oiling of wildlife and shorelines	Marine mammals Marine reptiles Birds Emergent and intertidal habitats Shoreline habitats	Vessels will adhere to the requirements of this EP to ensure that secondary impacts are reduced to ALARP (e.g. vessel emissions and discharges, light, noise, physical presence). During containment and recovery operations offshore, zones will be established for wash-down prior to vessels returning to ports to ensure that hydrocarbons are not spread beyond the area of impact. No nearshore vessel operations will occur at night to reduce the requirement for lighting and also reduce the potential impacts to marine fauna

[3] Further details on response strategies, including the initiation, implementation and termination can be found in the accompanying OPEP.

Response strategy	Negative		Positive		Relevant controls to manage impacts and risks of the strategy
	Impacts	Impacted receptors	Impacts	Impacted receptors	
Protection and deflection	Increased vessel movement increase chance of disturbance/collision with marine fauna Potential damage/disturbance to intertidal and benthic habitats	Marine mammals Marine reptiles Fish Coral reefs Seagrass	Oil/spill materials recovered and stored until appropriate disposal can be arranged Can reduce volume of surface slick Prevent or reduce oiling of wildlife and shorelines	Marine mammals Marine reptiles Birds Emergent and intertidal habitats Shoreline habitats	Vessels will adhere to the requirements of this EP to ensure that secondary impacts are reduced to ALARP (e.g. vessel emissions and discharges, light, noise, physical presence, IMS) Maintenance of the protection and deflection equipment once installed will ensure it is working effectively Competent personnel will conduct the activities to ensure potential damage or disturbance to habitats is reduced to ALARP Vessels used for nearshore operations will be of shallow draft to ensure impacts to the seabed are minimised and vessels can perform tasks adequately
Shoreline clean up	Potential shoreline disturbance Physical damage to sensitive flora and fauna Behavioural disturbance / displacement of marine fauna	Marine mammals Marine reptile Birds Coral reefs Seagrass Shoreline habitats	Removes stranded hydrocarbons from shorelines Reduces impacts associated with smothering effects Reduces risk of animals contacting stranded hydrocarbons Reduces potential for remobilisation of stranded oil to other sensitive receptors Aid recovery	Marine mammals Marine reptile Birds Shoreline habitats	Consultation will be undertaken with the local shire council to ensure stakeholders are aware of any activities and relevant local expertise can be provided Existing tracks and access roads will be used to prevent erosion and compaction unless otherwise directed by HMA Exclusion zones will be established for decontamination and wash-down Personnel not involved in the response will be prevented from accessing the clean up areas to minimise the potential for spread of oily waste Vegetation clean-up undertaken by qualified and competent personnel only to minimise potential damage to the existing environment
Oiled wildlife response	Increased vessel movement increase chance of disturbance/collision with marine fauna Approaching marine fauna could drive individuals towards/into spill Behavioural disturbance / displacement of marine fauna	Marine mammals Marine reptile Birds	Prevent or reduce oiling of wildlife Aid recovery of oiled wildlife	Marine mammals Marine reptile Birds	Fauna and flora are only handled or treated by trained and competent personnel

Table 7-12: Potential environmental impacts and operational considerations of response strategies for CHA credible spill scenarios

Response strategy	OPEP Section	Level 1 Deck Spillages CHA Platform (<2 m^3) and vessels (<0.1 m^3) diesel, lube, hydraulic oils	Level 2 Pipeline Leak (Cwlth or State waters location): Total of 97 m^3 Crude over 21 days	Level 2 Vessel Collision: 500 m^3 Diesel (over 3 hours)
Source control	2.3	Recommended prevents further release of hydrocarbons into environment	environmental benefits may outweigh environmental costs for all scenarios	
Monitor and Evaluate	2.4	Recommend situational awareness is required for all scenarios and to confirm level environmental benefits may outweigh environmental costs for all scenarios		
Chemical dispersants	N/A	Not recommended Dispersants are unlikely to be effective for Cliff Head crude as: • dispersant can only be applied to surface slicks which are > 10 g/m^2 threshold • dispersants should not be applied in water < 10 m depth • due to the Cliff Head crude forming solid waxy droplets in water, rather than a continuous sheen, it is highly likely dispersants would not contact the crude and instead pass between the solid droplets directly contaminating the water. Any dispersant making contact with crude would be unable to penetrate the crude, due to the properties of Cliff Head crude, and would instead run off into the marine environment.		Not recommended Dispersants are not effective for diesel
Offshore Containment and Recovery	2.5	Not recommended small volumes with no shoreline contact diesel, lube, hydraulic oil not suitable for offshore containment & recovery rapid spreading, evaporation and natural processes	Consider weather dependant for effectiveness concentration of surface crude predicted to be < concentration at which this strategy is likely to be effective (< 10 g/m^2 standard offshore recovery equipment is unlikely to be very effective on solid tar-balls, nets and sieves etc. will be used	Consider - weather dependant for effectiveness - surface hydrocarbons potentially > 10 g/m^2 Given the fast spreading nature of diesel causing the slick to break up and disperse, this response is not considered to be effective in reducing the impacts of a diesel spill. The ability to contain and recover spreading diesel on the ocean water surface is extremely limited due the very low viscosity of the fuels.
Shoreline Protection and Deflection	2.6	Not recommended small volumes with no or negligible shoreline contact or accumulations	Consider - There is potential for sections of shoreline to be contacted by surface hydrocarbons at thresholds > 1 g/m^2 .e.g. Dongara so protection booms may be useful in deflecting crude from specific high value	Consider potential for surface oil to make contact with waters around Dongara at concentrations > 1 g/m^2 within 1 hour. It should be noted that the modelling predicts impacts to the Dongara receptor which includes water

Response strategy	OPEP Section	Level 1 Deck Spillages CHA Platform (<2 m^3) and vessels (<0.1 m^3) diesel, lube, hydraulic oils	Level 2 Pipeline Leak (Cwlth or State waters location): Total of 97 m^3 Crude over 21 days	Level 2 Vessel Collision: 500 m^3 Diesel (over 3 hours)
		rapid spreading, evaporation and natural processes will remove surface hydrocarbons before shoreline contact little environmental benefit for shoreline disturbance	receptors reducing the accumulations at these locations. It should be noted that the modelling predicts impacts to the Dongara receptor which includes water depths 0-20m and does not provide time to shoreline contact, as shoreline accumulation is expected, shoreline protection should be considered. - potential maximum accumulation volumes are at Dongara, 36.3 m^3 summer and 35.4 m^3 winter	depths 0-20m and does not provide time to shoreline contact, as shoreline accumulation is expected, shoreline protection should be considered - potential maximum accumulations at Dongara up to 195 m^3 so protection and deflection may be an option to mitigate accumulations at sensitive locations around Dongara - very low likelihood of surface hydrocarbons > 10 g/m^2 reaching Leeman or any other shoreline so unlikely to be effective
Shoreline Clean-up	2.7.1	Not recommended small volumes with no or negligible shoreline contact or accumulations rapid spreading, evaporation and natural processes will remove surface hydrocarbons before shoreline contact little environmental benefit for shoreline disturbance	Consider may be applicable to mitigate accumulations – maximum forecast to occur at Dongara – 36.3 m^3 accumulations at other locations forecast to be < 27.5 m^3	Consider potential maximum accumulations at Dongara up to 195 m^3 and Leeman up to 154m^3 so light cleaning may be appropriate at some sites in this area e.g. hydrocarbon contaminated debris maximum accumulations outside of Dongara is low so unlikely shoreline clean up would be appropriate
Oiled Wildlife Response	2.8	Not recommended small volumes with little/no shoreline contact very thin films of oil for very short period of time	Consider maximum accumulations are forecast to occur at Dongara – 36.3 m^3 accumulations at other locations forecast to be < 27.5 m^3which is a potential risk to marine fauna Concentration of surface crude predicted to be mainly less than concentration of environmental significance (i.e. < 10 g/m^2) so oiling at sea less of a risk. Due to the behaviour of the crude, it is not expected to form slicks and stick to fauna (it will be waxy plates and tar balls) mostly concentrated around the spill release area and potentially along shorelines.	Consider surface hydrocarbons potentially > 10 g/m^2 therefore greater potential for oiled wildlife Predicted accumulated volumes at Dongara of 195 m^3 and Leeman up to 154m^3 Less likely to be required for other locations where accumulated volumes and low probability of contact with surface hydrocarbons > 10g/m^2.

As highlighted in Table 7-12, source control and monitor and evaluate are recommended for all spill scenarios, whereas chemical dispersants are not considered for any scenario. As such, chemical dispersants are not considered further in the NEBA procedure.

Summary NEBA

Table 7-13 provides a summary of the sensitive receptors, including priority receptors, found at each location and recommendations for implementation of the oil spill response strategies considered operationally viable for any spill scenario identified in Section 7 as described in Table 7-12.

Table 7-13: Summary of sensitive receptors, their location and assessment of relevant oil spill response strategies.

Sensitivity receptor	Location								OPEP response*				OSMP (OPEP Section 4)	
	General offshore	Shoal point to Oakabella Creek	Around Geraldton	Around Dongara	Around Leeman	Around Cervantes	Lancelin to Ledge Point	Abrolhos Islands	Offshore containment and recovery	Shoreline protection and deflection	Shoreline clean-up	Oiled wildlife response	Scientific OSMP	Operational OSMP
Key: X = receptor present, XP = priority receptor, R= recommended, C= considered, NR = not recommended, N/A = not applicable														
General offshore														
Plankton	X		X	X	X	X	X	X	C	N/A	N/A	N/A	1, 2	1,2
Fish (including eggs and larvae)	X		X	X	X	X	X	X	C	N/A	N/A	N/A	10, 11	1,2
Turtles	X		X					X	C	N/A	N/A	R	6	1,2,3,4
Marine mammals	X		X	X	X	X	X	XP	C	N/A	N/A	C	7,8	1,2,3,4
Seabirds	X		X	X	X	X	X	XP	C	N/A	N/A	R	9	1,2,3,4
Subtidal zone														
Submerged reefs/shoals			X	X	X	X	X	X	N/A	NR	NR	N/A	1,3	1,2,3
Seagrass								X	N/A	NR	NR	N/A	5, 4	1,2

Sensitivity receptor	Location								OPEP response*				OSMP (OPEP Section 4)	
	General offshore	Shoal point to Oakabella Creek	Around Geraldton	Around Dongara	Around Leeman	Around Cervantes	Lancelin to Ledge Point	Abrolhos Islands	Offshore containment and recovery	Shoreline protection and deflection	Shoreline clean-up	Oiled wildlife response	Scientific OSMP	Operational OSMP
Intertidal zone														
Rocky shore, nearshore intertidal reefs				XP		XP		XP	C	C	C	N/A	1	1,3
Mangroves								XP	C	C	C	N/A	1	1,3
Sandy shores/beaches			XP	XP	XP	XP	XP	XP	C	C	R	N/A	6	1,3
Sublittoral zone														
Seabird breeding, feeding and resting areas		XP	XP	XP	XP	XP	XP	XP	C	R	R	R	9	1,3,4
Sealion breeding and resting areas								XP	C	R	R	NR	8	1,3,4
Socioeconomic														
Fisheries	X		X	X		X		X	C	N/A	N/A	N/A	12	1
Tourism and recreation	X	X	X	X	X	X	X	X	C	N/A	N/A	N/A	None	1,3
Defence activities	X								C	N/A	N/A	N/A	None	1,3
Shipping	X		X						C	N/A	N/A	N/A	None	1,3
Protected areas						X		X	C	N/A	N/A	N/A	As Required	1,3

** Source control and monitor and evaluate are recommended response strategies for all receptors and are not included in this table, dispersants are not recommended for any receptor and therefore are not included in this table.*

Preliminary NEBA

The preliminary NEBA (Table 7-14) has been completed below by following the NEBA procedure (Figure 7.2 and as previously described in detail in this section) through the following summarised steps:

- Identify priority locations (identified via stochastic modelling results);
- Identify sensitive receptors; and
- Assess the potential environmental impacts of the operationally viable response strategies.

Hypothetical Hydrocarbon Spills

In the unlikely event of a Level 2 hydrocarbon spill, real time oil spill trajectory modelling (OSTM) may be commissioned if deemed a suitable response, and the benefits of the potential response strategies will be assessed at the time of a spill.

Based on the probable trajectories of a hydrocarbon spill, sensitive locations and receptors will be identified and an operational NEBA will be completed in the light of the information provided in Table 7-12 and Table 7-13. See Section 6.12 in the Cliff Head OPEP for further information.

Table 7-14: Preliminary NEBA conducted for priority locations identified via stochastic modelling

Section A – Information to Inform NEBA					**Section B – Preliminary NEBA** **Priority location** **Sensitive receptors**				
Response strategy	Negative impacts	Positive impacts	Considerations	Level	Cervantes Sandy beaches Intertidal reefs Marine mammal breeding (sea lion) Foraging/ nesting shorebirds and seabirds	Abrolhos Sandy beaches Intertidal reefs Mangroves Foraging/ nesting shorebirds and seabirds Marine mammal breeding (sea lion)	Dongara Sandy beaches Intertidal reefs Foraging/ nesting shorebirds	Leeman Sandy beaches Foraging/ nesting shorebirds	Geraldton Sandy beaches Intertidal reefs Foraging/ nesting shorebirds
Source Control	Acute and chronic toxicity effects of surface oil on organisms Physical effects e.g. smothering Potential long-term impacts to water, water column and inter-tidal resources Increased vessel movement increase chance of disturbance/collision with marine fauna	No harm caused from potentially damaging clean up actions Identify and prevent emerging risks to sensitive areas	Once sensitive receptors are identified, i.e. cetacean spotted, follow stand down procedures EPBC Regulations 2000, Part 8 Division 8.1 interactions with cetaceans (see 7.2 of EP)	1 2 (crude) 2 (diesel)	Recommended This strategy is applicable to some extent to all oil spills scenarios. However, if environmental sensitivities are threatened then additional response strategies will need to be subjected to a NEBA assessment to determine whether the environmental costs of these additional strategies are outweighed by the environmental benefits.				
Monitor and Evaluate	Acute and chronic toxicity effects of surface oil on organisms Physical effects e.g. smothering Potential long-term impacts to water, water column and inter-tidal resources Increased vessel movement increase chance of disturbance/collision with marine fauna	No harm caused from potentially damaging clean up actions Identify and prevent emerging risks to sensitive areas	Once sensitive receptors are identified, i.e. cetacean spotted, follow stand down procedures EPBC Regulations 2000, Part 8 Division 8.1 interactions with cetaceans (see 7.2 of EP)	1 2 (crude) 2 (diesel)	Recommended This strategy is applicable to some extent to all oil spills scenarios. However, if environmental sensitivities are threatened then additional response strategies will need to be subjected to a NEBA assessment to determine whether the environmental costs of these additional strategies are outweighed by the environmental benefits.				
Chemical Dispersants	Can increased concentration of dissolved and entrained hydrocarbons in water column Can have toxic effects on organisms in upper water column Not effective against all types of crude May reduce effectiveness of oleophilic skimmers.	Prevents and reduces oiling of wildlife Enhances natural degradation process Rapid treatment over large areas if required Inhibits sedimentation of hydrocarbons Relatively unaffected by adverse weather	Dispersant can only be applied to surface slicks which are $\geq$ 10 g/m^2 threshold Dispersants should not be applied in water < 10 m depth Due to the behaviour of Cliff Head crude in the water, dispersants are unlikely to be effective	1	Not recommended Dispersant are ineffective as a result of the thin surface slick (dispersant 'punches' through a thin slick and corrals the oil) and volatile nature of the hydrocarbons.				
				2 (crude)	Not recommended Cliff Head crude is forecasted to cool and solidify on discharge onto the after surface so that it would not spread as a film. Due to the solid droplet nature of the crude in water, dispersants will not be effective. Further, water depths are a maximum of 18 m at the spill source. However, since the spill source is a pipeline leak, the exact location of the spill source may be in shallow waters.				
				2 (diesel)	Not recommended Dispersant are ineffective as a result of the thin surface slick (dispersant 'punches' through a thin slick and corrals the oil) and volatile nature of the hydrocarbons.				
Offshore Containment and Recovery	Increased vessel movement increase chance of disturbance/collision with marine fauna Dependent on weather Generation of oily waste requiring disposal.	Oil/spill materials recovered and stored until appropriate disposal can be arranged Can reduce volume of surface slick Prevent or reduce oiling of wildlife and shorelines	NEBA process is applied when preparing the IAP for the spill response strategies Containment and recovery operations require surface slicks of thresholds $\geq$ 10 g/m^2 Inductions to the persons using the strategy equipment Booms in shallow water monitored to prevent trapped wildlife	1	Considered/Not recommended Containment and recovery at the spill source will reduce the amount of hydrocarbons reaching sensitive receptors. However, concentration of surface crude is expected to reduce to <1 g/m^3 at 7-10 km from the release site by spreading of the floating fragments. Containment and recovery will only be effective at concentrations >10 g/m^3 and therefore assessment will be required to determine whether this strategy is appropriate.				
				2 (crude)	Considered Offshore containment and recovery will reduce the amount of hydrocarbons reaching sensitive receptors. However, may cause damage or disturbance to other receptors. Assessment is required to determine if disturbance outweighs benefits of hydrocarbon removal.				

Section A – Information to Inform NEBA					Section B – Preliminary NEBA Priority location Sensitive receptors				
Response strategy	Negative impacts	Positive impacts	Considerations	Level	Cervantes	Abrolhos	Dongara	Leeman	Geraldton
					Sandy beaches Intertidal reefs Marine mammal breeding (sea lion) Foraging/ nesting shorebirds and seabirds	Sandy beaches Intertidal reefs Mangroves Foraging/ nesting shorebirds and seabirds Marine mammal breeding (sea lion)	Sandy beaches Intertidal reefs Foraging/ nesting shorebirds	Sandy beaches Foraging/ nesting shorebirds	Sandy beaches Intertidal reefs Foraging/ nesting shorebirds
			EPBC Regulations 2000, Part 8 Division 8.1 interactions with cetaceans (see 7.2 of EP)	2 (diesel)	Considered Offshore containment and recovery will reduce the amount of hydrocarbons reaching this sensitive receptor. However, may cause damage or disturbance to other receptors. Assessment is required to determine if disturbance outweighs benefits of hydrocarbon removal.		Not Applicable Not enough time to deploy prior to contact	Considered Offshore containment and recovery will reduce the amount of hydrocarbons reaching this sensitive receptor. However, may cause damage or disturbance to other receptors. Assessment is required to determine if disturbance outweighs benefits of hydrocarbon removal.	
Shoreline Protection and Deflection	Increased vessel movement increase chance of disturbance/collision with marine fauna Potential damage/disturbance to intertidal and benthic habitats	Oil/spill materials recovered and stored until appropriate disposal can be arranged Can reduce volume of surface slick Prevent or reduce oiling of wildlife and shorelines	NEBA process is applied when preparing the IAP for the spill response strategies Inductions to the persons using the strategy equipment Booms in shallow water monitored to prevent trapped wildlife Flat bottom vessels, catamarans or vessels with tenders used to access shorelines to deploy booms and other protective equipment. Beach profile will be restored after installing barriers/berms as determined by control agency EPBC Regulations 2000, Part 8 Division 8.1 interactions with cetaceans (see 7.2 of EP)	1	Not recommended Small volumes with no or negligible shoreline contact or accumulations Rapid spreading, evaporation and natural processes will remove surface hydrocarbons before shoreline contact Little environmental benefit for shoreline disturbance				
				2 (crude)	Consider Not enough time to prevent contact at Dongara (contact within a minimum of <1 day) but may reduce maximum accumulations which are forecast to be up to 36.3 m^3 along the length of the receptor, but may be selected for use at specific receptors such as Port Denison Surface concentrations reaching are unlikely to reach >10 g/m^3 which is the threshold limit of effectiveness for protection booms				
				2 (diesel)	Not recommended Very low likelihood of surface hydrocarbons > 10 g/m^3 reaching shorelines so unlikely to be effective Accumulations could be up to 18m^3 at Cervantes over time, no contact or accumulation at Abrolhos Islands or shoals		Consider Potential for surface oil to make contact with waters around Dongara at concentrations > 10 g/m^2 within 1 hour Potential maximum accumulations at Dongara up to 195 m^3 so protection and deflection may be an option to mitigate accumulations at sensitive locations around Dongara	Not recommended Very low likelihood of surface hydrocarbons > 10 g/m^3 reaching Leeman or any other shoreline so unlikely to be effective Maximum accumulations of 154 m^3 at Leeman	
Shoreline Clean-up	Potential shoreline disturbance from landing vessels on shorelines to deploy SCAT crew and clean-up equipment. Dependent on weather	Removes stranded hydrocarbons from shorelines Reduces impacts associated with smothering effects	Induction and training of onshore team accessing to uninhabited islands. Induction to include that spill response teams should avoid disruption of environment and take practical tactical	1	Not recommended Small volumes with no or negligible shoreline contact or accumulations Rapid spreading, evaporation and natural processes will remove surface hydrocarbons before shoreline contact Little environmental benefit for shoreline disturbance				

Section A – Information to Inform NEBA					Section B – Preliminary NEBA Priority location Sensitive receptors				
Response strategy	Negative impacts	Positive impacts	Considerations	Level	Cervantes	Abrolhos	Dongara	Leeman	Geraldton
					Sandy beaches Intertidal reefs Marine mammal breeding (sea lion) Foraging/ nesting shorebirds and seabirds	Sandy beaches Intertidal reefs Mangroves Foraging/ nesting shorebirds and seabirds Marine mammal breeding (sea lion)	Sandy beaches Intertidal reefs Foraging/ nesting shorebirds	Sandy beaches Foraging/ nesting shorebirds	Sandy beaches Intertidal reefs Foraging/ nesting shorebirds
	Equipment and labour intensive, requires logistical support	Reduces risk of animals contacting stranded hydrocarbons Reduces potential for remobilisation of stranded oil to other sensitive receptors Aides recovery	precautions to avoid contact with flora and fauna NEBA process is applied when preparing the IAP for the spill response strategies IMT to: Coordinate basic training to clean-up contractors; Oversee the clean-up process to ensure appropriate procedures are used to minimise the impact on the environment; Provide advice on practical precautions to minimise contact with flora and fauna; and Assist with the NEBA process when selecting spill response strategies and to evaluate the impact of strategies	2 (crude)	Consider May reduce amount of hydrocarbons on shore and potential contamination of shorebird resting, nesting and foraging sites. Will reduce potential impact on tourism. May reduce amount of hydrocarbons on potentially stranding on mangroves and the resulting toxicity. However, accumulations forecasted to be low (< 13.8 m^3 at Cervantes and no contact at the Abrolhos above the 100 g/m^2 threshold – assessment is required to determine if disturbance outweighs benefits of hydrocarbon removal.		Consider May be applicable mitigate accumulations – maximum forecast to occur at Dongara – up to 36.3 m^3 in summer However assessment is required to determine if disturbance outweighs benefits of hydrocarbon removal.	Consider May reduce amount of hydrocarbons on shore and potential contamination of shorebird resting, nesting and foraging sites. Will reduce potential impact on tourism. May reduce amount of hydrocarbons on potentially stranding on mangroves and the resulting toxicity. However accumulations forecasted to be low (< 27.5m^3) – assessment is required to determine if disturbance outweighs benefits of hydrocarbon removal.	
				2 (diesel)	Not recommended Maximum accumulations are low (<64 m^3) so unlikely shoreline clean up would result in net environmental benefit.		Consider Potential maximum accumulations at Dongara up to 195^3 so light cleaning may result in net environmental benefit at some sites in this area e.g. hydrocarbon contaminated debris	Not recommended Maximum accumulations are low (<154 m^3) so unlikely shoreline clean up would result in net environmental benefit.	

Section A – Information to Inform NEBA					Section B – Preliminary NEBA Priority location Sensitive receptors				
Response strategy	Negative impacts	Positive impacts	Considerations	Level	Cervantes	Abrolhos	Dongara	Leeman	Geraldton
					Sandy beaches Intertidal reefs Marine mammal breeding (sea lion) Foraging/ nesting shorebirds and seabirds	Sandy beaches Intertidal reefs Mangroves Foraging/ nesting shorebirds and seabirds Marine mammal breeding (sea lion)	Sandy beaches Intertidal reefs Foraging/ nesting shorebirds	Sandy beaches Foraging/ nesting shorebirds	Sandy beaches Intertidal reefs Foraging/ nesting shorebirds
Oiled Wildlife Response	Increased vessel movement increase chance of disturbance/collision with marine fauna Approaching marine fauna could drive individuals towards/into spill	Prevent or reduce oiling of wildlife Aide recovery of oiled wildlife	Maximise the best achievable and practicable protection measures to wildlife and their habitats during marine pollution incidents, prioritising the Abrolhos Islands groups Minimise the risk of impacts to oiled wildlife and wildlife threatened by oil Minimise injuries to wildlife threatened or impacted by other operational activities associated with the response (e.g. containment and clean up, dispersant application, aviation) Provide achievable care for wildlife in line with best practices, to return as many rescued wildlife back to the wild	1	Not recommended Small volumes with little/no shoreline contact Very thin films of oil for very short period of time				
				2 (crude)	Recommend Accumulations at Cervantes forecast to be < 13.8 m^3 no impact at Abrolhos above the 100 g/m^2 threshold Concentration of surface crude predicted to be less than concentration of environmental significance (i.e. < 10 g/m^2).		Recommend Maximum accumulations are forecast to be 36.3 m^3 which is a low risk to marine fauna Concentration of surface crude predicted to be less than concentration of environmental significance (i.e. < 10 g/m^2).	Recommend Accumulations at these locations forecast to be < 27.5 m^3 Concentration of surface crude predicted to be less than concentration of environmental significance (i.e. < 10 g/m^2).	
				2 (diesel)	Consider Less likely to be required for these locations where accumulated volume <18m^3 at no contact at Abrolhos. Low accumulated volumes and low probability of contact with surface hydrocarbons > 10g/m^2.		Yes Surface hydrocarbons potentially > 10 g/m^2 therefore greater potential for oiled wildlife Predicted accumulated volumes at Dongara of 195 m^3.	Consider Less likely to be required for these locations where accumulated volume <18m^3 accumulated volumes and low probability of contact with surface hydrocarbons > 10g/m^2.	

7.5.1.4 Environmental performance

Environmental outcomes, performance standards and measurement criteria for the oil spill response strategies are provided in Section 2 of the OPEP.

7.5.1.5 ALARP

No single response option will provide maximum protection for every sensitive receptor during a spill. Each response will have advantages and disadvantages and will protect some resources at the cost of others. The NEBA process will identify and compare net environmental benefits of alternative spill response options. The NEBA will effectively determine whether an environmental benefit will be achieved through implementing a response strategy compared to undertaking no response. To expedite the NEBA process, a preliminary NEBA has been undertaken as part of this EP and predictive spill modelling undertaken to inform potential response strategies. In the event of a spill, an operational NEBA would be formalised within 6 hours of the spill notification to the IMT. This accounts for the IMT being activated and notifications to regulators being provided so that consultation can occur on the appropriate spill response options. It should be noted that source control and monitoring will be implemented prior to the NEBA being finalised as these will inform the potential strategies that can be adopted, as detailed in the OPEP.

Spill response arrangements are the subject of annual testing with corrective and improvement actions identified to ensure spill response arrangements are continually optimised.

The response options assessed above are considered to be ALARP for the following reasons:

Source control

Pipeline and topside spills

Pipeline and topside spills are controlled via remote shutdown on detection on low pressure. This is expected to occur automatically and therefore minimises the risk and volume potentially spilled. No other practicable control measures could be implemented to reduce this volume. The worst-case scenario assumed in this EP is that a slow release of crude from a corrosion hole in the pipeline is undetected until aerial surveillance (undertaken every 21 days by TEO) detects a sheen.

Aerial surveillance will occur every 21 days to detect surface sheen in the Operational Area. The cost of these regular helicopter flights was considered to be minimal compared to the potential benefits gained from reducing the amount of crude released to the marine environment in the event of a pipeline release which is undetected through the usual means e.g. low-pressure alarms.

To increase the frequency of helicopter flights over the pipeline area to detect leaks to more than once every 21 days is not considered practicable as the cost associated with additional helicopter flights for the sole purpose of leak detection would be disproportionately expensive to the environmental benefit gained. A flight undertaken for the sole purpose of spill detection is an additional cost of ~$30K a year and introduces additional safety risks of mobilising aircraft. The low number of sensitive receptors in the area, and the likely formation of waxy solids on the surface as a result of a pipeline leak, which would be below the thresholds for impact in the immediate vicinity of the pipeline, the additional costs and safety risks associated with increasing the number of flights is not considered ALARP.

Vessel Spills

In the case of a vessel spill, source control will consist of the implementation of the vessel SOPEP.

Another vessel could be made available throughout vessel-based activities to be on standby and provide additional support in the event of a loss of hydrocarbon event. However, given the low likelihood of a collision occurring leading to the loss of MDO from the fuel tank, the low likelihood of a vessel with a fuel tank of 500 m^3 (given most vessel tank sizes are ~20m^3), and low number of sensitive receptors potentially impacted given the evaporative nature of diesel, the additional financial and environmental costs of additional vessel presence outweighs the small benefits in reducing the likelihood of a spill occurring. Plus, another vessel in field may increase the probability of a vessel collision.

Therefore, the source control options to be implemented are considered ALARP.

Monitor and evaluate

Tracking buoys

TEO owns two tracking buoys, which will be used to provide monitoring and evaluation capabilities for TEO in the event of an oil spill.

Vessel

TEO has a vessel contracted to undertake general activities during operations and could utilise this in the event of an incident. However, it is possible that this vessel may be required for other activities such as deployment of spill response equipment and therefore could not be used as a dedicated visual surveillance vessel. When considering timeframes for implementation of vessel surveillance, a worst-case scenario is assumed that TEO's usual contracted vessel is not immediately available and another must be sourced from another contractor, allowing time for contracts to be established. It is noted that vessel surveillance can only be undertaken when the weather conditions are safe (wind < 6 knots, sea state <2 m swell) and within daylight hours. It is not considered ALARP to maintain another vessel on a standby contract for the purposes of visual surveillance, particularly given the low likelihood of a spill occurring, and the short distance to port from the Operational Area, allowing for relatively quick mobilisation times once a vessel is identified, and surveillance will also be conducted through a number of complementary strategies (aerial surveillance, OSTM).

Aerial

Aerial surveillance will provide an accurate overview of the potential trajectory of a spill. Additional monitoring could be undertaken by vessels; however, this would provide a less clear view of the spill compared to aerial surveillance and increases the likelihood of vessel based impacts such as collision with marine fauna.

TEO has a helicopter on standby for operations based at Dongara and can utilise this to undertake visual surveillance relatively quickly. The timeframe for response includes the mobilisation of crew and a local trained observer to undertake initial observations. It is noted that deployment of the helicopter will only occur during daylight hours but is considered the most appropriate resource for undertaking monitoring and evaluation of the spill on location in combination with OSTM. More rapid deployment may be feasible but is dependent on the availability of crew and personnel, and therefore a conservative time of 3 hours is assumed. Having another helicopter on standby to undertake aerial surveillance is not considered to provide any additional benefit due to the predicted size of the visible spill trajectory area being small and easily surveyed from one helicopter. Additionally, having more than one aircraft operating in the vicinity introduces additional health and safety risks that are considered disproportionate to the benefit gained. Given TEO has a helicopter on standby for ongoing operations, this is considered ALARP, and no further aerial surveillance resources will be on standby.

Oil Spill Trajectory Modelling (OSTM)

OSTM is implemented through AMOSC and utilises RPS to undertake the modelling. Predictive spill modelling has already been conducted for this EP, and therefore the properties of the potential hydrocarbons spilt are already provided, and the modelling would be initiated within 2 hours of spill notification. As the point source and location would be known, this would allow for accurate prediction of the hydrocarbons and timely deployment of resources. As predictive OSTM has already been conducted for the EP, this provides detailed information on the weathering, location and likely spill scenarios and therefore RPS would have this data to hand rapidly to enable modelling to be conducted within the defined timeframes. The needs of the OPEP are met through the use of OSTM and this response option is considered ALARP.

Offshore containment and recovery

Where the NEBA predicts environmental benefit, vessels, booms and recovery systems will be deployed to limit the extent of environmental harm of an oil spill. The inappropriate deployment of vessels and booms could lead to environmental harm if they damage habitats or pose risk to marine fauna through collision, presence or routine discharges (as discussed in Section 6 and 7). The NEBA will identify whether this strategy has potential to lead to environmental harm and will only be implemented if the environmental benefits of containing a spill exceeds this risk.

Diesel could be above the 10g/m^2 threshold in the immediate vicinity of the spill (around Dongara) within 1 hour but would not be expected to reach other receptors at this threshold, Leeman has a 5% probability of surface hydrocarbons being >10g/m^2 within 15 hours in winter. Crude is not predicted to be at thresholds above 10g/m^2 even in the immediate vicinity of a pipeline release, but containment and recovery may be effective.

Booms

The use of booms is unlikely to be effective on a spill of crude as surface hydrocarbons are not predicted to reach the thickness threshold of 10g/m^2 to ensure the effectiveness. Therefore, booms will likely be considered for diesel spills only. Absorbent booms could be utilised in the immediate vicinity of diesel spill to contain surface hydrocarbons, the spill modelling predicts that the diesel would be >10g/m^2 around Dongara (which includes waters 0-20m), and a lower probability of this threshold around Leeman. TEO has 48 m of boom stored in its warehouse facility in Dongara, ensuring appropriate equipment could be mobilised quickly. Timeframes for mobilisation allow for vessel availability to be confirmed, equipment to be loaded and the vessel to be deployed. The steaming time from Port Denison to CHA is 1 hour, however if a vessel is sourced from Geraldton, this could take up to 4 hours. 13 hours is therefore considered appropriate to deploy first strike resources as the vessel and equipment would not be deployed at night. IBC's and IBC funnels would also be mobilised with the boom to support containment and recovery strategies.

It is highly likely that the NEBA assessment would not consider mobilisation of booms and containment equipment given the rapid evaporation of diesel that occurs (~50% within several hours), and equipment would be mobilised to site within 13 hours, therefore the majority of the slick would have dispersed. It is not considered ALARP to have vessels with booms and IBC's on board in the event of a spill from another project vessel given the low likelihood of it occurring and the relative NEBA that would be conducted for a diesel spill. This would require mobilisation of another vessel to field, increasing the potential environmental impacts (light, noise, air emissions, operational discharges) and also increasing the likelihood of a vessel collision. The timeframe for mobilisation cannot be further reduced given the potential for the spill to occur at night.

The length of boom identified (48 m) would be sufficient to commence containment and recovery of hydrocarbons in the immediate vicinity of the spill as a first response. The length of boom is determined by the potential vessel availability in the port of Dongara to deploy the boom as a first strike response. Vessels available within short timeframes to TEO are those supplied by Harbour Services Australia as TEO have a standing contract with them for vessel hire. These vessels are

frequently used for general operations activities and it is considered likely that they would be available for deployment of the boom from the TEO facilities.

More boom could be purchased to have on standby at the TEO warehouse, but suitable additional vessels would be required to deploy the booms during first strike. As up to 3 vessels would be deployed for containment and recovery operations (1 for the sweep system or 2 for towing a boom system and one for econet deployment), resulting in up to 3 vessels in field during first strike response; further boom deployment would add to the number of vessels in field during first strike, increasing potential collision risk and impacts associated with vessels in the marine environment which would be grossly disproportionate due to the increase in risk from introducing more vessels to a relatively small area. Vessels required for additional boom deployment would need to be sourced from other contractors that TEO may not have a current working agreement with and the costs associated with setting up new contracts with other suppliers for such a low likelihood of an event occurring is not considered ALARP given the potential spill risks and impacts associated with the activity.

Given the likely extent of a hydrocarbon spill and behaviour of diesel (rapid evaporation) and crude (waxy tar balls), the booms may not be effective against the spills themselves. Containment and recovery is likely to be the econets only for a crude spill, and containment and recovery are unlikely to be used in a diesel spill. Therefore, it is not considered appropriate to purchase more boom to deploy at first strike given the low likelihood of effectiveness.

Additional boom can easily and quickly be acquired through NATPLAN and WESTPLAN MOP resources if required following this first strike response and would allow time for the booms to be tested for their effectiveness on the spill prior to acquiring more vessels and boom.

Containment Nets

Containment nets may be effective on Cliff head crude at sea given its behaviour and likelihood of forming solid wax balls or plates. These would float and could be retrieved via the use of nets which TEO has in its warehouse facility in Dongara. IBC's would also be mobilised for containment of recovered crude before sending to shore for disposal. As described above for boom deployment, the timeframes for deployment consider vessel sourcing and not being able to deploy overnight. Six econets are available at the TEO warehouse for the first strike response.

As the hydrocarbons released from a pipeline leak are not predicted to be above thresholds of 10g/m^2 it is unknown if the nets will be effective on the crude released, it is not therefore not considered beneficial to procure more for use offshore until they can be tested in a spill. Additionally, the vessels used to deploy the econets will be small vessels with limited space on the back deck, therefore it is likely that a vessel used to deploy econets would only be employed for that response option. With other vessels in the field undertaking containment and recovery activities, the addition of more vessels for econet deployment would be grossly disproportionate due to the increase in risk from introducing more vessels to a relatively small area. If the NEBA assessment determines that the nets are working, more can be procured from in short timeframes to continue for offshore containment and recovery.

Location of resources and time to respond

As the CHA is normally unmanned, it is not considered ALARP to have containment and recovery resources located on the platform. In the event of an incident, vessels would have to mobilise to the CHA platform to retrieve equipment prior to responding to the spill and potentially increasing the response time. Location of equipment on the vessel was also considered, but it is possible that the vessel on contract to TEO would be utilised for other tasks during a response, and a separate vessel sourced to deploy containment and recovery equipment.

Additional vessels may also be required for boom deployment (i.e. 1-2 vessels) and transfer of equipment from one vessel to another may pose additional risks and time constraints that are not

considered ALARP. The time to respond therefore considers the worst-case scenario of a spill notification close to darkness, and a vessel being sourced from Geraldton to deploy containment and recovery resources.

Therefore, the use of containment and recovery is considered ALARP.

Shoreline protection and deflection

As with containment and recovery above, where the NEBA predicts environmental benefit, booms will be deployed to protect the highest priority shoreline and near shore environmental sensitivities. The inappropriate deployment of booms could lead to environmental harm if they damage habitats or pose risk to marine fauna through collision, presence or routine discharges (as discussed in Section 6 and 7). The NEBA will identify whether this strategy has potential to lead to environmental harm and will only be implemented if the environmental benefits of containing a spill exceeds this risk.

Predictive spill modelling does not predict floating oil from a crude release will be above the threshold of 10g/m^2 at any receptor. However, over time shoreline accumulations could occur triggering shoreline clean-up response, therefore this strategy will be considered. Predictive modelling can provide an indication of the likely shorelines that may be contacted, however a timeframe for accumulation is not provided, therefore real time modelling will be required in the event of a release to confirm receptor locations.

Deployment of shoreline protection and deflection equipment will be resourced through industry arrangements (NatPlan, State Hazard Plan – Maritime Environmental Emergencies) to ensure appropriate resources are used. TEO has identified that vessels appropriate for shallow water use could be made available through Harbour Services Australia who are currently providers of support vessels to CHA operational activities. Equipment utilised through NatPlan resources would include near-shore containment boom or beach guard booms due to the potential for shoreline impact along the mainland coastlines and port. Having appropriate shallow water vessels on standby was considered too costly, given the low likelihood of a spill occurring, and to make the most of the vessel being immediately available, protection and deflection equipment would also need to be on standby.

Predictive modelling does not predict floating oil >10 g/m^2 for crude spills but does predict potential shoreline contact of floating oil for diesel around Dongara. As the Dongara receptor identified in spill modelling also encompasses water depths 0-20m, a diesel spill would immediately contact this receptor. However, it would likely be a number of hours before contact along shorelines. Modelling predicts a minimum time for surface diesel to be >10g/m^2 of 15 hours in winter. This indicates that it would take time for the diesel to increase in thickness. Booms for containment and recovery would be deployed within 13 hours of spill notification (if NEBA considered this an appropriate strategy), and monitoring would also be deployed within 3 hours (aerial), allowing for some containment and therefore protection of shorelines whilst other resources are mobilised, and shorelines are observed for contact. The receptors at immediate risk of contact from a diesel spill are those around Dongara which includes sandy beaches and Port Denison which are ranked as 4 (low ranking) in the preliminary NEBA and therefore of relatively low priority, further providing support to not having resources on standby. Given the evaporative nature of diesel, the most likely response to a diesel spill will be to monitor and evaluate only and allow for natural weathering to occur.

As indicated in the modelling, the surface oil of crude spills will not be at levels that could be effectively prevented from reaching shorelines using shoreline protection and deflection equipment. As the shoreline impacts will be from accumulated hydrocarbons, it is difficult to determine from predictive spill modelling if protection and deflection would be effective as the crude will not form a “slick” that can be prevented from reaching shorelines. In order to prevent accumulation along beaches, entire sections of coastline would have to be cordoned off which

would reduce access and prevent a hazard to other marine users. For the benefit gained (preventing accumulated volumes of 38 m^3 crude along 32 km of shoreline), it is considered likely that shoreline clean-up is a more appropriate methodology to undertake as the location and volume of hydrocarbons will have been identified. Also, containment and recovery booms will already be in field undertaking operations as part of the first strike response and potentially delaying the potential arrival at shorelines of hydrocarbons.

For diesel spills, vessels and equipment would be mobilised and deployed on location within 24 hours of incident notification. This provides adequate time to undertake NEBA with the results of operational monitoring. It is not considered ALARP to mobilise in less time as this would involve having protection and deflection resources on standby, including personnel available to deploy and monitor the protection and deflection equipment following an incident and the costs associated with this is grossly disproportionate to the benefit gained particularly given that for diesel spills the recommended strategy is to monitor and evaluate and it is considered acceptable to wait for the spill to evaporate and disperse rather than deploy equipment.

However, access to resources for protection and deflection is maintained through NatPlan and State Hazard Plan – Maritime Environmental Emergencies and following NEBA assessment, booms may be deployed using locally sourced vessels and equipment located in WA. TEO does not have this equipment on standby given there are no high priorities for protection at immediate risk of impact, providing sufficient time to mobilise resources to site as directed by the HMA. Therefore, the use of protection and deflection is considered ALARP.

Shoreline clean-up

Where the monitoring and evaluation determines shoreline contact, and the NEBA predicts environmental benefit, shoreline clean up strategies will be implemented for shoreline receptors that contact hydrocarbons ≥ 100 g/m^2. The OPEP describes how, in the event of a spill that could potentially require shoreline clean-up, the procedure would occur. Shoreline clean-up would likely require further vessels, aircraft and personnel. This will increase the physical presence and amounts of routine discharges (as discussed in Section 6), as well as the potential for non-planned events (as discussed in Section 7). The NEBA will identify whether this strategy has potential to lead to environmental harm and will only be implemented if the environmental benefits of cleaning up a spill exceeds this risk. Therefore, the use of shoreline clean-up is considered ALARP.

Several shorelines are predicted to be impacted by crude oil above the threshold of 100 g/m^2, therefore it is considered appropriate to mobilise clean-up teams immediately to these shorelines. The worst-case maximum accumulation of crude along a receptor shoreline is 36.3 m^3 (Dongara, summer), however the maximum length of shoreline that may receive oil is 15 km, also at Dongara. Therefore, it is possible that the oil may be spread along this shoreline in low concentrations and clean-up may not be feasible. It is likely that the shorelines contacted would be sandy beaches, and therefore shovels and bags may be appropriate for removal given the low volumes potentially expected.

In the event of a diesel spill, accumulations of hydrocarbons ≥100 g/m^2, are expected, with up to 195 m^3 (Dongara, winter) along the shoreline, and a worst-case prediction that accumulations would be along 32 km of shoreline. This indicates that the diesel would be spread out along the shoreline, although it is possible it will be concentrated in a smaller area. Therefore, shoreline assessment will be crucial to determining the appropriate spill response. Most diesel spills that contact shorelines would evaporate and weather rapidly and therefore no shoreline clean-up would be considered of environmental benefit, however it is maintained as a response option in the event it is requested by the control agency.

Shoreline clean-up teams would be on location within 24 hours of the shoreline assessment team (on location within 24 hours of spill notification to IMT). This allows for appropriate NEBA to be undertaken based on the shoreline assessment team results. It also allows for appropriate

planning for access to shorelines via sea or road, and procurement of resources. Mobilising teams prior to this could result in them being at the wrong location, or in a more remote area. DoT will establish a forward operating base in the event of spill and personnel will be managed from there, timeframes will therefore be dictated by the control agency.

Having resources on standby such as shovels, bags and gloves is not considered ALARP given the time it would take for shorelines to accumulate hydrocarbons and the accumulations could occur at any one of a number of different locations along the WA mainland. Given the ready availability of this type of shoreline clean up equipment in local hardware stores around Geraldton and Dongara, the equipment can be sourced quickly in the event of a spill. Access to the shorelines would also be relatively quick given the infrastructure in place (main roads along the coast) and port access close to the potential spill location ensuring access to shorelines with the right vessel type and track access. It is considered grossly disproportionate to purchase shoreline clean-up equipment without prior knowledge of how much will be required and where given the timelines of when the equipment would be required.

Scientific monitoring

Seabirds, marine mammals and marine turtles, in addition to sensitive habitats, would be monitored for contact or potential contact with oil once a NEBA has been completed. TEO has developed an Overarching Oil Spill Monitoring Plan (OOSMP) which details the OMPs and SMPs that may be required in the event of a significant spill event. In the event of a level 2 or 3 spill, water quality monitoring would be conducted immediately. TEO has a set of sampling jars for initial water samples to be taken in the immediate vicinity of the spill (from a vessel, or along shorelines). The location would be determined through consultation with specialists (e.g. BMT) to ensure appropriate locations are selected. Upon notification of an incident, third party providers will be notified. Some activities (e.g. RPS spill modelling, OMP-2) will commence as soon as relevant data is provided, otherwise the provider will be in 'standby' mode until the SMP is initiated (as per initiation criteria). This allows for the provider to commence planning and implementation and potential equipment procurement until the SMP is activated.

Once an SMP is activated by the IMT (based on OMP results), BMT Oceanica will be informed and personnel would be required to be in field monitoring within 24 hours. This allows for baseline data collection at spill sites within the area of potential impact that have not yet been impacted, collection of data from reference sites (outside of the area of potential impact) and collection of data at impacted sites. Having scientific monitoring providers on standby for the duration of ongoing operations is considered prohibitively expensive, given the low likelihood of a spill occurring, and the ubiquitous nature of the coastline in the area providing adequate reference sites of potential impacted sites in the vicinity of the spill area. The current implementation characteristics outlined in the OPEP are considered ALARP.

Oiled wildlife response

Given the nature and scale of the potential spill, it is unlikely that an oiled wildlife response would be required. However, if oiled wildlife are detected, the OPEP describes how, in the event of a spill that will or could potentially contact wildlife, the IMT will activate DBCA and Industry (AMOSC) Oiled Wildlife Advisors (OWAs) as stipulated in the WA Oiled Wildlife Response Plan (WAOWRP). As TEO is able to access a variety of oiled wildlife resources and equipment through this arrangement and there is a low likelihood of it being required, no further controls were considered for implementation to ensure readiness.

7.5.1.6 Residual risk

Due to the use of vessels for oil spill response, the following aspects are considered to occur and have already been discussed in other sections of this EP and are therefore not repeated here.

Aspect	Consequence	Likelihood	Residual risk	Section
Underwater noise	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)	6.1.1
Artificial light	Moderate (2) – Minor environmental impact, slight or negligible remedial/recovery work	B – very unlikely	Low (4)	6.1.2
Planned discharges	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)	6.2.1
Atmospheric emissions	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)	6.1.6
Shoreline clean-up	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)	7.5.1.2
Oiled wildlife response	Minor (1) – Negligible environmental impact, effect contained locally	B – very unlikely	Low (2)	7.5.1.2

7.5.1.7 Acceptability

Consequence	
The consequence of the underwater noise, artificial light, planned discharges and atmospheric emissions are discussed in Section 6. Shoreline clean-up has potential for additional impacts as described in Table 7-11, including to damage sensitive flora and fauna and disturb or displace marine fauna. Oiled wildlife response may also lead to displacement or behavioural disturbance of marine fauna. However, the consequence of not conducting these response strategies may result in greater consequences to these receptors (see Sections 7.3.3 and 7.4.1). The NEBA procedure will ensure that the benefits of this response strategy outweigh the potential consequences. No stakeholder concerns have been raised regarding this aspect.	
Likelihood	
As outlined in Section 6, the likelihood of impacts occurring due to noise, artificial light, planned discharges and atmospheric emissions are considered low. Given the implementation of the NEBA, the likelihood of possible impacts occurring due to shoreline clean up and oiled wildlife response exceeding potential impacts of not implementing these strategies is considered low.	
Acceptability of risk	**With the control measures in place, including compliance with industry standards and legislation, to prevent impacts occurring due to spill response strategies, the risk is considered acceptable.**

7.6 Recovery Plan and Threat Abatement Plan Assessment

An EP must not be inconsistent with a recovery plan or threat abatement plan for a listed threatened species or ecological community. This section describes the assessment that Triangle Energy has undertaken to demonstrate that operational activities are not inconsistent with any relevant recovery plans or threat abatement plans. For the purposes of this assessment, the relevant Part 13 statutory instruments (recovery plans and threat abatement plans are:

- Recovery Plan for Marine Turtles in Australia 2017–2027 (DoEE, 2017).
- Conservation Management Plan for the Blue Whale 2015–2025 (Commonwealth of Australia, 2015a).
- Recovery Plan for the Australian Sea Lion (*Neophoca cinerea*) (DSEWPAC, 2013b).
- Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) 2014 (DoE, 2014a).

- Sawfishes and River Sharks Multispecies Recovery Plan (DoE, 2015b).
- Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans 2018 (DoEE, 2018).

Table 7-15 lists the objectives and (where relevant) the action areas of these plans, and also describes whether these objectives/action areas are applicable to government, the Titleholder and/or the Cliff Head operations. For those objectives/action areas applicable to the Cliff Head operations, the relevant actions of each plan have been identified, and an evaluation has been conducted as to whether impacts and risks resulting from the activity are clearly inconsistent with that action or not. The results of this assessment against relevant actions are presented in Table 7-16 to Table 7-21.

Table 7-15: Applicability of Recovery Plans and Threat Abatement Plans for listed threatened species or ecological communities to Cliff Head Operations

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	Titleholder	Cliff Head Operations
Marine Turtle Recovery Plan			
Long-term Recovery Objective: Minimise anthropogenic threats to allow for the conservation status of marine turtles to improve so they can be removed from the EPBC Act threatened species list	Y	Y	Y
Interim Recovery Objectives			
Current levels of legal and management protection for marine turtle species are maintained or improved, both domestically and throughout the migratory range of Australia's marine turtles	Y		
The management of marine turtles is supported	Y		
Anthropogenic threats are demonstrably minimised	Y	Y	Y
Trends in nesting numbers at index beaches and population demographics at important foraging grounds are described	Y		
Action Areas			
A. Assessing and addressing threats			
A1. Maintain and improve efficacy of legal and management protection	Y		
A2. Adaptively manage turtle stocks to reduce risk and build resilience to climate change and variability	Y		
A3. Reduce the impacts of marine debris	Y	Y	Y
A4. Minimise chemical and terrestrial discharge	Y	Y	Y
A5. Address international take within and outside Australia's jurisdiction	Y		
A6. Reduce impacts from terrestrial predation	Y		
A7. Reduce international and domestic fisheries bycatch	Y		
A8. Minimise light pollution	Y	Y	Y
A9. Address the impacts of coastal development/infrastructure and dredging and trawling	Y	Y	
A10. Maintain and improve sustainable Indigenous management of marine turtles	Y		
B. Enabling and measuring recovery			
B1. Determine trends in index beaches	Y		
B2. Understand population demographics at key foraging grounds	Y		
B3. Address information gaps to better facilitate the recovery of marine turtle stocks	Y		
Blue Whale Conservation Management Plan			
Long-term recovery objective: Minimise anthropogenic threats to allow for their conservation status to improve so that they can be removed from the EPBC Act threatened species list	Y	Y	Y
Interim Recovery Objectives			
The conservation status of blue whale populations is assessed using efficient and robust methodology	Y		
The spatial and temporal distribution, identification of biologically important areas, and population structure of blue whales in Australian waters is described	Y	Y	Y
Current levels of legal and management protection for blue whales are maintained or improved and an appropriate adaptive management regime is in place	Y		
Anthropogenic threats are demonstrably minimised	Y	Y	Y

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	Titleholder	Cliff Head Operations
Action Areas			
A. Assessing and addressing threats			
A.1: Maintain and improve existing legal and management protection	Y		
A.2: Assessing and addressing anthropogenic noise	Y	Y	Y
A.3: Understanding impacts of climate variability and change	Y		
A.4: Minimising vessel collisions	Y	Y	Y
B. Enabling and Measuring Recovery			
B.1: Measuring and monitoring population recovery	Y		
B.2: Investigating population structure	Y		
B.3: Describing spatial and temporal distribution and defining biologically important habitat	Y	Y	Y
Australian Sea Lion Recovery Plan			
Overarching Objective			
To halt the decline and assist the recovery of the Australian sea lion throughout its range in Australian waters by increasing the total population size while maintaining the number and distribution of breeding colonies with a view to: • improving the population status leading to the future removal of the Australian sea lion from the threatened species list of the EPBC Act • ensuring that anthropogenic activities do not hinder recovery in the near future or impact on the conservation status of the species in the future	Y	Y	Y
Specific Objectives			
Mitigate interactions between fishing sectors (commercial, recreational and Indigenous) and the Australian sea lion to enable the recovery of all breeding colonies	Y		
Mitigate the impacts of marine debris on Australian sea lion populations	Y	Y	Y
Mitigate the impacts of aquaculture operations on Australian sea lion populations	Y		
Investigate and mitigate other potential threats to Australian sea lion populations, including disease, vessel strike, pollution and tourism	Y	Y	Y
Continue to develop and implement research and monitoring programs that provide outputs of direct relevance to the conservation of the Australian sea lion	Y		
Increase community involvement in, and awareness of, the recovery program	Y		
Grey Nurse Shark Recovery Plan			
Overarching Objective			
To assist the recovery of the grey nurse shark in the wild, throughout its range in Australian waters, with a view to: • improving the population status, leading to future removal of the grey nurse shark from the threatened species list of the EPBC Act • ensuring that anthropogenic activities do not hinder the recovery of the grey nurse shark in the near future, or impact on the conservation status of the species in the future	Y	Y	Y

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	Titleholder	Cliff Head Operations
Specific Objective			
Develop and apply quantitative monitoring of the population status (distribution and abundance) and potential recovery of the grey nurse shark in Australian waters	Y		
Quantify and reduce the impact of commercial fishing on the grey nurse shark through incidental (accidental and/or illegal) take, throughout its range	Y		
Quantify and reduce the impact of recreational fishing on the grey nurse shark through incidental (accidental and/or illegal) take, throughout its range	Y		
Where practicable, minimise the impact of shark control activities on the grey nurse shark	Y		
Investigate and manage the impact of ecotourism on the grey nurse shark	Y		
Manage the impact of aquarium collection on the grey nurse shark	Y		
Improve understanding of the threat of pollution and disease to the grey nurse shark	Y		
Continue to identify and protect habitat critical to the survival of the grey nurse shark and reduce the impact of threatening processes within these areas	Y	Y	
Continue to develop and implement research programs to support the conservation of the grey nurse shark	Y		
Promote community education and awareness in relation to grey nurse shark conservation and management	Y		
Sawfish and River Sharks Recovery Plan			
Primary Objective			
To assist the recovery of sawfish and river sharks in Australian waters with a view to: • improving the population status leading to the removal of the sawfish and river shark species from the threatened species list of the EPBC Act • ensuring that anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future	Y	Y	Y
Specific Objectives			
Reduce and, where possible, eliminate adverse impacts of commercial fishing on sawfish and river shark species	Y		
Reduce and, where possible, eliminate adverse impacts of recreational fishing on sawfish and river shark species	Y		
Reduce and, where possible, eliminate adverse impacts of Indigenous fishing on sawfish and river shark species	Y		
Reduce and, where possible, eliminate the impact of illegal, unregulated and unreported fishing on sawfish and river shark species	Y		
Reduce and, where possible, eliminate adverse impacts of habitat degradation and modification on sawfish and river shark species	Y	Y	Y
Reduce and, where possible, eliminate any adverse impacts of marine debris on sawfish and river shark species noting the linkages with the Threat Abatement Plan for the Impact of Marine Debris on Vertebrate Marine Life	Y	Y	Y
Reduce and, where possible, eliminate any adverse impacts of collection for public aquaria on sawfish and river shark species	Y		

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	Titleholder	Cliff Head Operations
Improve the information base to allow the development of a quantitative framework to assess the recovery of, and inform management options for, sawfish and river shark species	Y		
Develop research programs to assist conservation of sawfish and river shark species	Y		
Improve community understanding and awareness in relation to sawfish and river shark conservation and management	Y		
Marine Debris Threat Abatement Plan			
Objectives			
Contribute to long-term prevention of the incidence of marine debris	Y	Y	Y
Understand the scale of impacts from marine plastic and microplastic on key species, ecological communities and locations	Y	Y	
Remove existing marine debris	Y		
Monitor the quantities, origins, types and hazardous chemical contaminants of marine debris, and assess the effectiveness of management arrangements for reducing marine debris	Y		
Increase public understanding of the causes and impacts of harmful marine debris, including microplastic and hazardous chemical contaminants, to bring about behaviour change	Y		

Table 7-16: Assessment against relevant actions of the Marine Turtle Recovery Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation
Marine Turtle Recovery Plan	Action Area A3: Reduce the impacts from marine debris	Action: Support the implementation of the Marine Debris Threat Abatement Plan (TAP) Priority actions at stock level: G-NWS – understand the threat posed to this stock by marine debris LH-WA – determine the extent to which marine debris is impacting loggerhead turtles F-Pil and H-WA – no relevant actions	Refer Section 6.3.2 Not inconsistent assessment: The assessment of accidental release of waste and hazardous materials has considered the potential risks to marine turtles.
	Action Area A4: Minimise chemical and terrestrial discharge	Action: Ensure spill risk strategies and response programs adequately include management for marine turtles and their habitats, particularly in reference to 'slow to recover habitats', e.g. nesting habitat, seagrass meadows or coral reefs Priority actions at stock level: G-NWS – ensure that spill risk strategies and response programs include management for turtles and their habitats LH-WA, F-Pil – ensure that spill risk strategies and response programs include management for turtles and their habitats, particularly in reference to slow to recover habitats, e.g. seagrass meadows or corals H-WA – no relevant actions	Refer Sections 6.2.1, 6.3.1, 6.3.4, 7.3, 7.4, 7.5 and Appendix A. Not inconsistent assessment: The assessment of accidental release of chemicals / hydrocarbons has considered the potential risks to marine turtles. Spill risk strategies and response program include management measures for turtles and their nesting habitats.
		Action: Routine discharges from CHA and project vessels are managed such that marine turtles are not adversely affected by changes in water quality. Priority actions at stock level: G-NWS – as above LH-WA, F-Pil – as above H-WA – no relevant actions	Refer Section 6.2.1 and 6.3.1 Not inconsistent assessment: The assessment of routine discharges of chemicals, deck drainage, treated sewerage, putrescible wastes and grey water has considered the potential risks to marine turtles. Individuals transiting the localised area may come into contact with routine discharges, however these are sporadic and in small quantities, and are unlikely to pose a significant risk. Contaminated drainage water and waste oils produced during workover activities will not be discharged.

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation
	Action Area A8: Minimise light pollution	Action: Artificial light within or adjacent to habitat critical to the survival of marine turtles will be managed such that marine turtles are not displaced from these habitats Priority actions at stock level: G-NWS – as above LH-WA – no relevant actions F-Pil and H-WA – manage artificial light from onshore and offshore sources to ensure biologically important behaviours of nesting adults and emerging/dispersing hatchlings can continue	Refer 6.1.2. Not inconsistent assessment: The assessment of light emissions has considered the potential impacts to marine turtles. Internesting, mating, foraging or migrating turtles are not impacted by light from offshore vessels or platform. Vessel light emissions could cause localised and temporary behavioural disturbance to isolated transient individuals. There are no recognised nesting or internesting areas or Habitat Critical to the Survival of the Species within the EMBA.
	Action Area B3: Address information gaps to better facilitate the recovery of marine turtle stocks	Action: Understand the impacts of anthropogenic noise on marine turtle behaviour and biology Priority actions at stock level: G-NWS – given this is a relatively accessible stock that is likely to be exposed to anthropogenic noise – Investigate the impacts of anthropogenic noise on turtle behaviour and biology and extrapolate findings from the North West Shelf stock to other stocks LH-WA, F-Pil – no relevant actions H-WA – investigate mixed stock genetics at foraging grounds	Refer Section 6.1. Not inconsistent assessment: The assessment of acoustic emissions has considered the potential impacts to flatback and olive ridley turtles. Vessel and operational acoustic emissions could cause localised and short-term behavioural disturbance to isolated transient individuals, which is unlikely to result in displacement of adult turtles from internesting or nesting habitat critical to the survival of marine turtles.
Assessment Summary The Marine Turtle Recovery Plan has been considered during the assessment of impacts and risks, and the CHA operations are not considered to be inconsistent with the relevant actions of this plan.			

Table 7-17: Blue Whale Conservation Management Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation
Blue Whale Conservation Management Plan	Action Area A.2: Assessing and addressing anthropogenic noise	Action 2: Assessing the effect of anthropogenic noise on blue whale behaviour Action 3: Anthropogenic noise in biologically important areas will be managed such that any blue whale continues to use the area without injury, and is not displaced from a foraging area	Refer Section 6.1. Not inconsistent assessment: The assessment of acoustic emissions has considered the potential impacts to pygmy blue whales.
	Action Area A.4: Minimising vessel collisions	Action 3: Ensure the risk of vessel strikes on blue whales is considered when assessing actions that increase vessel traffic in areas where blue whales occur and, if required, appropriate mitigation measures are implemented	Refer Section 7.2 Not inconsistent assessment: The assessment of vessel collision with marine fauna has considered the potential risks to pygmy blue whales. The Operational Area does not overlap with the migration BIA however it is recognised that individuals may be present occasionally. Individuals may deviate slightly from migratory route, but will continue on their migration to possible breeding grounds in Indonesian waters. Vessel collisions with pygmy blue whales are highly unlikely to occur, given the very slow vessel speeds and temporary nature of vessel based activities. Helicopter transfers are short term
	Action Area B.3: Describing spatial and temporal distribution and defining biologically important habitat	Action 2: Identify migratory pathways between breeding and feeding grounds Action 3: Assess timing and residency within Biologically Important Areas	Not inconsistent assessment: In the event of a spill, operational and scientific monitoring plans will be implemented by TEO to monitor marine mammals, in addition to sensitive habitats for contact or potential contact with oil as relevant. This allows for baseline data collection at spill sites within the area of potential impact that have not yet been impacted, collection of data from reference sites (outside of the area of potential impact) and collection of data at impacted sites.
Assessment Summary The Blue Whale Conservation Management Plan has been considered during the assessment of impacts and risks, and CHA operations are not considered to be inconsistent with the relevant actions of this plan.			

Table 7-18: Assessment against relevant actions of the Australian Sea Lion Recovery Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation
Australian Sea Lion Recovery Plan	Investigate and mitigate other potential threats to Australian sea lion populations, including disease, vessel strike, pollution and tourism	Improve the understanding of—and where necessary mitigate—the threat posed to Australian sea lion populations by illegal killings, vessel strike, pollution and oil spills	Refer Sections 6.2.1, 6.3.1, 6.3.4, 7.3, 7.4, 7.5 7.2 Not inconsistent assessment: The species was identified to potentially occur within the EMBA and therefore the assessment of accidental release of hydrocarbons has considered the potential risks to Australian sea lions. In the event of a spill, operational and scientific monitoring plans will be implemented by TEO to monitor marine mammals, in addition to sensitive habitats for contact or potential contact with oil as relevant. This allows for baseline data collection at spill sites within the area of potential impact that have not yet been impacted, collection of data from reference sites (outside of the area of potential impact) and collection of data at impacted sites.
Assessment Summary The Australian Sea Lion Recovery Plan has been considered during the assessment of impacts and risks, and CHA operations are not considered to be inconsistent with the relevant actions of this plan.			

Table 7-19: Table Assessment against relevant actions of the Grey Nurse Shark Recovery Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation
Grey Nurse Shark Recovery Plan	Improve understanding of the threat of pollution and disease to the grey nurse shark	Review and assess the potential threat of introduced species, pathogens and pollutants	Refer Section 6.3.2 Not inconsistent assessment: The assessment of accidental release of waste and hazardous materials has considered the potential risks to grey nurse sharks.
			Refer Sections 6.3.1, 6.3.4, 7.3, 7.4, 7.5. Not inconsistent assessment: The species was identified to potentially occur within the EMBA and therefore the assessment of accidental release of hydrocarbons has considered the potential risks to grey nurse sharks.
Assessment Summary The Grey Nurse Shark Recovery Plan has been considered during the assessment of impacts and risks, and CHA operations are not considered to be inconsistent with the relevant actions of this plan.			

Table 7-20: Table Assessment against relevant actions of Sawfish and River Shark Recovery Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation
Sawfish and River Shark Recovery Plan	Reduce and, where possible, eliminate adverse impacts of habitat degradation and modification on sawfish and river shark species	Identify risks to important sawfish and river shark habitat and measures needed to reduce those risks	Refer 6.3.1, 6.3.4, 7.3, 7.4, 7.5 Not inconsistent assessment: The species was identified to potentially occur within the EMBA and therefore the assessment of accidental release of hydrocarbons has considered the potential risks to sawfish and river shark.
	Reduce and, where possible, eliminate any adverse impacts of marine debris on sawfish and river shark species	Assess the impacts of marine debris including ghost nets, fishing gear and plastics on sawfish and river shark species	Refer 6.3.2 Not inconsistent assessment: The assessment of accidental release of waste and hazardous materials has considered the potential risks to sawfish and river sharks.
Assessment Summary The Sawfish and River Shark Recovery Plan has been considered during the assessment of impacts and risks, and CHA operations are not considered to be inconsistent with the relevant actions of this plan.			

Table 7-21: Assessment against relevant Marine Debris Threat Abatement Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation
Marine Debris TAP	Objective 1: Contribute to long-term prevention of marine debris.	Action 1.02: Limit the amount of single use plastic material lost to the environment in Australia.	Refer Section 6.3.2 Not inconsistent assessment: The assessment of accidental release of waste and hazardous materials has considered the potential risks to vertebrate wildlife.
Assessment Summary The Marine Debris TAP has been considered during the assessment of impacts and risks, and CHA operations are not considered to be inconsistent with the relevant actions of this plan.			

8 Implementation strategy

Regulation 14 of the Environment Regulations requires an EP to contain an implementation strategy for the activity. This section describes the implementation strategy for the EP, specifically detailing the measures to ensure that the environmental performance outcomes and standards are achieved.

The implementation strategy identifies:

- Systems, practices and procedures,
- Organisational structure and specific roles and responsibilities,
- Employee inductions and training,
- Communication and consultation,
- Emergency response planning,
- Decommissioning planning,
- Monitoring,
- Auditing, review, management of non-conformance and recording requirements,
- Management of change.

This strategy is intended to ensure that:

- All environmental risks and impacts associated with Cliff Head oil field operations activities are identified and reduced to a level that is acceptable and ALARP,
- Environmental performance outcomes and environmental performance standards are being met,
- Arrangements are in place to respond to, and monitor the impacts of hydrocarbon spills,
- Stakeholder consultation is maintained as required in accordance with the objectives of the OPGGS(E) Regulations and regulatory guidance material.

TEO as the Operator of the Cliff Head oil field has implemented an Integrated Management System (IMS). The IMS aspects relevant to ensuring that the implementation strategy is appropriately implemented, such as the roles and responsibilities of personnel, record keeping, continual improvement, emergency response and auditing are addressed in the HSE Management System Description (10HSEQGENPOL3544).

8.1 Environmental management framework

8.1.1 HSE management system

Triangle Energy (Operations) Pty Ltd has an established Health, Safety & Environment Policy Statement for all its operations.

For Cliff Head, TEO realises this policy by implementing a tiered management system which includes:

- Manuals
- Standards
- Plans and Procedures.

TEO has a clear interest in the environmentally sustainable development of the operation and have had input into the IMS where required to ensure that activities are managed in such a way to reduce the risk of negative impacts to the environment to ALARP.

A description of the HSEMS elements and the location of details of their implementation within this EP is outlined in Table 8-1 below.

Table 8-1: Description of HSEMS elements and location within this EP

Environmental policy	HSE Commitment Statement and Environment Policy	Section 1
Planning	Environmental aspects associated with activities have been identified and potential impacts assessed and evaluated	Section 6 and 7
	Control measures, including performance standards and measurement criteria, to reduce impacts and risk have been identified	Section 6 and 7
	Legislation relevant to the survey has been identified	Section 3
	Consultation conducted, and arrangements for ongoing consultation in place, with relevant stakeholders.	Section 10
Implementation and Operation	Roles and responsibility to ensure compliance with environmental commitments have been outlined	Section 8.2
	Competence and training requirements have been identified	Section 8.3
	Information to be monitored and recorded during activities identified	Section 9
	Emergency preparedness and response arrangements (including OPEP) have are identified	Section 8.5 and the accompanying *Cliff Head Oil Pollution Emergency Plan*
Checking	TEO undertakes scheduled audit/s of the activity to ensure: • Opportunities for improvement and suggested remedial actions are provided • Non-conformances are effectively acted upon and closed out • Relevant control measures are in place • Environmental commitments, detailed in this environmental plan, are used as the basis to the audit.	Sections 8.8
	Arrangements detailed in Emergency Response plans will be tested at intervals commensurate with the nature and scale of the activity	Section 8.5 and *Cliff Head Oil Pollution Emergency Plan*
Management review	Annual Environmental Reports will review of achievement of the environmental performance outcomes for the survey to determine if they have been met.	Section 9
	Any identified actions and lessons learnt will be included in the environmental management of the on-going operational activities, in addition to discrete workover or IMR activities, as soon as practicable via a Management of Change.	Section 8.9

8.2 Roles and responsibilities

The organisation structure during general operations is provided in Figure 8.1 below.

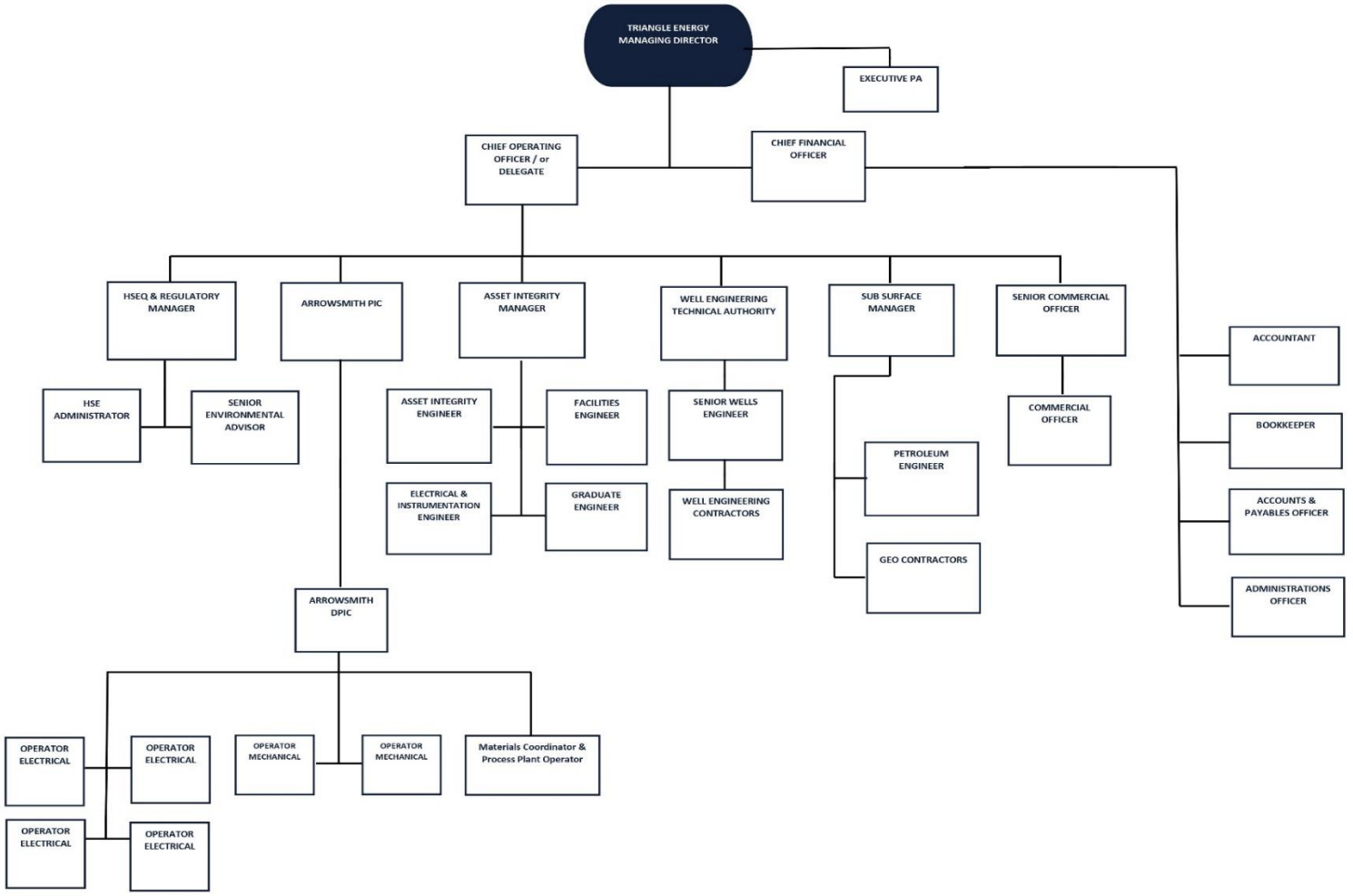


Figure 8.1: Organisation Chart for Cliff Head Operations

The main responsibilities of the principal personnel for general operations are outlined in Table 8-2 below.

8.2.1 General operations

The members of the Operations Team, including subcontractor personnel, shall be required to assist in all matters related to the preservation and protection of the environment. Personnel, including those seconded from subcontractor organisations, are responsible for ensuring they only perform work for which they have been trained and comply with the requirements of statutory environmental legislation. Environmental performance in line with this EP is the responsibility of everyone involved in the operation (site and office based), as such their position description describes their responsibilities. Through training and awareness sessions, HSE meetings, participation in operation HSE assessments, exercise and drills, continued awareness of responsibility is maintained. Chain of command and reporting is provided in organisation charts displayed in TEO documents and this EP. Training and competency effectiveness is managed by competency based training and assessment style training with tests and regular refreshment of knowledge.

The Operations Team will ensure that TEO is kept informed of all matters in a manner that will permit them to comply with their obligations for statutory reporting.

A system is in place that ensures that all contractors perform work in a healthy, safe and environmentally sound manner and compatible with TEO policies and objectives. All major contractors involved with the Cliff Head Facilities will be assessed according to the Contractor HSE Evaluation procedure (10HSEQGENPC15). An approved contractor register has been developed for the Cliff Head Facilities (10HSEQGENPC15RG01) and will be maintained throughout the life of the operation.

Work crews will all have full inductions and will be required to work under the IMS while they are on the Cliff Head platform. The contractor will also be required to provide the necessary procedures, which outlines the work they will be performing on the Cliff Head platform.

Table 8-2: Key Roles and Responsibilities

Position	Reports to	Responsibilities
Chief Operating Officer / or delegate	TEO Managing Director	The Chief Operating Officer / or delegate has ultimate authority and accountability for implementing the TEO policies and systems for the Cliff Head asset, and for consequently ensuring that adequate resources are made available to the Cliff Head Operations Department to achieved Environmental Performance Objective (EPO) and Environmental Performance Standards (EPS) outlined in this environment plan. The key environmental responsibilities include: • Accountable to the compliance of approved environment plan and all other referenced and supporting plans. • Provide adequate resources to meet EPO & EPS outlined in this environment plan. • Accountable to the implementation of the TEO policies and systems. • Attend HSE meetings as required and provide HSE leadership. • Review HSE related Incidents and reporting of reportable and recordable incidents to the Regulator. • Incident Management Team Leader.

Position	Reports to	Responsibilities
		• Accountable for planning for decommissioning and/or re-purposing of the facilities.
TEO Asset & Integrity Manager	Chief Operating Officer / or delegate	Reporting to the Chief Operating Officer / or delegate, the TEO Asset and Integrity Manager has the responsibility to implement this environment plan and all other supporting plans. The key environmental responsibilities include: • Responsible for the compliance of approved environment plan and all other referenced and supporting plans. • Manage resources within the Cliff Head Operations to meet EPO & EPS outlined in this environment plan. • Responsible to manage resources to implement the TEO policies and systems. • Attend HSE meetings as required and provide HSE leadership. • Incident Management Team Second in Command (2IC) and Alternate IMTL.
HSE Advisors	Chief Operating Officer / or delegate	Responsible for: • Developing operations Safety and Environmental documentation for government approval and implementation. • Performance monitoring, audit and review of project health, safety and environmental compliance and performance. • Providing awareness and education of HSE standards, regulations, risks and initiatives. • Supporting preventative and corrective action implementation. • Collating Incident and Hazard reports. • HSE Objectives management and monitoring which include measurement / audit of EP related commitments. • Member of the integrated management team (IMT). • Auditing of the integrated management system (IMS) and management system standards (MSS) against the commitments and statutory requirements. • Auditing of compliance with Offshore EP commitments. • Ensuring MoC procedure followed. • Review of all Environmental Incidents. • Ensure recording of environmental incidents in MYOSH. • Annual environmental reporting. • Maintaining Stakeholder Engagement Register.

Position	Reports to	Responsibilities
TEO Designated Person In Charge (PIC)	Chief Operating Officer / or delegate	The Designated Person In Charge (PIC) is responsible for: • Establishing and maintaining safety, health and environmental performance that meets or exceeds statutory and TEO standards and requirements. • Reviewing the competency of Cliff Head facility personnel and developing and implementing appropriate Competency Based Training Assessment (CBTA) modules. • Ensuring that all incidents and near misses at the facilities are reported in accordance with procedures. • Acting as the Tactical Response Team Leader (refer to OPEP) in the event of an emergency. • Ensuring that the facility both onshore and offshore is operated safely, with minimal environmental impact and in compliance with this EP, legislation, the facility Safety Case and the IMS. • Selection and recruitment of suitable skilled personnel and appraising and develop their competencies. • Ensuring that safety meetings, toolbox meetings, JSEAs, local audits and emergency exercises are conducted as required by standards and procedures. • Liaison with local landowners and regulatory authorities. • Maintaining the Permit to Work System.
Vessel Master	TEO Designated PIC	• Implements and ensure adherence all relevant environmental legislative requirements (including maintaining a look out for cetaceans), commitments, conditions and procedures on-board the vessel. • Adheres to the requirements of EPBC Regulations 2000 – Part 8 Division 8.1 (interacting with cetaceans). • Complies with the provisions of MARPOL, SOLAS and STWC conventions and relevant marine orders. • Reports marine pollution incidents to AMSA. • Maintains clear communication with the crew. • Communicates hazards and risks to the workforce and their implications and the importance of following good working practices. • Maintains vessel in state of preparedness for emergency response. • Reports any incidents to the PIC and ensures that follow-up actions are carried out. • Applies appropriate enforcement mechanisms to prevent breaches of the Environment Plan.

Position	Reports to	Responsibilities
Personnel & Subcontractors	Chief Operating Officer / or delegate TEO Designated PIC	All personnel, including subcontractors, are responsible for the environment, in so far as they have some control, either direct or indirectly. Each person will: • Keep the workplace in a clean and tidy condition. • Immediately report all environmental incidents/accidents, or other environmental concern in the workplace. • Only perform work for which they have been trained. • Comply with the requirements of statutory safety legislation. • Participate in environmental meetings and awareness training. • Comply with, and adhere to this EP, Safety Case and according to instructions, procedures and regulations. • Subcontractors must understand and work according to TEO IMS.
Helicopter Contractor	Chief Operating Officer / or delegate TEO Designated PIC	• Implements and ensure adherence all relevant environmental legislative requirements (including cetacean monitoring), commitments, conditions during flights. • Adheres to the Australian National Guidelines for Whale & Dolphin Watching & relevant Proximity Distances. • Reports any incidents to the PIC and ensures that follow-up actions are carried out.
ROV/Diving Team	Chief Operating Officer / or delegate TEO Designated PIC	Responsibilities include: • Undertake assessment of water jetting pressure. • Conduct pre- and post-dive inspections for hydraulic leaks (when using hydraulic ROVs). • Visual inspections and maintenance activities.

8.2.2 Non Production Phase and Decommissioning

As the Cliff Head field transitions from the current Production phase, to the Non Production Phase (NPP) and through to final Decommissioning, TEO will review the organisational structure and appropriate roles and responsibilities, to manage the continued protection of the environment and compliance with statutory environmental legislation.

Leading up to NPP and decommissioning planning, TEO will appoint a Manager to oversee Decommissioning Planning as outlined in Section 8.6.2. This role will be appointed by Q3 2023.

8.3 Training and competencies

As required by Regulation 14(5), this section of the implementation strategy includes measures that ensure all personnel associated with operating the Cliff Head oil field operations are aware of their EP related responsibilities, and that all relevant personnel have appropriate competencies and training.

All staff engaged to work on the Cliff Head Facilities are inducted into the TEO HSEMS on employment. This process includes specific instruction on the TEO HSE Policy (Section 1.8) and the responsibilities of staff under the HSE Policy. Staff are, therefore, aware of their general obligation to operate within the expectations of the HSEMS, to promote the understanding of HSEMS; and to reinforce awareness of the commitments made in relation to protection of the environment. An induction program has been established to provide an overview of the HSEMS objectives. These induction programs include the Cliff Head Alpha CBTA (TEO) and Site based induction/ pre-briefing prior to commencement of work on site. All personnel working on CHA and/or pipeline will receive an induction, including environmental management, prior to commencement of their duties on site to ensure understanding of their responsibilities in conforming to performance standards set out in the EP. The objectives of the induction are:

- To provide background information on the environmental sensitivities
- To provide an overview of the hazards and associated controls implemented to manage environmental risks and impacts, including controls for which inductees are responsible for
- To raise environmental awareness of the roles and responsibilities of all personnel, including incident reporting (reportable and recordable incidents)
- To achieve the environmental objectives described in the Environment Plan
- To meet applicable legislative requirements in relation to environmental training and awareness.

In addition, significant issues addressed in the CHA induction / training program will include:

- JHA
- Protection of significant fauna and flora
- Housekeeping and waste management
- Hazardous materials handling
- Spill prevention and response
- Emergency response
- Environment incident reporting and recording matrix including reporting requirements for whales, dolphins and turtles
- Other relevant site-specific management practices and environmental obligations.

Effective mechanisms that promote involvement and communication of all personnel in the management of environmental hazards and risks will be implemented throughout the project. This will include:

- Hazard Identification (HAZID) and Hazard and Operability Study (HAZOP) studies
- Pre-job planning (toolbox talks and job hazard analysis)
- Incident reporting, investigation and communication of findings
- Change requests
- Issuing of HSE Bulletins/alerts
- Use of notice boards.
- Competency based training assessments
- HSEQ Inductions.

Copies of the Health Safety & Environment Policy Statement will be displayed at prominent locations at the work sites (e.g. notice boards, meeting rooms, offices). The HSE Policy shall be explained to each new employee and subcontractor by his or her line supervisor and attached to his or her detailed job description.

8.3.1 Contractors

Contractors, subcontractors and third parties working on Cliff Head must meet and follow the requirements set out in Contractor and Third Party Management Plan (10HSEQGENPL17) when engaged by TEO for any contracted works on the Cliff Head operation.

Specifically, where TEO is intending to retain a contractor who provides a major service and who will manage and supervise that service delivery in accordance with their own detailed HSE management system (Primary Contractor) then a number of measures are implemented to ensure environmental performance. TEO's contractor selection process will comprise of the following steps:

- Evaluation of tender: evaluate and rank the tenderers against the award criteria including environmental criteria using the completed HSEQ Evaluation Questionnaire
- Contractor classifications depending on level of HSE MS interaction
- HSEQ pre-qualification: to identify compliance to facility legal requirements
- Contract HSE Section: contain TEO's environmental requirements.

Prior to entering into any service contract, TEO initially reviews the policy(s) and management system of the potential contractor to ensure that:

- They operate to environmental standards acceptable to TEO.
- They implement a comprehensive system of managing their HSE performance during operations.
- They have performed similar work recently and can demonstrate appropriate HSE performance standards.
- They are aware of, have access to, the commitments described in this EP.

Contractual terms are then established that bind the Primary Contractor to perform at the HSE standards agreed and use the HSE management system consistent with that described in this EP.

The arrangements for implementing the management system are then reviewed to ensure there is an effective system to manage environmental performance.

The Cliff Head Marine Operations Procedure (10OPGOPC04) outlines the requirements and standards applicable to marine vessels contracted to support the offshore activities of the Cliff Head project. It includes the requirements for compliance with standards and legislation such as MARPOL, COLREGS, Marine Orders, Dangerous Goods code, EPBC Regulations (Part 8) and biosecurity and what is expected of each vessel class. Specific to the Cliff Head activity, it also includes items such as:

- Restrictions on operating conditions e.g. vessel speeds, weather limits, transit routes
- EPBC Regulations (Part 8) requirements: minimum distances from cetaceans, vessel speeds, sighting reporting
- Vessel emissions and discharges: Provides summary of restrictions on discharges (e.g. waste)
- Vessel spill prevention: drainage from machinery spaces to bilge system
- Material shipment/transport: waste storage and transport, SDS requirements, IMS
- Spill response capability: hydrocarbon storage, spill response kits, implemented and tested SOPEP or equivalent
- Materials Lifting and dropped objects: lifting certifications, JHA and PTW, dropped object analysis
- Biosecurity – assessment and ongoing compliance with IMS procedure
- Seabed disturbance: anchoring in an emergency
- Communications: radio and watch

- Training: personnel trained in accordance with training matrix.

The monitoring, audit and review arrangements as described in Sections 8.6 and 8.3 ensures that TEO remains confident that the Primary Contractor fully implements the program at the appropriate standard. The procedure forms part of the contractual agreement with vessel operators to ensure compliance with applicable legislation, standards and the EP.

Where contractors or third party documentation does not demonstrate compliance or standards submitted are considered deficient and do not meet the requirements set out in the TEO Management System, TEO's standards will apply. These are to be identified to the contractor and discussed pre-contract.

Contractors and third parties may be required to submit a Health, Safety, Environment and Quality Management Plan for their scope of work at the discretion of the TEO Asset Manager Production & Development WA.

Each contract shall contain requirements that guide the contractor in how to approach the HSE aspects of the work. It will also provide the Cliff Head contract owner with a set of standards to use in order to manage the contractor from an HSE perspective. These include:

- HSE Minimum Requirements schedule.
- Specific Asset Integrity Management (AIM) requirements driven by the Cliff Head AIM plan.
- Additional specific HSE requirements relevant to the Scope of Work or specific HSE risks identified in the work scope.
- Where appropriate, specific HSE management improvements required of the contractor, identified during the pre-qualification process, together with defined dates by which the improvements must be completed.

With these procedures in place, TEO can be assured that the requirements of the EP are met as a minimum.

8.4 Communication and consultation

8.4.1 Employee Communication and Participation

Effective mechanisms that promote involvement and communication of all personnel in the management of environmental hazards and risks will be implemented throughout the activities. This will include:

- HAZID (safety/environment) and HAZOP studies
- Pre-job planning (toolbox talks and job hazard analysis)
- Incident reporting, investigation and communication of findings
- Change requests
- Issuing of HSE Bulletins/alerts
- Use of notice boards.
- CBTAs
- HSEQ Inductions.

The PIC and Workover Superintendent will be responsible for keeping the workforce informed about environmental matters and act as a focal point for personnel to raise environmental issues. Daily pre-start meetings held during activities cover any relevant HSE matters and HSE meetings are held frequently during activities to ensure the workforce is informed about relevant HSE issues. These meetings are outlined in the Contractor and Third Party Management Plan (10HSEQGENPL17) to ensure contractors are aware of their HSE responsibilities.

8.5 Emergency response procedures

An Emergency Management Plan (EMP) (10HSEQGENPL01) together with the Cliff Head OPEP (10HSEQENVPL15) have been developed for the protection of personnel, contractors, community, environment, TEO assets and the public perception of the company.

TEO will implement the OPEP in the event of a significant hydrocarbon spill (Level 2). To maintain a state of oil spill preparedness, personnel with OPEP responsibilities will be made aware of their obligations, oil spill response equipment will be maintained, contracts with critical equipment and personnel suppliers will be managed, and agreements will be in place with national regulatory agencies for support in oil spill response. TEO will also implement its oil spill response exercise and training schedule, Table 8-3 details the key OPGGS (E) Regulations applicable to the OPEP and how they are fulfilled. Further information on oil spill response is provided in the OPEP.

Table 8-3 : Key OPEP OPGGS (E) Regulations

Regulation	Requirement	Addressed
14 (8)	The implementation strategy must contain an oil pollution emergency plan and provide for the updating of the plan.	The accompanying Cliff Head OPEP fulfils this regulation, Section 13.2 specifically provides information regarding updating the OPEP
14 (8AA)	The oil pollution emergency plan must include adequate arrangements for responding to and monitoring oil pollution, including the following: a) The control measures necessary for timely response to an emergency that results or may result I oil pollution b) The arrangements and capability that will be in place, for the duration of the activity, to ensure timely implementation of control measures, inducing arrangements for ongoing maintenance of response capability c) The arrangements and capability that will be in place for monitoring the effectiveness if the control measures and ensuring that the environmental performance standards for the control measures are met d) The arrangements and capability in place for monitoring oil pollution to inform response activities	Section 10 of the OPEP details oil spill response arrangements. The OPEP has been specifically developed for the activity and will be reviewed as necessary if new information comes to light or changes are made to the activity/environmental risks posed (Section 13).
14(8A)	The implementation strategy must include arrangements for testing the response arrangements in the oil pollution emergency plan that are appropriate to the response arrangements and to the nature and scale of the risk of pollution for the activity	Section 13 of the OPEP states that the plan will be tested once this latest amendment is approved. The testing program meets the requirement to test not later than 12 months after the most recent test. TEO does not intend to add a new location or facility to the EP therefore no further testing would be required. Section 13 of the OPEP requires that the OPEP will be reviewed in the event of any significant change to the activity (i.e. which introduced a new significant environmental risk) and re-tested if necessary.

Regulation	Requirement	Addressed
14(8B)	The arrangements for testing the response arrangements must include: a) A statement of the objectives of testing b) A proposed schedule of tests c) Mechanisms to examine the effectiveness of response arrangements against the objectives of testing d) Mechanisms to address recommendations arising from tests	Testing arrangements are provided in Section 13 of the OPEP
14(8C)	The proposed schedule of tests must provide for the following: a) Testing the response arrangements when they are introduced b) Testing the response arrangements when they are significantly amended c) Testing the response arrangements not later than 12 months after the most recent test d) If a new location for the activity is added to the environment plan after the response arrangements have been tested and before the next test is conducted – testing the response arrangements in relation to the new location as soon as practicable after it is added to the plan e) If a facility becomes operational after the response arrangements have been tested and before the next test is conducted – testing the response arrangements in relation to the facility when it becomes operational	Testing arrangements are provided in Section 13 of the OPEP
14 (8D)	The implementation strategy must provide for monitoring of impacts to the environment from oil pollution and response activities that: a) is appropriate to the nature and scale of the risk of environmental impacts for the activity; and b) is sufficient to inform any remediation activities.	Section 4 of the OPEP details the Operational and Scientific Monitoring Plan (OSMP) that would be implemented in the event of a spill to monitor impacts to the environment.
14 8(E)	The implementation strategy must include information demonstrating that the response arrangements in the oil pollution emergency plan are consistent with the national system for oil pollution preparedness and response.	Section 8.6 of the OPEP details how the OPEP integrates with national, state and industry plans.
26	Oral or written notification of a reportable incident must be given to the Regulator (NOPSEMA) as soon as practicable, but not later than 2 hours after the first occurrence of the incident, or after the time the operator becomes aware of the incident. The notification must contain: • All material facts and circumstances concerning the incident, that is known, or is able to find out;	Section 9 of the EP defines the reporting requirements of reportable and recordable incidents as well as routine reporting. Section 1.4 of the OPEP defines the reporting requirements.

Regulation	Requirement	Addressed
	• Details of any action taken to avoid or mitigate any adverse environmental impacts from the incident; and • Details of the corrective action that has been taken, or is proposed, to prevent a similar reportable incident.	
26A	A written report of a reportable incident must be given to the Regulator (NOPSEMA) as soon as practicable, but not later than 3 days after the first occurrence of the incident, or after the time the operator becomes aware of the incident. The notification must contain: • All material facts and circumstances concerning the incident, that is known, or is able to find out; • Details of any action taken to avoid or mitigate any adverse environmental impacts from the incident; and • Details of the corrective action that has been taken, or is proposed, to prevent a similar reportable incident.	Section 9 of the EP defines the notification requirements for reportable incidents. Section 1.4 of the OPEP defines the reporting requirements.

The OPEP defines how the Perth based Incident Management Team (IMT) will support the site based Tactical Response Team (TRT) in responding to an emergency situation either at the ASP facility or on the CHA platform to minimise impact on the environment and to ensure the safety of company personnel and the integrity of the facilities. The Chief Operating Officer / or delegate is the IMT Team Leader and is supported by other roles as described in Section 8.2. The OPEP will be regularly tested through the use of annual desktop and simulated exercises and quarterly tests on specific OPEP components.

Emergency Shutdown Systems (ESS) (10OPPSPC17) have been developed, the purpose of which are to:

- Monitor and automatically detect abnormal operational and equipment conditions;
- Alert the Control Room operator to excursions from pre-determined operational parameters;
- Provide executive actions that control and reduce the consequence of a process incident or equipment hazard;
- Reduce the probability of ignition or explosion by isolating ignition sources in the event of a hydrocarbon release, and
- Automatically manage the process control to a safe state.

The ESS also includes details of the fire and gas detection systems for both CHA and ASP.

8.6 Decommissioning Framework

As outlined in Section 2.6, Cliff Head offshore operations are expected to transition to the Non-Production Phase (NPP) within the five year period covered by this EP. Cessation of production is currently forecast for mid-2025 (based on best estimate 2P Reserves position). TEO have therefore commenced planning for non-production and subsequent decommissioning of all infrastructure on title.

Decommissioning is part of the asset lifecycle for an offshore petroleum project and involves the timely, safe and environmentally responsible removal of, or otherwise satisfactorily dealing with, infrastructure that was previously used to support oil and gas operations. As the Cliff Head facilities approach end of field life, TEO is maturing plans for decommissioning in accordance with

requirements under the OPGGS Act and EPBC Act Approval Conditions (EPBC 2003/1300). TEO does not currently have plans to decommission the Cliff Head offshore facilities within the scope of this EP. Subsequent environmental approvals to undertake decommissioning of the Cliff Head facilities will be sought under the relevant legislation closer to the time of the activity.

Section 572 of the OPGGS Act places duties on titleholders in relation to the maintenance and removal of structures, equipment and property brought onto title. Requirements include the following:

- Maintain structures, equipment and property in the title area in good condition and repair.
- Remove all structures, equipment and property when it is neither used nor to be used in connection with operations authorised by the title.
- Removal should be planned and undertaken throughout the operations authorised by the title when property is neither used, nor to be used.

The base case for decommissioning under the OPGGS Act is the complete removal of infrastructure. However, Section 572 (7) and Section 270 (3) provide scope for in situ decommissioning or other arrangements to be made providing the titleholder can demonstrate that the alternative decommissioning approach delivers equal or better environmental, safety and well integrity outcomes compared to complete removal and that the approach complies with all other legislative and regulatory requirements. TEO's planning basis for decommissioning is therefore complete removal of property, while alternative options may also be investigated and evaluated. A comparative assessment of decommissioning options will be conducted that considers the risks and benefits of each option with respect the following criteria:

- Legislative and regulatory requirements;
- Technical feasibility;
- Environment;
- Safety;
- Stakeholder concerns; and
- Economic cost.

8.6.1 Inventory and Maintenance of Equipment and Property

TEO maintains an inventory of equipment and property on the title via a Computerised Maintenance Management System (CMMS). The CMMS includes a detailed record of infrastructure, equipment and property and associated status to support planning for decommissioning. It is used to monitor, maintain and repair all property where necessary, such that all property can be removed in a safe and environmentally responsible manner when required as part of future planning for decommissioning, and the ongoing presence of the property is not causing unacceptable environmental impacts or risks. This will ensure that TEO complies with obligations under the following sections of the OPGGS Act:

- Section 572(2) – maintain in good condition and repair all structures that are, and all equipment and other property that is, in the title area and used in connection with the operations
- Section 572(3) – remove from the title area all structures that are, and all equipment and other property that is, neither used nor to be used in connection with the operations in which the titleholder is or will be engaged; and that are authorised by the permit, lease licence or authority (unless otherwise approved by NOPSEMA).

A risk-based maintenance schedule is implemented to ensure equipment and property is maintained to a standard where it can be removed when no longer in use nor to be used in future operations. Planned IMR activities and timeframes are outlined in Sections 2.3.3 and 2.4.2 in relation to the CHA platform and pipelines respectively. Table 8-4 provides a summary of Cliff Head

property and equipment on the title, including current condition status and decommissioning end state (base case). A list of technical and environmental studies undertaken to date and proposed further studies to support the evaluation of decommissioning alternate end states is also provided in Table 8-4.

Table 8-4: Cliff Head Property, Condition and Decommissioning End States (Base Case and Alternative) (Commonwealth Waters)

Property	Current Condition	Base Case Decommissioning End State	Studies Undertaken	Alternative End States that may be considered (subject to equal or better outcome assessment)	Proposed Further Studies
Cliff Head Alpha Topsides	• Topsides structure remains in good working order as confirmed by ongoing inspections and Asset Life Extension assessment (CHD-02-ST-RP-0067), suitable for ongoing operation to 2029 with good maintenance practice. • Subcellar deck grating remains safe for personnel access but has been derated from original design intent. Remediation planned for FY22-23.	• Tanks, pipes and equipment cleaned of residual hydrocarbons or other hazardous materials. • Topsides removed and transferred onshore for disposal.	• Linch Pin, 2021. Cliff Head Asset Retirement Obligation – Platform and Pipelines Decommissioning. LP210601-J-000-002. • Elemental Group, 2021. Cliff Head Decommissioning Cost Estimate 2021. Report #268. • TEO Decommissioning Framework, 2020 (10HSEQENVPC09). • TEO Decommissioning Strategy, 2021 (10HSEQENVPC10). • TEO 'No Production Phase' Planning Report, 2022 . • TEO Decommissioning Stakeholder Engagement Strategy, 2022.	• Leave topsides in place for any repurposing option (e.g., renewable energy or carbon dioxide sequestration).	• Conceptual studies and engineering design studies/feasibility assessment. • Safety risk assessment. • Waste management study to identify options for repurposing, recycling and disposal of materials • Ongoing review and update of cost estimation and financial assurance
Cliff Head Alpha Jacket	• Remains in good working order as confirmed by ongoing inspections and Asset Life Extension assessment (CHD-02-ST-RP-1219 and CHD-02-ST-RP-1220), suitable for ongoing operation to 2029 with good maintenance practice.	• Jacket and footings severed below the mudline, removed and transferred onshore for disposal.	• Linch Pin, 2021. Cliff Head Asset Retirement Obligation – Platform and Pipelines Decommissioning. LP210601-J-000-002 • Elemental Group, 2021. Cliff Head Decommissioning Cost Estimate 2021. Report #268 • TEO Decommissioning Framework, 2020 (10HSEQENVPC09). • TEO Decommissioning Strategy, 2021 (10HSEQENVPC10). • TEO 'No Production Phase' Planning Report, 2022. • BMT Oceania (2015) Cliff Head Facility Marine Water and Sediment Quality Baseline Report. • TEO Decommissioning Stakeholder Engagement Strategy, 2022.	• Leave full jacket in place for any repurposing option (e.g., renewable energy or carbon dioxide sequestration).	• Conceptual studies and engineering design studies/feasibility assessment. • Safety risk assessment. • Analysis of existing (2021/2022) ROV footage of pipeline and subsea infrastructure to characterize the ecological communities. • Waste management study to identify options for repurposing, recycling and disposal of materials. • As-left survey to be conducted post-decommissioning to confirm removal of infrastructure and any debris, and to assess the seabed condition against the requirement to make good any damage to the seabed under Section 270 of the OPGGS (Environment) Regulations. • Ongoing review and update of cost estimation and financial assurance.
Platform production wells (5) and water injection wells (3).	Wells currently in Operate phase, well integrity managed using Triangle WOMP and WIMS. Well integrity reported in annual well integrity report.	• Downhole equipment (including electrical submersible pumps) removed. • Wells plugged and abandoned with permanent barriers in place. • Conductors and casing strings cut below the mudline and removed above the cut point.	• Clear Cut Interventions – Cliff Head Well Abandonment Scope • Elemental Group, 2021. Cliff Head Decommissioning Cost Estimate 2021. Report #268. • Aztech Well Construction 2021 – Basis of P&A Design Technical note (TEO-DR-TN-01) • TEO Decommissioning Framework, 2020 (10HSEQENVPC09). • TEO Decommissioning Strategy, 2021 (10HSEQENVPC10). • TEO 'No Production Phase' Planning Report, 2022. • BMT Oceania (2015) Cliff Head Facility Marine Water and Sediment Quality Baseline Report. • TEO Decommissioning Stakeholder Engagement Strategy, 2022.	• Repurposing option (e.g. carbon dioxide sequestration).	• Aztech Well Construction completing expanded scope basis of P&A design for each individual Cliff Head well. Work commenced September 2022. • Further study to validate expanded capability of Clear-cut Interventions Hydraulic Workover Unit for well abandonment. • Submitted and approved P&A WOMP prior to commencement of P&A activity. • Waste management study to identify options for repurposing, recycling and disposal of materials. • Ongoing review and update of cost estimation and financial assurance.

Property	Current Condition	Base Case Decommissioning End State	Studies Undertaken	Alternative End States that may be considered (subject to equal or better outcome assessment)	Proposed Further Studies
Subsea production pipeline, produced water injection pipeline and chemical supply umbilical (with electrical control umbilical)	Pipelines remain with full structural and pressure integrity. Widespread localised pitting throughout both pipelines requiring ongoing corrosion management and monitoring.	• Removal of umbilicals. • Cleaning and flushing of pipelines. • Cutting and lifting pipeline sections to remove from the seabed and transfer onshore for disposal.	• Linch Pin, 2021. Cliff Head Asset Retirement Obligation – Platform and Pipelines Decommissioning. LP210601-J-000-002 • Elemental Group, 2021. Cliff Head Decommissioning Cost Estimate 2021. Report #268 • Subcon, 2017. Cliff Head Free Span Correction. CHD-03-PL-DR-0025. • TEO Decommissioning Framework, 2020 (10HSEQENVPC09). • TEO Decommissioning Strategy, 2021 (10HSEQENVPC10). • TEO No Production Phase Planning Report, 2022'. • BMT Oceania (2015) Cliff Head Facility Marine Water and Sediment Quality Baseline Report. • TEO Decommissioning Stakeholder Engagement Strategy, 2022.	• Abandonment of the pipelines in-situ, with potential enhancement of habitat such as rock armourment.	• Conceptual studies and engineering design studies/feasibility assessment for removal/leave in-situ options. • Analysis of existing (2021/2022) ROV footage of pipeline and subsea infrastructure to characterize the ecological communities and confirm burial status. • Detailed options assessment for removal/leave in-situ options. • Material Degradation studies (e.g. plastics, concrete coating & steel) for leave in-situ options. • Investigation of cleaning options/effectiveness to remove contaminants for leave in-situ options. • Waste management study to identify options for repurposing, recycling and disposal of materials. • As-left survey to be conducted post-decommissioning to confirm removal of infrastructure and any debris, and to assess the seabed condition against the requirement to make good any damage to the seabed under Section 270 of the OPGGS (Environment) Regulations. • Ongoing review and update of cost estimation and financial assurance.

8.6.2 Decommissioning Planning

TEO anticipates that the Cliff Head field offshore operations activity is within 3-7 years of end of field life. The earliest cessation of production (temporary or permanent) is therefore forecast to be mid-2025. Potential for life extension or reuse options are being considered, but in accordance with TEO's decommissioning obligations, planning for full decommissioning is being progressed in parallel.

TEO have adopted a Project Development Process for Decommissioning Planning with key decision points (i.e. gates) required to be passed before progressing to the next Phase (Figure 8.3). The Feasibility Phase (i.e. Review of Decommissioning Obligations and Timing) has been completed and TEO have now entered the Select Phase. Throughout the Decommissioning Project Development Process, the base case of the complete removal of infrastructure is incorporated into the planning phases.

TEO will develop Work Programme and Budgets (WP&B) to seek funding from the Cliff Head Joint Venture Partners (refer Section 1) for planned activities, including Planning for Decommissioning and Decommissioning, to enable TEO to meet its commitments. These WP&Bs are typically completed on a Financial Year basis and approved by the Joint Venture Partners or adjusted as required.

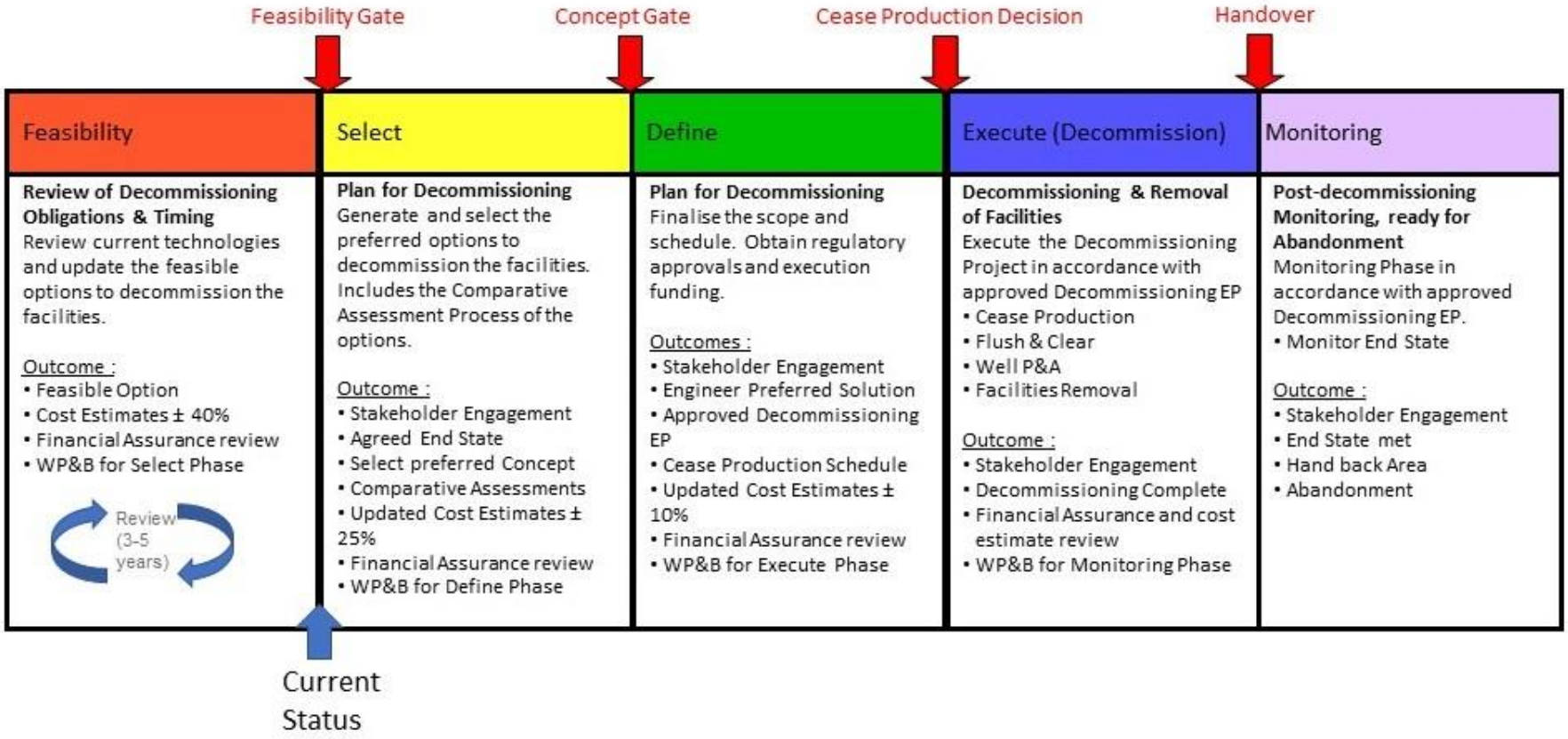


Figure 8.2: TEO Decommissioning Planning Process

A range of studies have been conducted to date to support TEO's decommissioning planning, including the Cliff Head Abandonment Study (Elemental Group, 2021), which has been periodically updated and includes an outline of decommissioning methods and estimated costs. This document forms the basis against which TEO is planning for decommissioning with respect to execution strategy, financial and organisational capacities. A Decommissioning Framework (10HSEQENVPC09) and Decommissioning Strategy (10HSEQENVPC10) have been developed, which outline TEO's commitments and steps towards meeting its obligations in relation to decommissioning the Cliff Head facilities. This includes ensuring appropriate planning and preparation for decommissioning of all infrastructure is identified and the timing of activities to be executed is understood to allow for decommissioning to take place in a timely manner to meet regulatory requirements. A summary of studies completed to date and proposed future studies to support decommissioning is provided in Table 8-4.

No later than 12 months prior to the forecast end of field life, TEO will have in place a Decommissioning Plan that details how TEO intends to meet the following commitments:

- Permanently plug and abandon all production and re-injection wells while the title is still in force.
- Remove or cause to have removed from the title all property brought into the title, as authorised by TEO, while the title is still in force unless alternative arrangements have been made to the satisfaction of NOPSEMA.
- Ensure through monitoring, and if required maintenance, so that (i) property can be removed when required and (ii) the ongoing presence of the property is not causing unacceptable environmental impacts or risks.

The plan will include, as a minimum, the following details:

- Regulatory obligations
- Stakeholder engagement plans
- Asset inventory, status and removal plans
- Decommissioning assumptions
- Study requirements
- Risk assessments
- Decommissioning schedule including key activity, regulatory approval and project management milestones.
- Decommissioning Cost Estimate, including financial assurance.

An overview of actions for the development of TEO's Decommissioning Plan and indicative timeframes is provided in Table 8-5.

An indicative overarching planning schedule is presented in Figure 8.3.

Table 8-5: Decommissioning Planning for Cliff Head Offshore Operations

Action	Indicative Timeframe
Ongoing inspection, maintenance and repair of property and equipment to ensure operational and structural integrity for ultimate removal, consistent with maintenance requirements of OPGGS Act s572.	Ongoing until all property and equipment has been removed from the title or alternative arrangements have been accepted by NOPSEMA.
Progressive removal of disused equipment as and when required, as tracked by TEO's CMMS, consistent requirements of OPGGS Act s572.	Ongoing, as required, until all property and equipment has been removed from the title or alternative arrangements have been accepted by NOPSEMA.
Financial Assurance – a periodic review and update of decommissioning cost estimates (refer to Cliff Head Abandonment Study (Elemental Group, 2021)) as decommissioning planning matures, including a review of TEO's financial assurance to determine the appropriateness and relevance of the funding mechanism to meet the Decommissioning Plan objectives.	Ongoing, periodically reviewed and refined to ensure costs align with TEO's ongoing decommissioning planning, evolving regulatory expectations and up-to-date technologies
Development of a Stakeholder Consultation Strategy to provide a structured process to guide ongoing engagement as the project progresses towards end of field life and enters the decommissioning phase. Consultation will be undertaken to understand requirements and expectations of stakeholders who may be impacted by proposed decommissioning end-states of Cliff Head infrastructure.	Commencement in Q4 2022 Stakeholder consultation ongoing as outlined in the Stakeholder Consultation Strategy
Development of a Decommissioning Strategy and Framework outlining TEO's regulatory requirements/obligations and activities required as part of the scoping/planning, permissioning, execution and post-decommissioning phases.	2022 - complete
Development of Cliff Head Abandonment Study, outlining decommissioning methodologies and cost estimates for abandonment of wells and Cliff Head infrastructure. This document forms the basis against which TEO demonstrates how decommissioning activities are provided for with respect to execution strategy, financial and organisational capacities.	Last updated in 2021 and periodically updated as decommissioning planning matures.
Concept definition for the permanent plug and abandonment of the subsea wells	2023-2024
Scoping and completion of technical engineering studies in support of assessing removal options, timing and synergies with other planned decommissioning activities.	Scoping – 2023 Completion – 2023-2025
Scoping and completion of environmental and scientific studies to inform evaluation of decommissioning options.	Scoping – 2023 Completion – 2023-2025
Assessment of options in support of decommissioning activities including: • CHA topsides removal, • jacket severance and removal, • subsea preservation and removal options.	2025-2026

Action	Indicative Timeframe
Cessation of production Activities will involve flushing of flowlines and pipelines prior to well permanent plug and abandonment activities. Flowlines flushing is expected to be conducted from ASP to the CHA topsides and return to ASP and/or to the reservoir, leaving flowlines temporarily preserved with treated process water. Flushing and cleaning the flowlines, prior to permanent plugging of the wells, leads to the internal fluid being replaced with preservation fluid. This typically consists of process water treated with a corrosion inhibitor, potentially an oxygen scavenger (to inhibit corrosion and prevent chloride stress corrosion cracking (CSCC) in the CRA) and a biocide (to inhibit microbial growth which can lead to corrosion). The concentration of the fluids is calculated to provide internal corrosion protection for the flowlines for an extended duration so flowlines are maintained until they are decommissioned. Leaving the subsea infrastructure in situ under these conditions and meeting these maintenance requirements, satisfies the requirements of Section 572 of the OPGGS Act.	Mid-2025 (at the earliest)
Submit EP for well plug and abandonment	12 months prior to well plug and abandonment campaign
Submit EP(s) for offshore infrastructure decommissioning	12 months prior to infrastructure removal campaign(s)
Execution of well plug and abandonment. Exact timing of the activity will be determined by a number of factors including commercial negotiations and rig availability. The wells will be monitored and maintained to ensure well integrity under an approved well operations management plan until plug and abandonment occurs.	Within 3 years of cessation of production (while the title is still in force), with an earliest target of 2026.
Execution of offshore infrastructure decommissioning. Inspection and maintenance regimes will continue until the time frame for removal is agreed in a future EP.	Within 5 years of cessation of production (while the title is still in force), with an earliest target of 2027 for the CHA and 2028 for the pipeline.

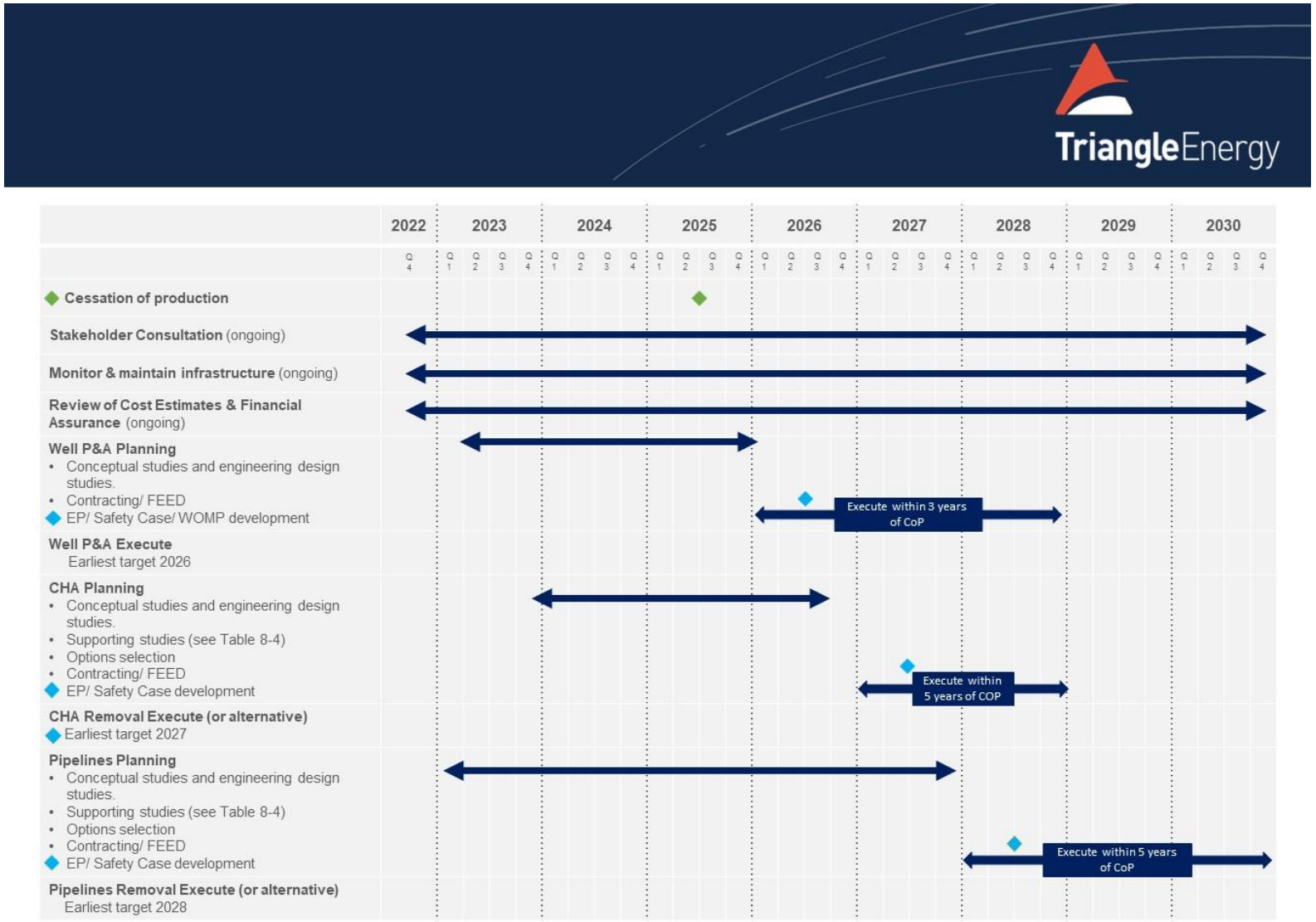


Figure 8.3: Indicative Decommissioning Planning Schedule

8.6.2.1 Decommissioning Cost Estimation and Financial Assurance

Cost estimates for the decommissioning of the Cliff Head facilities are periodically reviewed and refined to ensure costs align with TEO's ongoing decommissioning planning, evolving regulatory expectations and up-to-date technologies. Cost estimates include activities required to meet the base case requirement of complete removal of property.

TEO's Cliff Head Abandonment Study (Elemental Group, 2021) was prepared independently and is the current document through which TEO understands and tracks decommissioning costs in order to provide financial assurance that the costs of complete removal of property can be met. It identifies the scope, anticipated methods and costs for decommissioning the Cliff Head facilities, and includes both the removal of property and management of waste.

The Cliff Head Abandonment Study (Elemental Group, 2021) will continue to be subject to periodic reviews to ensure it reflects up to date technologies, resources and costs. As the Cliff Head field approaches end of field life and transitions into cessation of production, decommissioning planning will become more detailed and associated cost estimates will be further refined. Refer to section on decommissioning planning above (Section 8.6.2).

As work progresses through each gate of the decommissioning project to execution phase, TEO will develop WP&Bs (Section 8.6.2) and seek funding from the JV Partners for planned decommissioning activities during each Phase of the Decommissioning Planning process (Figure 8 2). WP&Bs are prepared, reviewed and updated every financial year (as a minimum). Also, as a minimum, at the completion of each Phase, the cost estimate to fully execute the works is also refined and updated and issued to each JV Partner for financial assurance purposes.

A Financial Assurance review will be conducted at each update of the decommissioning cost estimate (Figure 8.2) to provide an assessment of the level of confidence that the objectives of the Decommissioning Plan will be met, taking into consideration the particular Phase of the Decommissioning Planning process. In particular:

- according to the Decommissioning Plan (refer Section 8.6.2)
- realistic cost estimates and budget
- realistic schedule

The following rating system provides a level of granularity to assist in focussing on potential issues and develop appropriate mitigation strategies (Table 8-6):

Table 8-6: Financial Assurance Review Assessment Rating

Assessment Rating	Description
Green	Delivery of the Decommissioning Project to time, cost and according to the Decommissioning Plan appears highly likely and there are no major outstanding issues that at this stage appear to threaten delivery significantly
Green/Amber	Delivery of the Decommissioning Project to time, cost and according to the Decommissioning Plan appears probable however constant attention will be needed to ensure risks do not become major issues threatening delivery.
Amber	Delivery of the Decommissioning Project to time, cost and according to the Decommissioning Plan appears feasible but significant issues already exist requiring management attention. These need to be addressed promptly.
Amber/Red	Delivery of the Decommissioning Project to time, cost and according to the Decommissioning Plan is in doubt with major issues apparent in a number of key areas. Urgent action is needed to address these.

Assessment Rating	Description
Red	Delivery of the Decommissioning Project according to the Decommissioning Plan appears to be unachievable. There are major issues on Decommissioning Project definition, schedule, budget, or with the Decommissioning plan. The Decommissioning Project may require adjustments to ensure overall viability.

Funding for ongoing operations and planning for decommissioning is primarily through the proceeds from the sale of Cliff Head crude oil.

Funding to fully execute the decommissioning work, in addition to the proceeds from the sale of Cliff Head crude oil, will be raised from the respective Joint Venture Partner Owner(s) (i.e Triangle Energy (Global) (TEG) and Pilot Energy). Options include, but are not limited to, additional oil projects revenue within the Cliff Head Permit, funds set aside for future activities, including decommissioning (e.g. TEG Infrastructure Fund), other Parent Company operations (e.g. Mt Horner), or free cash from potential re-purposing (e.g. carbon dioxide sequestration), unrestricted cash reserves or proceeds from the divestment of the Cliff Head interest.

8.6.2.2 Planning for Plug and Abandonment Activities

Plug and abandonment (P&A) activities will be conducted under a separate future well P&A EP and are therefore outside the scope of this EP. This section provides an indicative overview of activities that would be conducted based on technical studies and planning conducted to date (as described in Table 8-4).

Plug and abandonment of the Cliff Head oil field will include water injection and production wells on the Cliff Head Alpha installation. The wells are all fitted with dry horizontal type Xmas trees on the mezzanine deck of the facility. The wells can be accessed via deck hatches for well servicing and/or abandonment using the hydraulic workover unit (HWU). The proposed operations summary can also be completed with a jack up MODU.

Plug and Abandonment activities for the decommissioning phase of Cliff Head Alpha will include the removal of production tubing and associated downhole completions equipment. P&A planning has been built around industry best practice of “caprock restoration” as described under the Oil and Gas UK Well Decommissioning guidelines.

The intention is for an HWU intervention to complete P&A activities which involve the following stages for a production well.

- Rig up over the well
- Pull ESP & Production tubing/Coiled Tubing
- Run Wireline set plug in 4-1/2” tubing tail pipe
- Pressure test plug and pressure test production packer
- Cut tubing above the production packer
- Unlatch tubing hanger
- Circulate well volume
- Pull tubing out of hole
    - Cement Bond Logging (CBL) may be required to qualify barrier status of external cement to 9-5/8” tubing.
    - Opportunity exists here to use tubing as the cementing string.
- Run CBL if required
    - Section Milling may be required if minimum requirements for Cement bond cannot be verified.

- Mix and pump >61ft (200ft) permanent abandonment cement plug (described as a combination barrier per OGUK well decommissioning guidelines)
- Wait-on-Cement (WOC) and tag top of cement plug
- POOH with Cement stinger
- Nipple down well control equipment
- Cut and pull 9-5/8" casing
- Mix and pump environmental plug
- Well now Plugged and Abandoned, ready for conductor to be cut at final decommissioning stage.

Well P&A activities are expected to be supported offshore by a typical complement of offshore supply vessels, however due to large volumes of equipment being transported after removal from the wells more capable and larger vessels may be required to support the abandonment activities. The base abandonment case for the Cliff Head wells uses a hydraulic workover unit for removal of equipment and conveyance of tools with cementing and logging equipment on the deck of CHA.

8.6.3 Decommissioning Engagement Strategy

In accordance with Regulations 11A and 16(b) of the OPGGS (Environment) Regulations, TEO will consult with relevant persons and stakeholders who may be impacted by proposed decommissioning end-states of the pipelines and marine structures. An internal stakeholder mapping workshop was held in August 2022 and a Stakeholder Engagement Strategy has been developed to guide proactive and effective engagement throughout the decommissioning process.

Initial meetings with key stakeholders will commence in Q1 2023. It is noted that these activities constitute the first step in proactive and meaningful engagement with stakeholders. Feedback from the initial engagement will shape subsequent engagement and guide the decommissioning process.

8.7 Monitoring

TEO and its contractors undertake periodic monitoring. This information is collected using the tools and systems outlined below based on the EPOs, controls, EPSs and MCs in this EP.

The tools and systems collect, as a minimum, the evidence referred to in the MCs in Sections 6 and 7. The collection of this evidence forms part of the record of compliance maintained by TEO and forms the basis for demonstrating that the EPOs and EPSs are met. Compliance is summarised in a series of routine reporting documents (refer to Section 9). The following tools and systems to monitor environmental performance, (including collection of evidence of compliance with controls), where relevant, include:

- Environmental emissions/discharge reporting systems that record volumes of unplanned and planned discharges to ocean.
- Routine internal reporting (as described in Section 9.2) and routine external annual compliance reporting (as described in Section 9.3).
- Internal auditing and assurance program (as described in Section 8.8).

Collectively, these systems/tools involve collection of evidence of compliance with controls.

Throughout the activity, TEO will continue to identify any new source-based risks and impacts through the Monitoring and Auditing systems and tools described above and within Section 8.8.

8.7.1 Management of knowledge

Review of knowledge relevant to the existing environment is undertaken in order to identify changes relating to the understanding of the environment or legislation that supports the risk and impact assessments for EPs. Relevant knowledge is defined as:

- Environmental science supporting the description of the existing environment
- Socio-economic environment and stakeholder information
- Environmental legislation.

8.8 Audit, review and continuous improvement

In accordance with Regulation 14(6) the implementation strategy must provide for sufficient monitoring, recording, audit, management of non-conformance and review of environmental performance including demonstration that the environmental performance outcomes and standards are being met.

A system is in place to assess operating performance to ensure that the processes and systems adopted are effective in meeting TEO policies and objectives, and legislative requirements.

The Cliff Head HSE Audit Schedule (10HSEQGENPL15) is the key mechanism by which the IMS is audited for compliance. This document details the schedule of audits of the MSS referred to above. TEO will conduct regular inspections and audits during the operations phase on an annual basis to verify that the environmental performance objectives and standards outlined in this EP have been met.

The TEO Environmental commitments register is compliance tool which consolidates all environmental commitments and defines key Environmental performance standards, measurement criteria and operational controls. Compliance assessment with the register is conducted during the annual internal environmental audit. External audits of the IMS occur as part of the ISO 9001, ISO 14001 and ISO 18001 certification process on an annual basis.

HSE reviews covering part or all activities are conducted as required based on feedback from incidents, review of HSE performance indicators, and general management of the department's activities. Reviews will also evaluate the need for changes in light of:

- Changing legislation;
- Changing businesses activities and environments;
- Outcomes of audits;
- Changing science and technology; and
- Changing societal and stakeholder expectations.

In the event that these external changes are required to be reflected in the EP, changes to the EP and OPEP will be made in accordance with the Environmental Management of Change (MoC) Form (10HSEQENVPC07FM01) (refer Section 8.9.1).

The HSEMS is based on a framework for achieving continuous improvement (see Table 8-1). For this five-year EP, continuous improvement will be achieved as a result of:

- Corrective actions and feedback from audits and inspections, incident investigations and after-action reviews;
- Opportunities for improvement and changes identified during annual reviews and management of change (MoC) documents (Section 8.9) and the various employee communication and participation processes outlined in Section 8.4; and
- Actions taken to address concerns and issues raised during the ongoing stakeholder management process.

Identified continuous improvement opportunities will be assessed in accordance with the Environmental Management of Change (MoC) Form (10HSEQENVPC07FM01) (refer to Section 8.9) to ensure any potential changes to this EP, or OPEP, are managed in accordance with the OPGGS(E) Regulations and in a controlled manner.

Vessel contractors are required to maintain current versions of this EP and the accompanying OPEP and the documents will be available to employees and contractors involved in the activity. A commitments register is provided to relevant personnel to aid in reporting of environmental performance. Technical operational reports that contain HSE information will also be made available during environmental performance reviews.

8.9 Management of change and review of the EP

8.9.1 Management of Change

Changes to the EP and OPEP will be made in accordance with the Cliff Head Management of Change Procedure (MoC) (10HSEQGENPC18). The Cliff Head Environmental Change Form (10HSEQENVPC07FM01) is used to assess the environmental impacts of the proposed change and inform the MoC process. The MoC procedure will determine whether a revision of the environment plan is required and whether that revision is to be submitted to NOPSEMA pursuant to Regulation 17 of the OPGGS(E) Regulations.

The Asset Integrity Manager in consultation with the HSE Specialists is responsible for determining if and when a review of the EP is required. When changes to an activity are proposed, the relevant Manager (with assistance from the HSE Specialist) is required to undertake the MoC process as described in the procedure.

The MoC process manages the change(s) or proposed change(s) to an activity and/or changes to impact and risk profiles associated with an activity. The MoC process facilitates the identification of these changes and ensures that the regulatory approval commitments and requirements including stakeholder consultation are managed accordingly. Implementation of the MoC process ensures all the activities that are undertaken by TEO are in full compliance with regulatory approvals and conditions and are risk assessed in accordance with the process described in this EP (Section 5).

Any changes made under the MoC procedure will maintain the environmental impacts and risks of the activity at an acceptable level and ALARP. Implementation of additional control measures may be required to ensure impacts and risks are reduced to ALARP and acceptable levels. If the impacts or risks differ significantly from those in the EP (as per Regulation 17), then a revision of the EP is required to be submitted to NOPSEMA. Following approval of the MoC internally, this will be communicated to all relevant personnel via daily toolbox talks, HSE meetings and/or bulletins to site and office personnel. Details of the titleholders and nominated liaison person are provided in Section 1.2. Should any details outlined in Section 1.2 change while the EP is in force, NOPSEMA will be notified as outlined in Section 1.3.

8.9.2 Review of EP

TEO will review the EP within each calendar year following acceptance of this EP as long as the EP remains valid (5 years). This review will be completed through the measurement of environmental performance, ongoing audits, inspections and checks. The results of the review will be detailed in the annual performance report (Section 9.3.1.2). The EP review will have the overall aim to evaluate if the commitments made in the EP as well as arrangements specified in implementation strategy are being met and that the EP continues to be effective in reducing impacts and risks to ALARP and acceptable levels. This includes:

- Environmental performance (adequacy of environmental management tools against number of reportable and/or recordable incidents);
- Continued relevance of the implementation strategy, performance objectives and performance standards;
- Review of existing performance standards and measurement criteria (giving consideration to updated or new standards);
- Inspection and checklist approaches;
- Monitoring data and trends;
- Results of audit and adequacy of auditing;
- Compliance with Environmental Management of Change (MoC) process;
- Compliance with new regulations, guidance etc (refer section 8.7.
- Relevance of the systems, practices and procedures described are up to date (revisions occur when or before the stated dates);
- Fulfilling of roles and responsibilities of key persons;
- Fulfilling of training, competency and ongoing awareness requirements; and
- Management of non-conformance meets the requirements.

Any potential review findings resulting in amendments to the EP and/or its implementation strategy will be assessed through the MoC process described in Section 8.9. The TEO HSEQ & Regulatory Manager is responsible for ensuring compliance with the EP and has specific KPIs to meet on this HSE objective.

9 Reporting requirements

9.1 Background

TEO has an Incident Investigation and Management procedure in place (10HSEQGENPC23). Reporting matrices are incorporated into the OPEP (Section 1.3) and guide personnel on appropriate action. An incident reporting and recording matrix is made available on site, to inform personnel what constitutes a recordable and reportable incident.

The procedure is designed to ensure that each incident, hazard or near miss which resulted in or could have reasonably resulted in a situation detrimental to the health and safety of personnel, the environment in which they work or have a significant impact on the business will be investigated to establish root causes and identify corrective actions.

MyOSH is a TEO online database which stores incident reports, hazards, audits and inspections and action tracking. TEO Personnel undertake regular workplace inspections of different components of Operations. Hazard cards are raised by TEO Personnel when they observe safety or environmental concerns. Items requiring action (during workplace inspections or on hazard cards) are addressed immediately, where possible. Actions and remedial actions are documented in MyOSH and closed out on completion. All staff must report any environmental incidents associated with the Cliff Head Oil Field Development to the PIC. The TEO COO / or delegate will report to NOPSEMA any recordable or reportable incidents in accordance with the requirements of the OPGGSA.

9.2 Internal reports (incident reporting)

9.2.1 Incident reporting

Hazards and incidents are reported in accordance with the Incident Investigation and Management Procedure (10HSEQGENPC23).

The HSE Specialist must ensure that all HSE incidents are recorded in MyOSH, and an incident investigation and close-out report is undertaken. In addition, all incidents will be added to the MyOSH incident database.

The results of incidents and associated investigations are communicated routinely at HSE meetings and corrective actions monitored to close-out.

9.3 External reports

9.3.1 Routine reporting

9.3.1.1 Emissions Reporting

TEO is committed to implementing sustainability initiatives and views the measuring and reporting of emissions as an important step in identifying opportunities to reduce emissions.

TEO reports National Pollutant Inventory (NPI) emissions data annually to DWER, which assesses and submits all data from facilities in Western Australia to the Commonwealth. DCCEEW publishes national data on the NPI website.

The National Greenhouse and Energy Reporting System (NGERS) commenced in July 2008. TEO has reported greenhouse gas emissions, energy use and production under this system since 2009.

Details of discharges and emissions that are recorded are provided in respective measurement criteria in Section 6.1.6.3 for atmospheric emissions for all activities (CHA operations and vessels)

Section 6.2.1.3 for planned discharges from vessels and Section 6.3 for discharges from the CHA including during workover activities. All other wastes generated on vessels or CHA is returned onshore for disposal. In the event of a spill, emissions and discharges will also be reported as for planned vessel usage.

Records utilised for the quarterly emissions reporting includes incident reports in myOSH defining spill volumes and locations as well as calculated gas emissions from the Engineering team.

9.3.1.2 Annual Performance Report

In accordance with the *Offshore Petroleum & Greenhouse Gas Storage (Environment) Regulations 2009* (Regulation 26C), a report must be submitted in relation to TEO's environmental performance for the activity, at intervals provided for in the environment plan.

As such, an annual environmental performance report shall be submitted to NOPSEMA to assess compliance with the EP performance objectives, standards and procedures and performance criteria and will include:

- An overview of the operations and activities undertaken at the Facility
- Information on existing discharge points to the environment
- Trends in emissions and discharges
- Summarise results of audits conducted
- Changes undertaken under the MoC procedure
- Any additional consultation required, including identification of new stakeholders
- Lessons learnt
- Any other relevant information to demonstrate compliance.

9.3.2 Non-routine (incident) reporting

In accordance with Regulation 14(2), the implementation strategy must outline reporting requirements by the titleholder(s) to the Regulator in relation to the environmental performance of activities.

Table 9-1 details TEO's environmental notification and reporting requirements to NOPSEMA and other regulators. Notifications to NOPSEMA will be via:

- Telephone: 1300 674 472
- Email: submissions@nopsema.gov.au

Vessels will be responsible for reporting hydrocarbon spills to regulators pursuant to maritime regulations (e.g. MARPOL) and as stipulated in relevant emergency response plans (e.g. SOPEP).

Environmental recordable and reportable incidents will be reported to NOPSEMA in accordance with Table 9-1. The incident reporting requirements from Table 9-1 will be provided to all personnel during the CHA Site Induction to ensure accurate and timely reporting.

9.3.2.1 Reportable Incidents

For the purposes of this activity, a reportable incident is defined as an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage. TEO considers this to be any event that has a consequence level of serious or above accordance with TEO Risk Matrix (Appendix D).

TEO will be responsible for reporting all reportable incidents under Regulation 26 of the OPGGS (E) Regulations within 2 hours. Table 9-1 provides threshold limits for a reportable incident.

9.3.2.2 Recordable Incidents

Recordable incidents will also be reported according to the requirements of Regulation 26B of the OPGGS (E) Regulations no later than 15 days after the end of the calendar month.

Recordable incidents which are a breach of EPO or EPS could include (but are not limited to):

- Uncontrolled release of hydrocarbon or hazardous chemical to the marine environment.
- Unrecovered container of hydrocarbon, chemical or waste to sea.
- Vessel strike with EPBC listed fauna.
- Harm or mortality to marine fauna whether attributable to the activity or not.
- Large oil slick or sheen on the sea surface whether attributable to the activity or not.

Table 9-1 provides threshold limits for a recordable incident.

Table 9-1: Activity notification and reporting requirements

Regulation	Requirement	Required Information	Timing	Type	Recipient
Before the Activity					
Regulation 29 & 30 - Notifications	NOPSEMA must be notified that the Activity is to commence.	Complete NOPSEMA's Regulation 29 Start of Activity Notification form	At least 10 days before the Activity commences	Written	NOPSEMA
During the Activity					
Regulation 16(c), 26 & 26A – Reportable Incident	NOPSEMA must be notified of any reportable incidents. For the purposes of Regulation 16(c), a reportable incident is defined as: An incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage. TEO considers this to be any event that has a consequence level of **serious** or above accordance with Section 5.1	The oral notification must contain: • All material facts and circumstances concerning the reportable incident known or by reasonable search or enquiry could be found out; and • Any action taken to avoid or mitigate an adverse environmental impact of the reportable incident; and • The corrective action that has been taken, or is proposed to be taken, to sop, control or remedy the reportable incident.	As soon as practicable, and in any case not later than 2 hours after the first occurrence of a reportable incident, or if the incident was not detected at the time of the first occurrence, at the time of becoming aware of the reportable incident. **Phone: 1300 674 472**	Oral	NOPSEMA
		A written record of the oral notification must be submitted. The written record is not required to include anything that was not included in the oral notification.	As soon as practicable after the oral notification. **Email: submissions@nopsema.gov.au**	Written	NOPSEMA NOPTA DMIRS
		A written report must contain: • All material facts and circumstances concerning the reportable incident known or by reasonable search or enquiry could be found out; and • Any action taken to avoid or mitigate any adverse environmental impacts of the reportable incident; and	Must be submitted as soon as practicable, and in any case not later than 3 days after the first occurrence of the reportable incident unless NOPSEMA specifies otherwise. Same report to be submitted to NOPTA and DMIRS within 7 days after giving the written report to NOPSEMA.	Written	NOPSEMA NOPTA DMIRS

Regulation	Requirement	Required Information	Timing	Type	Recipient
		• The corrective action that has been taken, or is proposed to be taken, to stop, control or remedy the reportable incident. • The action that has been taken, or is proposed to be taken, to prevent a similar incident occurring in the future. Consider reporting using NOPSEMA's Report of an Accident, Dangerous Occurrence or Environmental Incident form.			
Regulation 26B – Recordable Incidents	NOPSEMA must be notified of a breach of an environmental performance outcome or standard, in the environment plan that applies to the activity that is not a reportable incident.	Complete NOPSEMA's Recordable Environmental Incident Monthly Report form.	The report must be submitted as soon as practicable after the end of the calendar month, and in any case, not later than 15 days after the end of the calendar month. **Email: submissions@nopsema.gov.au**	Written	NOPSEMA
AMSA Reporting	In consultation AMSA requests notification of reportable vessel incidents under Marine Safety (*Domestic Commercial Vessel) National Law Act 2012*, Schedule 1 including: • the loss of a vessel; • a collision with another vessel or an object; • the grounding, sinking, flooding or capsizing of a vessel; • a fire; • a loss of stability that affects the safety of the vessel;	A written report must contain: • Incident details (date and time); • Location; • Type of incident; • Incident description; • Vessels involved (DCV); • Persons involved; and • Details of assistance rendered/received at incident.	Within 72 hours of the incident Any spills greater than 10 tonnes in Commonwealth waters must be reported to AMSA (via AusSar) within one hour, via the national 24-hour emergency notification	Written	AMSA

Regulation	Requirement	Required Information	Timing	Type	Recipient
	• a close quarters situation; • the death or injury, or possible death or injury, of a person on board; and • the loss, or possible loss, of a person from a vessel.				
DPIRD Reporting	If marine pests or disease are suspected this must be reported to DPIRD.	Notification of any suspected marine pests or diseases including any organism listed in the Western Australian Prevention List for Introduced Marine Pests and any other non-endemic organism that demonstrates invasive characteristics.	Within 24 hours	Oral	DPIRD FishWatch
DCCEEW Reporting	Any harm or mortality to EPBC Act- listed threatened marine fauna.	Notification of any harm or mortality to an EPBC listed species of marine fauna whether attributable to the activity or not	Email: EPBC.permits@environment.gov.au	Written	DCCEEW
	Recording and reporting of all cetacean sightings	Record of all cetacean sightings	Forms emailed to within 3 months of sighting	Written	AMMC and DCCEEW
Australian Marine Mammal Centre	Any ship strike incident to be recorded on national ship strike database	Notification of any vessel strike to whales Ship strike report:	https://data.marinemammals.gov.au/report/shipstrike	Written	NMMC
End of Activity					
Regulation 29 – Notifications	NOPSEMA and DMIRS must be notified that the activity is completed.	Complete NOPSEMA's Regulation 29 Start or End of Activity Notification form for both notifications.	Within 10 days after the completion.	Written	NOPSEMA DMIRS
Regulation 14 (2) & 26C – Environmental Performance	NOPSEMA must be notified of the environmental performance of the activity.	Report must contain sufficient information to determine whether or not environmental performance outcomes and standards in the environment plan have been met.	Annual report submitted within 3 months after the anniversary of the reporting period, with the period commencing on the dated Regulation 29 notification form.	Written	NOPSEMA

9.3.3 Reporting contacts

Both the Cliff Head Emergency Management Plan (10HSEGENPL01) and the CHA Oil Pollution Emergency Plan (10HSEQENVPL15) contain a summary of the reporting contacts needed for emergency situations and includes those required for emergencies relating to the environment. Also appended are various site plans and reference drawings. Along with the contact list these plans can be used for developing emergency response and communicate location of the emergency to external emergency and logistic services.

9.3.4 Record keeping

Within the framework of the IMS, a records management system has been established to track all incoming and outgoing communication and documents. TEO has also established a similar database to record all correspondence.

The records management systems also incorporate HSE regulatory compliance databases, documenting required actions as specified in project commitments and conditions of approval.

As a titleholder, TEO is responsible for ensuring compliance, although many of the records generated may be routinely generated by third parties including contractors. To ensure information is adequately provided to TEO, the Contractor and Third Party Management Plan (10HSEQGENPL17) is implemented. The controlled document provides the requirements which managers, supervisors, contractors, subcontractors and third parties working on Cliff Head must meet and follow when engaged by TEO. This procedure ensures that all third parties are working to a standard which meets or exceeds all Cliff Head's expectations, standards and legislative requirements.

As a minimum, TEO will store and maintain the following records for a period of five (5) years. These records will be available to the regulator upon request.

9.3.4.1 Titleholder generated records

The following records are generated by activities on the CHA:

- Reportable and recordable incident details (and investigation reports where applicable);
- Induction records;
- Environmental monitoring reports/checklists and end-of-activity reports;
- Completed MoC documentation;
- Audit and inspection reports;
- Stakeholder consultation records.

9.3.4.2 Vessel-generated records

- Pre-mobilisation IMCA CMID (or equivalent) audit;
- Environmental monitoring reports/checklists and end-of-activity reports;
- Training and qualification records (including activity specific inductions or project initiation meeting records).

9.3.5 Information management & document control

Information management and document control is a critical part of managing HSEQ issues for the Cliff Head facilities.

This is achieved by having clear document control requirements as outlined in the Document Control procedure (10BAITPC01). This procedure details the requirements for review and approval

of all controlled documents and how these documents will be distributed and made accessible to all involved in the Cliff Head operation.

TEO also maintains a computerised maintenance management system to schedule and record all maintenance on equipment and machinery associated with the facility. The system enables maintenance records to be retrieved (e.g. during audits utilising unique equipment identifiers) to ensure the correct maintenance on equipment is completed within defined timeframes. TEO also confirm during audits that third party contractors maintain auditable and retrievable records of equipment maintenance.

10 Stakeholder consultation

TEO's long-term sustainability is contingent upon maintaining strong and meaningful relationships with the communities where operations are based. TEO has established good relations with the Regulators, fishing community, landholding sectors, tourism stakeholders and other operators in the area.

TEO aims to continue consultation with local communities to identify and address the potential impacts of their activities, address any concerns regarding ongoing operations and inform the management of environmental impacts and risks relating to the activity. TEO respects, upholds and promotes human rights and respects cultural considerations and heritage. TEO seeks to create and maintain long-term relationships that ensure TEO makes a positive contribution to these communities.

Since the development of Cliff Head in 1999, TEO (previously Roc Oil (WA) Pty Limited) has undertaken comprehensive stakeholder consultation. A consultation plan has been formulated, identifying key steps for both preparatory and ongoing consultation phases within which separate tasks are required (Cliff Head Stakeholder Consultation Plan (10HSEQENVPL12)). These steps are summarised in Table 10-1, with more detail provided in the following sections.

Table 10-1: Key steps identified for the consultation process

Step	Task	Timing	Details	Implementation strategy
Preparatory consultation				
1	Initial consultation	During preparation of EP	Provide overview of operational, workover and pipeline IMR activities.	Letters/emails sent to all stakeholders identified as relevant persons outlining proposed activity.
2	Online and other media advertisements	During preparation of EP	Provide opportunity for persons / organisations to self-identify	Information about the activity is published online and in the media, including on the TEO website, LinkedIn and the local weekly Dongara newspaper (Appendix H). Contact details are provided to allow opportunity for persons or organisations to self-identify as relevant persons (Section 10.2.5).
3	Incorporate feedback into activity plans	During preparation of EP	Assessment of feedback regarding proposed activity.	Where feedback is received, the merits of feedback are assessed and evaluated. Where appropriate and practicable, commitments have been identified accordingly as outlined in the EP and confirmed in Section 6 and 7 (e.g. notifications to AHS and AMSA)
Ongoing consultation				
4	Review for additional stakeholders	Once a year following EP acceptance date; and during the 5-year review and update of the EP	Review stakeholder engagement register to identify any new relevant stakeholders	Date and outcome of review (list of stakeholders) provided in the Annual Performance Report (Section 9.3.1.2).
5	Engage with new stakeholders	Following stakeholder review (Step 3)	Provide stakeholders with information provided during initial consultation	Notification letters/emails distributed to stakeholders; details provided in Annual Performance Report (Section 9.3.1.2). Should any change in activity be required as a result of the stakeholder feedback, the changes will be reviewed in line with the MoC procedure outlined in Section 8.9, and the EP revised and resubmitted if necessary.
6	Notification of workover or	4 weeks prior to pipeline IMR	Specific stakeholders to be notified prior	Notification letters/emails distributed to stakeholders as detailed in Performance Standards in Section 6.1.4.3.

Step	Task	Timing	Details	Implementation strategy
	pipeline IMR activities	activities or workover	to pipeline IMR or workover activities	
7	Notification of change in proposed activities	As soon as reasonably practicable after identification of change in activity	Relevant persons to be notified of any change in how activities are conducted where the change leads to a new or increased impact or risk	Change in activity will first be assessed in the MoC procedure outlined in Section 8.9, and the EP revised and resubmitted if necessary. Impacts to individual stakeholders are included in the MoC assessment and should any additional impacts be identified, stakeholders who may be affected will be notified of the changes. The change in activity will not occur until stakeholder feedback has been received and assessed as per Figure 10.1 unless not carrying out the change in activity poses unacceptable health, safety or environmental risks.
8	Decommissioning Engagement	Commence Quarter 1 2023	Relevant persons who may be impacted by proposed decommissioning end-states of the pipelines and marine structures will be consulted with.	An internal stakeholder mapping workshop was held in August 2022 and a Stakeholder Engagement Strategy has been developed to guide proactive and effective engagement throughout the decommissioning process. Initial meetings with key stakeholders regarding decommissioning are planned to commence in Quarter 1 2023.
9	TEO Senior Environmental Advisor	Ongoing	Provides a focal point for continual communication with members of the rock lobster fishing industry throughout the activity.	Available for face to face meetings with stakeholder where appropriate to discuss issues and identify options to resolve issues. The feedback received and potential options will be assessed and supported by TEO Perth based management. Any changes to activity plans will be communicated back to stakeholders via the TEO Environmental Advisor or directly to the fisheries associations to ensure agreement is met as outlined in Figure 10.1. This will ensure that risks and impacts to socioeconomic values are continually reduced to ALARP.
10	Maintenance of stakeholder engagement records	Ongoing	Stakeholder engagement register on IMS is maintained to	The Stakeholder Engagement Register is updated as feedback is received and includes details such as information received, response from TEO and outcome. Feedback is assessed as per Figure 10.1.

Step	Task	Timing	Details	Implementation strategy
			record all correspondence between TEO and stakeholders.	Should any change in activity be required as a result of the stakeholder feedback, the changes will be reviewed in line with the MoC procedure outlined in Section 8.9, and the EP revised and resubmitted if necessary. The Stakeholder Engagement Register is reviewed monthly to ensure all feedback received is addressed and closed out. A summary of additional feedback received is provided in the Annual Performance Report (Section 9.3.1.2).

10.1 Stakeholder Consultation Approach

TEO consults relevant persons in the course of preparing EPs to obtain appropriate feedback from relevant persons to inform planning for proposed petroleum activities and build upon TEO's ongoing stakeholder consultation for its offshore petroleum activities in the region. This process may evolve throughout the life of the EP. The consultation approach has been guided by the following material:

- NOPSEMA Brochure - Requirements for consultation and public comment on petroleum activities in Commonwealth waters – August 2018 (NOPSEMA 2018);
- NOPSEMA Guideline GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area (NOPSEMA 2022);
- NOPSEMA Guidance Note GN1785: Petroleum Activities and Australian Marine Parks (NOPSEMA 2020);
- NOPSEMA Guideline GL2086: Consultation in the course of preparing an environment plan (NOPSEMA 2022);
- AFMA - Petroleum industry consultation with the commercial fishing industry (AFMA 2019);
- WA Department of Transport: Offshore Petroleum Industry Guidance Note;
- WA Department of Primary Industries and Regional Development: Guidance statement for oil and gas industry consultation with the Department of Fisheries (DPIRD 2013);
- DoIIS Offshore Petroleum and Greenhouse Gas Activities: Consultation with Australian Government agencies with responsibilities in the Commonwealth Marine Area (NOPSEMA 2020b);
- Commonwealth DoE: Guidance for proponents on best practice Indigenous engagement for environmental assessments under the *Environment Protection and Biodiversity Conservation Act 1999* (DoE 2016).

Following the decision made by the Federal Court of Australia in *Tipakalippa v National Offshore Petroleum Safety and Environmental Management Authority (No 2) [2022] FCA 1121* on 21 September 2022 (Justice Bromberg's decision) and subsequent dismissal of Santos' appeal on the 2 December 2022, the process outlined in Section 10.2 was reviewed, and consultation with newly identified relevant persons undertaken as a result.

It is noted that the stakeholder consultation process will remain ongoing throughout the life of the EP, following acceptance by NOPSEMA. TEO will continue to engage with identified relevant persons, as required, in accordance with the methodology outlined in Section 10.5.

10.2 Identification of Relevant Persons

TEO has followed the requirements of subregulation 11A (1) of the Environment Regulations to identify relevant persons in the course of preparing this EP, those being:

a) Each Department or agency of the Commonwealth to which the activities to be carried out under the EP, or the revision of the EP, may be relevant;

b) Each Department or agency of the State to which the activities to be carried out under the EP, or the revision of the EP, may be relevant;

c) The Department of the responsible State Minister[4];

[4] As defined in the OPGGS Act 2006, the responsible State Minister, in relation to a State, means:
a) whichever of the following applies:
i. the Minister of the State (other than Tasmania) who is authorised under a law of the State to perform the functions, and exercise the powers, of a member of the Joint Authority for the State under this Act;
ii. the Minister of Tasmania who is responsible for the State Petroleum Submerged Lands Act for

d) Persons or organisations whose functions, interests or activities may be affected by the activities to be carried out under the EP, or the revision of the EP; and

e) Any other person or organisation that are considered relevant.

Refer to Section 10.2.1 to 10.2.6 for more detail on stakeholder categories under subregulation 11A (1).

The process for identification of relevant persons under subregulation 11A(1)(d) included:

1. Consideration of the natural and socio-economic values and sensitivities of the environment that may be affected by planned and unplanned activities, as described in Section 4;
2. Review of the broad functions, interests, or activities of ascertainable persons or organisations that may intersect with the environment that may be affected by planned and unplanned activities (Table 10-2);
3. Determining if the identified stakeholder's functions, interests or activities may be affected by the activities proposed to be carried out under this EP through a review of the intersections identified in Table 10-2.

The process for identification of relevant persons has also considered whether functions, interests, or activities may be affected by planned activities or unplanned events, as informed by the impact and risk assessments performed in Section 6 and Section 7, respectively.

Planned Activities: The area in which the environment and persons' functions, interests, or activities may be affected by planned activities includes the Operational Area (refer Section 2.1) and the potential spatial extent of effects from the emissions and discharges associated with those planned activities, as described in Section 6.

Unplanned Events: The area in which the environment and persons' functions, interests, or activities may be affected by unplanned events is derived from modelling of worst-case hydrocarbon spill scenarios (as described in Section 4.1 and depicted in Figure 4.1 - "the EMBA"), as well as environmental impacts associated with other unplanned events/activities such as introduction of IMS, vessel collision with marine fauna, and spill response activities (Section 7).

A different level of engagement is appropriate with persons whose functions, activities or interests will not be affected by the planned activities but may be affected by unplanned – and highly unlikely – events, e.g. a hydrocarbon spill resulting from vessel collision and fuel tank failure. Identification and engagement of relevant persons for unplanned events is undertaken with three separate objectives:

1. Consultation with Government and industry spill response agencies regarding the OPEP, in particular, an appropriate level of spill preparedness, response arrangements and response strategies;
2. Consultation with the Director of National Parks (Parks Australia/Marine Parks) in accordance with NOPSEMA Guidance Note GN1785: Petroleum Activities and Australian Marine Parks (NOPSEMA 2020); and
3. Notification to other categories of relevant persons identified as potentially having functions, interests, or activities that may be affected by unplanned events, in order to provide them with an opportunity to submit queries, feedback, claims or objections, or invite them to contribute to the knowledge of the existing environment present within the EMBA.

Noting the extent of the EMBA for highly unlikely unplanned events, identification and engagement with relevant persons within the EMBA is an ongoing process throughout the life of the EP.

Tasmania; or

b) another Minister of the State acting for and on behalf of the Minister referred to in paragraph (a).

The identification of a person or organisation whose functions, interests or activities may be affected by the activity is informed by a number of factors, including but not limited to:

- Consideration of the nature and scale of the activity.
- Review of TEO's existing EP stakeholder list, which is informed by TEO's consultation process.
- Understanding the potential for interaction based on the timing and location of the activity.
- Identifying the environment that may be affected by unplanned activities (EMBA) using stochastic modelling to inform assessment of relevant government departments for incident response planning.
- A review of the most recent fishery data such as AFMA ABARES data and DPIRD FishCube to inform recent fishery activity in the activity area.
- Consideration of previous TEO consultation in the Operational Area.
- Advice from representative industry associations.
- Review of relevant databases including the Native Title Vision database, Aboriginal Heritage Inquiry System, National Indigenous Australians Agency (NIAA) Indigenous land and sea management projects interactive map, and the DCCEEW Register of Environmental Organisations, as detailed below.
- Input from other stakeholders as to other potentially relevant persons as appropriate.

TEO considers factors including the above criteria as part of a case-by-case approach for each EP to identify relevant persons.

For each relevant person identified, TEO will assess what level of engagement is required, either to Notfiy or Consult. Notfiy provides the relevant person with balanced and objective information to assist them in understanding the project and to consider whether their functions, interests, or activities may be affected by planned activities or unplanned events. Consultation aims to seek the opinion or feedback from the relevant person. The classifications are not fixed, any relevant person that has been notified may be escalated to consult should they require more information or come back with an objection or claim, and vice versa.

TEO notes that there are persons or organisations who have general interests or concerns about the oil and gas industry as a whole, including the matters of greenhouse gas emissions and the effects of climate change. It is important to differentiate between persons or organisations with a general concern about such matters and persons or organisations with functions, interests or activities may be affected specifically by the activities described in this EP, who are identified as relevant persons under subregulation 11A(1)(d). As such, persons or organisations with interests or concerns that relate specifically to the activity and the location of the Operational Area and EMBA are identified as relevant persons, consistent with subregulation 11A(1)(d). The position on oil and gas exploration and development, and associated greenhouse gas emissions is determined at a broader government policy level; these matters are not activity-specific or location-specific, therefore, persons or organisations with only general interests or concerns are not considered relevant persons according to subregulation 11A(1)(d) and are not identified for direct and targeted consultation. Other, non-targeted mechanisms for disseminating information about the activity (such as online and other media advertisements, as outlined in Table 10-1) are utilised by TEO to ensure information is available in the public domain, and any additional persons or organisations who consider themselves to be relevant persons have an opportunity to self-identify to TEO, as per Section 10.2.5.

Table 10-2: Stakeholder Identification Matrix

Stakeholder	Physical Environment		Key Ecological Features	Protected Areas	Threatened Ecological Communities	Habitats	Marine Fauna					Socio Economic Values						Planned Activities	Unplanned Events
	Climate	Water Quality and Sediment				Benthic, Sandy Seafloor, Limestone pavement, Patch Reef, Emergent Reef, Seagrass, Intertidal, Islands Banks and Shoals	Sharks, Fishes and Rays	Marine mammals	Marine reptiles	Marine birds	Invertebrates and Plankton	Petroleum Exploration and Production	Ports and Shipping	Tourism and Recreation	Commercial and Recreational fisheries and aquaculture	Defence Activities	Indigenous Heritage and Non-indigenous Heritage		
a) Each Department or agency of the Commonwealth to which the activities to be carried out under the EP, or the revision of the EP, may be relevant	✓			✓	✓		✓	✓	✓	✓		✓				✓	✓	✓	✓
b) Each Department or agency of the State to which the activities to be carried out under the EP, or the revision of the EP, may be relevant			✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓
c) The Department of the responsible State Minister												✓						✓	✓
d) Persons or organisations whose functions, interests or activities may be affected by the activities to be carried out under the EP, or the revision of the EP																			
Non-government spill response agencies		✓										✓							✓
Local Government Authorities														✓	✓			✓	✓
Commercial Fisheries							✓								✓			✓	✓
Tourism and Recreation Operators														✓				✓	✓
Other Industry and Marine Users						✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓
Traditional Owner groups with native title claims																	✓	✓	✓
Traditional owner groups with Sea Country interests						✓	✓	✓	✓	✓	✓						✓	✓	✓
Research Organisations		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓
Non-government organisations	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓
e) Any other person or organisation that are considered relevant																		✓	✓

10.2.1 Commonwealth Government Departments and Agencies

In accordance with NOPSEMA Guideline GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area (NOPSEMA 2022), TEO has identified a number of Departments with functions that intersect with the values and sensitivities present in the areas potentially impacted by planned and unplanned activities. Government department portfolio changes have been assessed to ensure all relevant departments have been identified.

10.2.2 State Government Departments and Agencies

State Government departments identified as relevant include those with legislated requirements, decision-making powers or other direct role managing the environment or the functions, interests and activities of key stakeholder groups that may be affected by the proposed planned and unplanned activities.

10.2.3 The Department of the responsible State Minister

For WA, the department of the State Minister authorised to perform the functions, and exercise the powers, of a member of the Joint Authority for the State is the Department of Mines, Industry Regulation and Safety (DMIRS).

10.2.4 Persons or Organisations whose Functions, Interests or Activities may be Affected

10.2.4.1 Local Government

Local Government Authorities (LGAs) may be identified as relevant where significant community interest in the proposed activity is expected. TEO will provide LGAs with information about the proposed activity such that they are informed should a member of the community contact them.

10.2.4.2 Traditional Owner Groups

Traditional owner representative bodies with native title claims and Land Use Agreements within the areas potentially impacted by planned and unplanned activities, as well as groups that represent traditional owners with broader connection to the values and sensitivities present both spiritually and in terms of resources and ecosystem, referred to as Sea Country.

Identification of relevant persons involves the review of relevant databases including the Native Title Vision database, Aboriginal Heritage Inquiry System, and the NIAA Indigenous land and sea management projects interactive map.

Engagement of relevant persons is initially undertaken with the known Native Title Service Providers and groups with Native Title Determinations and Indigenous Land User Agreements. Through this process, additional traditional owner groups with Sea Country interests may be identified.

10.2.4.3 Non-government Organisations

Research organisations with identifiable research activities in the areas potentially impacted by planned and unplanned activities are included as relevant persons.

Environmental non-government organisations or industry representative groups may also be considered as relevant persons where they are registered in Australia on the DCCEEW Register of Environmental Organisations and where they meet the following criteria:

1. Organisation has been active in the past 12 months; and

2. Organisation has a publicly available mission statement (or purpose) that clearly describes their collective functions, interests or activities; and
3. Mission statement (or purpose) has relevance to:
    a. collaborating with or directed toward offshore oil and gas activities in Australia; and
    b. the protection of the natural environment present within the Operational Area and/or EMBA.

10.2.4.4 Commercial Fisheries

Relevant commercial fisheries were identified through a review of the most recent fisheries data from ABARES (Commonwealth managed fisheries) and DPIRD Fishcube (State managed fisheries), where fisheries with permit areas intersecting the areas potentially impacted by planned and unplanned activities within the past 5 years were considered relevant.

Identification and engagement of relevant persons within the relevant fisheries is initially undertaken with the Commonwealth or State Government agency for fisheries, as well as the fisheries' industry associations. Through this process, specific fishery licence holders may be identified and notified. The AFMA advice for petroleum industry consultation with the Commonwealth commercial fishing industry (AFMA 2019) encourages titleholders to consult both with relevant fishing industry associations and with fishing licence holders/ operators. Some fishing industry associations provide a fee-for-service arrangement for engaging with licence holders.

The Commonwealth Fisheries Association (CFA) is the peak body representing all Commonwealth managed fisheries in Australia, however, it is CFA policy that consultation be done directly with the representative body for each fishery. Tuna Australia represent fishers in the Western Tuna and Billfish Fishery (the only Commonwealth fishery with activities relevant to the Operational Area and EMBA). WAFIC is the peak industry body representing commercial fishers in WA, including all WA managed fisheries and fishers in the Commonwealth managed Western Tuna and Billfish Fishery. On 30th November 2022, WAFIC issued TEO with a formal position statement regarding consultation; WAFIC requests that titleholders develop separate consultation strategies for unplanned events (e.g., oil spills), where titleholders are able to demonstrate that the likelihood of the activity such events occurring is extremely low. WAFIC and the commercial fishing licence holders they represent, should not be proactively consulted on unplanned events. Consultation on unplanned events should only be undertaken if an incident occurs that may affect commercial fishers. TEO has followed this advice during identification and subsequent engagement with relevant commercial fisheries.

TEO has engaged with commercial fishing licence holders relevant to the planned activity through WAFIC and has also notified Tuna Australia.

10.2.4.5 Tourism and Recreational Operators

TEO identified tourism and recreation stakeholders based on activities identified in Section 4.7 that may occur within the areas potentially impacted by planned and unplanned activities. Relevant persons and organisations were identified considering the following groups and functions:

- State and regional tourism associations;
- Recreational fishing industry bodies;
- State and regional SCUBA and free diving clubs and associations;
- State and regional sailing and boating clubs and associations; and
- Marine or coastal tour operators.

Identification and engagement of relevant persons within the tourism and recreation sectors is initially undertaken with representative industry bodies (e.g. regional tourism associations, the State recreational fishing body). Through this process, specific operators or clubs may be identified.

10.2.4.6 Other Industry and Marine Users

Other industry and marine users identified as relevant persons, with reference to Section 4.8 may include but not be limited to:

- Petroleum titleholders with permits or activities that overlap with the planned EMBA;
- Operators of submarine cable operators within the planned EMBA; and
- Port authorities.

10.2.5 Assessment of Relevant Persons Identified for this EP

The list of relevant persons consulted during the development of the EP is outlined in Table 10-3.

Table 10-3: Identification of Relevant Person Consulted

Relevant Person/Organisation	Relevant to planned activities (Yes / No)	Relevant to unplanned events (Yes / No)	Notify / Consult	Description of Consultation
Regulation 11A, 1(a) Each Department or agency of the Commonwealth to which the activities to be carried out under the EP, or the revision of the EP, may be relevant				
Department of Climate Change, Energy, the Environment and Water (General)	Yes	Yes	Notify	Responsible for implementing Commonwealth public policy, guidance, management plans and programs to support climate change, sustainable energy use, water resources, the environment and heritage. DCCEEW includes the Australian Antarctic Division encompassing the Australian Marine Mammal Centre.
Department of Climate Change, Energy, the Environment and Water (Director of National Parks)	No	Yes	Notify	The Director of National Parks is the statutory authority responsible for administration, management and control of Australian marine parks. Under the EPBC Act and subordinate regulations, a range of activities undertaken in an Australian marine park requires approval from the Director of National Parks. Petroleum and greenhouse gas activities undertaken in an Australian marine park are assessed by NOPSEMA in accordance with the Program. Planned activities will not occur within or near an Australian marine park, however, the Director of National Parks has been notified of the activity. The Director of National Parks will also be notified in the unlikely event of a hydrocarbon spill that may impact an Australian marine park, consistent with NOPSEMA Guidance Note GN1785: Petroleum Activities and Australian Marine Parks (NOPSEMA 2020).
Australia Maritime Safety Authority (AMSA)	Yes	Yes	Consult	The Australian Maritime Safety Authority (AMSA) is a statutory authority and its principal functions are to: - promote maritime safety and protection of the marine environment - prevent and combating ship-sourced pollution in the marine environment - provide infrastructure to support safe navigation in Australian waters - provide a national search and rescue service to the maritime and aviation sectors. AMSA delivers a range of navigational services, primarily aimed at the levy-paying commercial shipping industry. These services provide ships with the ability to navigate safely around Australia's coastline and to and from its ports. AMSA typically provide advice regarding marine navigational safety, therefore, the level of engagement is 'consult'.
Australian Hydrographic Office (AHO)	Yes	Yes	Notify	The Australian Hydrographic Office is responsible for the publication and distribution of notice to mariners, nautical products and other information required for the safety of ships navigating in Australian waters. As notice to mariners is not required at this stage of consultation, and the operating Cliff Head offshore facilities are already marked on nautical chart products, AHO is contacted at the 'Notify' level.

Relevant Person/Organisation	Relevant to planned activities (Yes / No)	Relevant to unplanned events (Yes / No)	Notify / Consult	Description of Consultation
Department of Defence	Yes	Yes	Consult	Responsible for defending Australia and its national interests. Cliff Head platform overlaps with restricted airspace R131G.
Department of Agriculture, Fisheries and Forestry (DAFF) (Fisheries)	Yes	Yes	Consult	Commonwealth Department responsible for the biological, economic and social sustainability of Australian fisheries, particularly those managed by the Australian Government.
Department of Agriculture, Fisheries and Forestry (DAFF) (Marine Pests)	Yes	Yes	Consult	Commonwealth Department with primary policy and regulatory responsibility for managing biosecurity for incoming goods and conveyances, including biosecurity for marine pests. The Department implements and enforces the *Biosecurity Act 2015*.
Department of Agriculture, Fisheries and Forestry (DAFF) - Biosecurity (vessels, aircraft and personnel)	Yes	Yes	Consult	Commonwealth Department responsible for biosecurity and processing of vessels and administers the *Biosecurity Act 2015*.
National Native Title Tribunal (NNTT)	Yes	Yes	Consult	The Yamatji National Native Title area overlaps the Operational Area and the South West Settlement National Native Title area overlaps the EMBA. Following the decision made by the Federal Court of Australia in *Tipakalippa v National Offshore Petroleum Safety and Environmental Management Authority (No 2) [2022] FCA 1121* on 21 September 2022, TEO has extended consultation to Traditional Owner groups with potential Sea Country interests in the Operational Area and EMBA. NNTT were consulted regarding the process of identifying relevant Traditional Owner groups.
Australian Fisheries Management Authority (AFMA)	Yes	Yes	Notify	The Australian Fisheries Management Authority (AFMA) is responsible for the implementation of Commonwealth fisheries policy. In managing Commonwealth fisheries, AFMA pursues objectives as outlined in the Fisheries Management Act 1991, Fisheries Administration Act 1991 and Torres Strait Fisheries Act 1984. AFMA are consulted in relation to Commonwealth managed fisheries with potential for operations to overlap the Operational Area and the EMBA.

Relevant Person/Organisation	Relevant to planned activities (Yes / No)	Relevant to unplanned events (Yes / No)	Notify / Consult	Description of Consultation
Department of Climate Change, Energy, the Environment and Water (DCCEEW) - Underwater Cultural Heritage	No	No	N/A	Commonwealth Department administers the *Underwater Cultural Heritage Act 2018* (UCH Act). The Commonwealth Government regulates activity in relation to protected underwater cultural heritage (UCH) within Australian waters including the Commonwealth marine area. The underwater cultural heritage database was accessed for the purposes of this EP, but no need to consult was identified.
Department of Climate Change, Energy, the Environment and Water (DCCEEW) – Environment Approvals Division	No	No	N/A	The Environment Approvals Division of DCCEEW manages the process of environmental approvals where an action has the potential to result in a significant impact to matters of national environmental significance under the EPBC Act, including in the Commonwealth Marine Area. However, NOPSEMA is endorsed by the Federal Minister for the Environment to regulate petroleum and greenhouse gas storage activities in Commonwealth waters, such that they do not require separate referral, assessment and approval under the EPBC Act by DCCEEW.
Australian Communication and Media Authority (ACMA)	Yes	Yes	Consult	The ACMA regulates communications and media in Australia, including subsea media and telecommunications cables. No subsea cables are present within the Operational Area or EMBA, however, ACMA can be contacted and asked to advise if any new cables are planned for construction, where activities could intersect with planned or unplanned activities.
Regulation 11A, 1(b) Each Department or agency of a State to which the activities to be carried out under the EP, or the revision of the EP, may be relevant				
Department of Transport – Marine (DoT WA)	Yes	Yes	Consult	Legislated responsibility for oil pollution response in State waters. State Government department responsible for marine vessel traffic safety.
Department of Biodiversity, Conservation and Attractions (DBCA)	Yes	Yes	Notify	Lead agency in WA for Oiled Wildlife Response.
Department of Primary Industries and Regional Development (DPIRD) – Fisheries	Yes	Yes	Consult	State government department responsible for the management of State fisheries and aquatic resources.
DWER (Department of Water Environment Regulation)	Yes	Yes	Notify	State government department responsible for environment and water regulation

Relevant Person/Organisation	Relevant to planned activities (Yes / No)	Relevant to unplanned events (Yes / No)	Notify / Consult	Description of Consultation
EPA Western Australia	No	No	N/A	EPA is Western Australia's EPA's key roles is to provide Government with advice on the environmental acceptability of development proposals and statutory planning schemes. However, their legislated requirements and decision-making powers extend to State jurisdiction, and their functions, interests and activities are not expected to be affected. Therefore, they are not considered a relevant State department under Regulation 11A, 1(b).
Regulation 11A, 1(c) Departments of the responsible State Minister				
WA Department of Mines, Industry Regulation and Safety (DMIRS)	Yes	Yes	Notify	The Department of the responsible State Minister for waters offshore from WA in accordance with OPGGS (Environment) Regulation 11A. The Department will be notified in the event of a reportable incident (Regulation 26 and 26A) and prior to commencement of drilling activities (Regulation 30).
Department of Industry, Science and Resources (DISR) - National Offshore Petroleum Titles Administrator (NOPTA)	No	No	N/A	NOPTA is a branch within the Department of Industry, Science and Resources, the Department of the Minister for offshore petroleum and GHG titles in Commonwealth waters under the OPGGS Act 2006. NOPTA is already provided notifications of title developments as the titles administrator for Commonwealth waters. NOPTA does not represent a Minister of the State authorised to perform the functions a member of the Joint Authority for WA under the OPGGS Act. Therefore, they are not a relevant person and do not require additional consultation.
Regulation 11A, 1(d) Person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the EP, or the revision of the EP				
Local Government Authorities				
Shire of Irwin	Yes	Yes	Notify	LGA representing Dongara and Port Denison. Given the interests of the LGA are located on coastline adjacent to the proposed activities, and noting potential community interest in the proposed activity, TEO will provide the LGA with information about the activity such that they are informed should a member of the community contact them.

Relevant Person/Organisation	Relevant to planned activities (Yes / No)	Relevant to unplanned events (Yes / No)	Notify / Consult	Description of Consultation
City of Greater Geraldton	No	Yes	Notify	LGA representing Greater Geraldton. Given the EMBA includes the coastline of the LGA and a hydrocarbon spill could potentially affect the functions, interests and activities of the LGA, TEO will provide the LGA with information about the proposed activity.
Shire of Chapman Valley	No	Yes	Notify	LGA representing the Shire of Chapman Valley. Given the EMBA includes the coastline of the LGA and a hydrocarbon spill could potentially affect the functions, interests and activities of the LGA, TEO will provide the LGA with information about the proposed activity.
Shire of Northampton	No	Yes	Notify	LGA representing Northampton, including Horrocks, Port Gregory and Kalbarri. Given the EMBA includes the coastline of the LGA and a hydrocarbon spill could potentially affect the functions, interests and activities of the LGA, TEO will provide the LGA with information about the proposed activity.
Shire of Carnamah	No	Yes	Notify	LGA representing the Shire of Carnamah. Given the EMBA includes the coastline of the LGA and a hydrocarbon spill could potentially affect the functions, interests and activities of the LGA, TEO will provide the LGA with information about the proposed activity.
Shire of Coorow	No	Yes	Notify	LGA representing Coorow, including Leeman and Greenhead. Given the EMBA includes the coastline of the LGA and a hydrocarbon spill could potentially affect the functions, interests and activities of the LGA, TEO will provide the LGA with information about the proposed activity.

Relevant Person/Organisation	Relevant to planned activities (Yes / No)	Relevant to unplanned events (Yes / No)	Notify / Consult	Description of Consultation
Shire of Dandaragan	No	Yes	Notify	LGA representing the Shire of Dandaragan, including Jurien Bay, Cervantes, Wedge Island and Lancelin. Given the EMBA includes the coastline of the LGA and a hydrocarbon spill could potentially affect the functions, interests and activities of the LGA, TEO will provide the LGA with information about the proposed activity.
Shire of Gingin	No	Yes	Notify	LGA representing the Shire of Gingin, including Lancelin. Given the EMBA includes the coastline of the LGA and a hydrocarbon spill could potentially affect the functions, interests and activities of the LGA, TEO will provide the LGA with information about the proposed activity.
Commonwealth Fishing Industry Associations				
Commonwealth Fisheries Association (CFA)	Yes	Yes	Notify	Peak representative body for all Commonwealth fisheries. CFA represent all Commonwealth fisheries, but have communicated to industry that they primarily get involved in fisheries management and policy level decision-making. They do not typically get involved in consultation relating to individual petroleum activities and interactions with specific fisheries or fishers. Therefore the level of engagement is selected as notify, rather than consult, though further consultation can be had with CFA should they request it.
Seafood Industry Australia	Yes	Yes	Notify	Peak representative body for the Australian seafood industry as a whole. They do not typically get involved in consultation relating to individual petroleum activities and interactions with specific fisheries or fishers. Therefore the level of engagement is selected as notify, rather than consult, though further consultation can be had with SIA should they request it.
Tuna Australia	Yes	Yes	Notify	Tuna Australia is the representative body for the Western Tuna and Billfish Fishery. As per Section 4.7.4, fishing effort data confirms that the fishery is active at a low level within or adjacent to the Operational Area (ABARES fishing effort data indicates less than 5 vessels per year in 60 NM block overlapping the Operational Area; fishing is unlikely to occur in the Operational Area itself, noting tuna are typically targeted in deeper offshore waters than the Operational Area).

Relevant Person/Organisation	Relevant to planned activities (Yes / No)	Relevant to unplanned events (Yes / No)	Notify / Consult	Description of Consultation
Australian Southern Bluefin Tuna Industry Association (ASBTIA)	Yes	Yes	Notify	Representative body for the Southern Bluefin Tuna Fishery. As per Section 4.7.4, fishing effort data confirms that the fishery is not active within the Operational Area or EMBA. Fishing effort occurs off SA and the east coast of Australia. However, juvenile southern bluefin tuna (EPBC Act listed Conservation Dependent species) migrate annually down the west coast of WA, between spawning grounds near Indonesia and feeding grounds in the Southern Ocean. Therefore, ASBTIA will be notified and further consultation can be had, should they request it.
State Fishing Industry Associations				
Western Australian Fishing Industry Council (WAFIC)	Yes	Yes	Consult	The peak industry body representing professional fishing, pearling and aquaculture enterprises, processors and exporters in Western Australia
Western Rock Lobster Council	Yes	Yes	Consult	Representative body for the Western Rock Lobster Fishery.
Pearl Producers Association of WA (PPA)	Yes	Yes	Consult	Peak representative organisation of the Australian South Sea Pearling Industry
Geraldton Professional Fisherman's Association	Yes	Yes	Consult	Representative body for commercial fishers operating in Geraldton
Dongara Professional Fisherman's Association	Yes	Yes	Consult	Representative body for commercial fishers operating in Dongara
Commonwealth Fisheries - Licence holders				
Western Tuna and Billfish Fishery	Yes	Yes	Consult	As per Section 4.7.4, fishing effort data confirms that the fishery is active at a low level within or adjacent to the Operational Area (ABARES fishing effort data indicates less than 5 vessels per year in 60 NM block overlapping the Operational Area; fishing is unlikely to occur in the Operational Area itself, noting tuna are typically targeted in deeper offshore waters than the Operational Area) . Tuna Australia has been notified and further consultation can be had with licence holders, should they request it. Engagement with the Licence holder in the Western Tuna and Billfish Fishery who reside in WA and fish waters off the WA coast have been contacted by WAFIC.

Relevant Person/Organisation	Relevant to planned activities (Yes / No)	Relevant to unplanned events (Yes / No)	Notify / Consult	Description of Consultation
Western Skipjack Fishery	No	No	N/A	As per Section 4.7.4, fishing effort data confirms that the fishery is not active within the Operational Area or EMBA. The fishery has not been active since 2008 and, therefore, licence holders will not be consulted. N.B. Tuna Australia, the representative industry body for this fishery will be notified in relation to the Western Tuna and Billfish Fishery. ASBTIA will also be notified.
Small Pelagic Fishery	No	No	N/A	As per Section 4.7.4, fishing effort data confirms that the fishery is not active within the Operational Area or EMBA.
Southern Bluefin Tuna Fishery	Yes	Yes	Notify (notification will be provided to ASBTIA; individual licence holders will not be contacted unless suggested by ASBTIA)	As per Section 4.7.4, fishing effort data confirms that the fishery is not active within the Operational Area or EMBA. Fishing effort occurs off SA and the east coast of Australia. However, juvenile southern bluefin tuna (EPBC Act listed Conservation Dependent species) migrate annually down the west coast of WA, between spawning grounds near Indonesia and feeding grounds in the Southern Ocean. ASBTIA will be notified and further consultation can be had with licence holders, should they request it.
Western Deepwater Trawl Fishery	No	Yes	N/A	The Western Deepwater Trawl Fishery management area lies in waters depths >200m. A review of ABARES fishing effort data indicates that recent fishing effort occurs in waters off Carnarvon, north of the EMBA. However, in previous years, some fishing effort has occurred in waters further south and in close proximity to the EMBA. While the fishery does not overlap the EMBA, it has been included as potentially relevant on a precautionary basis, noting the close proximity of the fishery to the EMBA. Despite being a Commonwealth fishery, AFMA list WAFIC as the representative industry body for the fishery. WAFIC has requested that titleholders develop separate consultation strategies for unplanned events (e.g., oil spills), where WAFIC and the commercial fishing licence holders they represent, should not be proactively consulted on unplanned events. Consultation on unplanned events should only be undertaken if an incident occurs that may affect commercial fishers. TEO has followed this advice and this fishery has not been contacted directly.
State Managed Fisheries				

Relevant Person/Organisation	Relevant to planned activities (Yes / No)	Relevant to unplanned events (Yes / No)	Notify / Consult	Description of Consultation
Octopus Interim Managed Fishery	Yes	Yes	Consult (via WAFIC)	As per Section 4.7.4, fishing effort data confirms that the fishery is active within the Operational Area. Fishers in this fishery were consulted via WAFIC.
West Coast Demersal Gillnet and Demersal Longline (Interim) Management Fishery	Yes	Yes	Consult (via WAFIC)	As per Section 4.7.4, fishing effort data confirms that the fishery is active within the Operational Area. Fishers in this fishery were consulted via WAFIC.
West Coast Demersal Scalefish (Interim) Managed Fishery	Yes	Yes	Consult (via WAFIC)	As per Section 4.7.4, fishing effort data confirms that the fishery is active within the Operational Area. Fishers in this fishery were consulted via WAFIC.
West Coast Rock Lobster Managed Fishery	Yes	Yes	Consult (via WAFIC)	As per Section 4.7.4, fishing effort data confirms that the fishery is active within the Operational Area. Fishers in this fishery were consulted via WAFIC.
Patience Bulk Haulage (West Coast Rock Lobster Managed Fishery License Holder)	Yes	Yes	Consult (via WAFIC)	As per Section 4.7.4, fishing effort data confirms that the fishery is active within the Operational Area. Fishers in this fishery were consulted via WAFIC.
Marine Aquarium Managed Fishery	No	Yes	Notify (via WAFIC)	As per Section 4.7.4, fishing effort data confirms that the fishery is not active within the Operational Area. However the fishery is active within the EMBA. Therefore, notification was provided to WAFIC. However, WAFIC has requested that titleholders develop separate consultation strategies for unplanned events (e.g., oil spills), where WAFIC and the commercial fishing licence holders they represent, should not be proactively consulted on unplanned events. Consultation on unplanned events should only be undertaken if an incident occurs that may affect commercial fishers. TEO has followed this advice.
Specimen Shell Managed Fishery	No	Yes	Notify (via WAFIC)	As per Section 4.7.4, fishing effort data confirms that the fishery is not active within the Operational Area. However the fishery is active within the EMBA. Therefore, notification was provided to WAFIC. However, WAFIC has requested that titleholders develop separate consultation strategies for unplanned events (e.g., oil spills), where WAFIC and the commercial fishing licence holders they represent, should not be proactively consulted on unplanned events. Consultation on unplanned events should only be undertaken if an incident occurs that may affect commercial fishers. TEO has followed this advice.

Relevant Person/Organisation	Relevant to planned activities (Yes / No)	Relevant to unplanned events (Yes / No)	Notify / Consult	Description of Consultation
West Coast Deep Sea Crustacean Fishery	No	Yes	Notify (via WAFIC)	As per Section 4.7.4, fishing effort data confirms that the fishery is not active within the Operational Area. However the fishery is active within the EMBA. Despite not being active in the Operational Area, fishers in this fishery were consulted via WAFIC.
Mackerel Managed Fishery	No	Yes	Notify (via WAFIC)	As per Section 4.7.4, fishing effort data confirms that the fishery is not active within the Operational Area. However the fishery is active within the EMBA. Therefore, notification was provided to WAFIC. However, WAFIC has requested that titleholders develop separate consultation strategies for unplanned events (e.g., oil spills), where WAFIC and the commercial fishing licence holders they represent, should not be proactively consulted on unplanned events. Consultation on unplanned events should only be undertaken if an incident occurs that may affect commercial fishers. TEO has followed this advice..
West Coast Pure Seine Managed Fishery	No	Yes	Notify (via WAFIC)	As per Section 4.7.4, fishing effort data confirms that the fishery is not active within the Operational Area. However the fishery is active within the EMBA. Therefore, notification was provided to WAFIC. However, WAFIC has requested that titleholders develop separate consultation strategies for unplanned events (e.g., oil spills), where WAFIC and the commercial fishing licence holders they represent, should not be proactively consulted on unplanned events. Consultation on unplanned events should only be undertaken if an incident occurs that may affect commercial fishers. TEO has followed this advice.
Abrolhos Islands and Mid West Trawl Managed Fishery	No	Yes	Notify (via WAFIC)	As per Section 4.7.4, fishing effort data confirms that the fishery is not active within the Operational Area. However the fishery is active within the EMBA. Therefore, notification was provided to WAFIC. However, WAFIC has requested that titleholders develop separate consultation strategies for unplanned events (e.g., oil spills), where WAFIC and the commercial fishing licence holders they represent, should not be proactively consulted on unplanned events. Consultation on unplanned events should only be undertaken if an incident occurs that may affect commercial fishers. TEO has followed this advice.
Abalone Managed Fishery	No	No	N/A	As per Section 4.7.4, fishing effort data confirms that the fishery is not active within the Operational Area or EMBA. Therefore, notification was provided to WAFIC. However, WAFIC has requested that titleholders develop separate consultation strategies for unplanned events (e.g., oil spills), where WAFIC and the commercial fishing licence holders they represent, should not be proactively consulted on unplanned events. Consultation on unplanned events should only be undertaken if an incident occurs that may affect commercial fishers. TEO has followed this advice.

Relevant Person/Organisation	Relevant to planned activities (Yes / No)	Relevant to unplanned events (Yes / No)	Notify / Consult	Description of Consultation
South West Coast Salmon Managed Fishery	No	No	N/A	As per Section 4.7.4, fishing effort data confirms that the fishery is not active within the Operational Area or EMBA. Therefore, notification was provided to WAFIC. However, WAFIC has requested that titleholders develop separate consultation strategies for unplanned events (e.g., oil spills), where WAFIC and the commercial fishing licence holders they represent, should not be proactively consulted on unplanned events. Consultation on unplanned events should only be undertaken if an incident occurs that may affect commercial fishers. TEO has followed this advice.
Shark Bay Crab Managed Fishery	No	No	N/A	As per Section 4.7.4, fishing effort data confirms that the fishery is not active within the Operational Area or EMBA. Therefore, notification was provided to WAFIC. However, WAFIC has requested that titleholders develop separate consultation strategies for unplanned events (e.g., oil spills), where WAFIC and the commercial fishing licence holders they represent, should not be proactively consulted on unplanned events. Consultation on unplanned events should only be undertaken if an incident occurs that may affect commercial fishers. TEO has followed this advice.
West Coast (Beach Bait Fish Net) Managed Fishery	No	No	N/A	As per Section 4.7.4, fishing effort data confirms that the fishery is not active within the Operational Area or EMBA. Therefore, notification was provided to WAFIC. However, WAFIC has requested that titleholders develop separate consultation strategies for unplanned events (e.g., oil spills), where WAFIC and the commercial fishing licence holders they represent, should not be proactively consulted on unplanned events. Consultation on unplanned events should only be undertaken if an incident occurs that may affect commercial fishers. TEO has followed this advice.
West Coast Deep Sea Crustacean Managed Fishery	No	Yes	Notify (via WAFIC)	The West Coast Deep Sea Crustacean Managed Fishery can fish in water depths greater than the 150 m isobath, with fishing targeting crystal crabs, which are caught primarily in depths of 500 – 800m. Fishing effort is primarily concentrated between Fremantle and Carnarvon. Fishing effort may potentially overlap with the EMBA. Therefore, notification was provided to WAFIC. However, WAFIC has requested that titleholders develop separate consultation strategies for unplanned events (e.g., oil spills), where WAFIC and the commercial fishing licence holders they represent, should not be proactively consulted on unplanned events. Consultation on unplanned events should only be undertaken if an incident occurs that may affect commercial fishers. TEO has followed this advice.
Recreational Fisheries				
Recfishwest	Yes	Yes	Consult	Peak representative recreational fishing body for WA.

Relevant Person/Organisation	Relevant to planned activities (Yes / No)	Relevant to unplanned events (Yes / No)	Notify / Consult	Description of Consultation
Australian Recreational Fishing Foundation (ARFF)	Yes	Yes	Notify	The Australian Recreational Fishing Foundation is the peak representative recreational fishing body to the Australian Federal Government. It is a partnership between State peak recreational fishing bodies, representative organisations and fish habitat groups.
Oil & Gas Industry / Other Industry				
Australian Marine Oil Spill Centre (AMOSC)	Yes	Yes	Consult	Operates the Australian oil industry's major oil spill response facility
Mid West Ports	Yes	Yes	Consult	Port Authority
Tourism & Recreation				
Tourism Western Australia	Yes	Yes	Consult	Representative agency for State tourism operations
Visit WA	Yes	Yes	Consult	Western Australian tourism operator
Eco Abrolhos	No	Yes	Notify	Tour charter company operating within the EMBA
Turquoise Coast Visitor Centre	Yes	Yes	Consult	Representative agency for local tourism operations
Kalbarri Visitor Centre	No	Yes	Consult	Representative agency for local tourism operations
Pinnacles Visitor Centre	No	Yes	Consult	Representative agency for local tourism operations including sea lion tours
Visit Geraldton	No	Yes	Consult	Representative agency for local tourism operations
Australia's Coral Coast	Yes	Yes	Consult	Representative agency for local tourism operations
Western Australian Visitor Centre	Yes	Yes	Consult	Representative agency for local tourism operations
Dongara Port Denison Visitors Centre	No	Yes	Consult	Representative agency for local tourism operations
Western Australian Indigenous Tourism Operators Council	Yes	Yes	Consult	Representative agency for local tourism operations
Wedge WA	No	Yes	Consult	Representative agency for local tourism operations
Abrolhos Island Charters	No	Yes	Notify	Tour charter company operating within the EMBA

Relevant Person/Organisation	Relevant to planned activities (Yes / No)	Relevant to unplanned events (Yes / No)	Notify / Consult	Description of Consultation
Lobster Shack	No	Yes	Notify	Tour charter company operating within the EMBA
Abrolhos Adventures	No	Yes	Notify	Tour charter company operating within the EMBA
Platinum Plus Charters	No	Yes	Notify	Tour charter company operating within the EMBA
Turquoise Safaris	No	Yes	Notify	Tour charter company operating within the EMBA
Regulation 11A, 1(e) Any other person or organisation that the titleholder considers relevant				
NGOs				
World Wildlife Fund for Nature (WWF)	Yes	Yes	Consult	World's leading conservation organisation
The Wilderness Society	Yes	Yes	Consult	An Australian, community based environmental advocacy organisation
WA Conservation Council	Yes	Yes	Consult	Western Australia's foremost not-for-profit, non-government conservation and environment organisation
Midwest Carbon Zero	yes	yes	Notify	Midwest Carbon Zero are an organisation in Geraldton, Western Australia who advocate for stronger climate action at all levels of government. Midwest Carbon Zero support and partner with business and community in the transition to a zero emissions world.
Abrolhos Islands: Houtman Abrolhos Conservation Network	No	Yes	Notify	Organisation formed to conserve the Islands unique terrestrial, marine and heritage assets, whilst managing increasing pressure from human activities. Organisation promotes ecologically sustainable developments at the Houtman Abrolhos Islands and surrounding marine ecosystems.
Australian Conservation Foundation	Yes	Yes	Consult	Advocacy organisation targeting the climate crisis and nature destruction.
Greenpeace Australia Pacific	Yes	Yes	Consult	Advocacy organisation targeting the climate crisis and nature destruction.

Relevant Person/Organisation	Relevant to planned activities (Yes / No)	Relevant to unplanned events (Yes / No)	Notify / Consult	Description of Consultation
Climate Action Network Australia	No	Yes	N/A	Persons or organisations with only general interests or concerns regarding climate change (i.e. not activity specific or specific to locations within the EMBA) are not considered relevant persons according to subregulation 11A(1)(d) and are not identified for direct and targeted consultation.
350.org Australia	No	No	N/A	Persons or organisations with only general interests or concerns (i.e. not activity specific or specific to locations within the EMBA) are not considered relevant persons according to subregulation 11A(1)(d) and are not identified for direct and targeted consultation.
Australian Youth Climate Coalition	No	No	N/A	Persons or organisations with only general interests or concerns regarding climate change (i.e. not activity specific or specific to locations within the EMBA) are not considered relevant persons according to subregulation 11A(1)(d) and are not identified for direct and targeted consultation.
Australian Marine Conservation Society	Yes	Yes	Consult	Mission includes action to protect Australia's ocean. Many active campaigns opposing industrial activity.
BirdLife Australia	Yes	Yes	Consult	Purpose includes: "Working with industry to ensure protecting nature is at the forefront of decisions, policies and practices."
Clean Ocean Foundation	Yes	Yes	Consult	Purpose includes stopping all forms of ocean pollution including industrial discharges to marine environments.
Dolphin Research Australia	Yes	Yes	Consult	Conservation org
Environment Defenders Office	Yes	Yes	Consult	Using the law (eg OPGGS regs) to protect wildlife, people and places.
Environment Justice Australia	No	No	N/A	Persons or organisations with only general interests or concerns (i.e. not activity specific or specific to locations within the EMBA) are not considered relevant persons according to subregulation 11A(1)(d) and are not identified for direct and targeted consultation.
Fauna and Flora International	Yes	Yes	Consult	"Influencing businesses and industry players to ensure biodiversity makes it onto the corporate agenda"

Relevant Person/Organisation	Relevant to planned activities (Yes / No)	Relevant to unplanned events (Yes / No)	Notify / Consult	Description of Consultation
Sea Shepherd Australia	Yes	Yes	Consult	Direct action campaigns on the ocean to protect and conserve the ocean.
Sea turtle foundation	Yes	Yes	Consult	"Identify, highlight, and minimise processes threatening populations"
Northern Agricultural Catchment Council	Yes	Yes	Consult	NRM organisation within EMBA inc Abrolhos Is. NACC coastal team doesn't specifically state working with business.
Whale and Dolphin Conservation (Australasia) Inc	Yes	Yes	Consult	Clear references to oil and gas drilling against goal to create healthy seas.
Traditional Owner Groups				
Yamatji Southern Regional Corporation (YSRC)	Yes	Yes	Consult	The native title representative body for the Yamatji and Pilbara regions of WA. A Yamatji Proponent Standard Heritage Agreement is in place between TEO and Yamatji Southern Regional Corporation as of February 2021.
Bundi Yamatji Aboriginal Corporation	Yes	Yes	Notify	The prescribed body corporate for the Yamatji Nation native title holders and will become the Registered Native Title Body Corporate
Office of the Registrar of Indigenous Corporations	Yes	Yes	Notify	The Registrar of Indigenous Corporations is an independent statutory office holder appointed by the Minister for Indigenous Affairs under the Corporations (Aboriginal and Torres Strait Islander) Act 2006 (CATSI Act).
Yamatji Marlpa Aboriginal Corporation (YMAC)	Yes	Yes	Notify	Regional Entity to implement best practice governance structure to manage the benefits of the settlement agreement
South West Aboriginal Land and sea Council	No	Yes	Notify	Represents the Noongar Traditional Owners associated with the South West Settlement National Native Title area overlapping the EMBA
Noongar Boodjar Language Cultural Aboriginal Corporation	No	Yes	Notify	Operates as a peak body for the Noongar language and dialects

Relevant Person/Organisation	Relevant to planned activities (Yes / No)	Relevant to unplanned events (Yes / No)	Notify / Consult	Description of Consultation
Yued Aboriginal Corporation	No	Yes	Notify	Represents the Yued Noongar Traditional Owners associated with the South West Settlement National Native Title area overlapping the EMBA
Kwelena Mambakort Wedge Island Aboriginal Association	No	Yes	Notify	Represents the traditional owners of Wedge Island

10.2.6 Identification of Relevant Other Persons or Organisations

During the life of the EP, additional persons may be identified by:

- TEO as part of ongoing consultation, monitoring and review
- Contacting TEO and self-identifying
- Third parties, regulators or industry providing stakeholder information to TEO.

In addition, persons or organisations may self-identify to TEO. Self-identifying persons or organisations are reviewed and assessed by TEO based on the process and criteria outlined in Section 10.2. If TEO concludes the person is a relevant person in accordance with sub-regulation 11A (1), they will be consulted as outlined in Section 10.5. Where additional persons are not assessed by TEO as being relevant, the person or organisation will be advised of this.

10.3 Preparatory consultation

10.3.1 Stakeholder Consultation Method and Materials

As a general approach, consultation with identified relevant persons comprises the following steps:

1. Provision of information suitable for each relevant person to make an informed assessment of the possible consequences of the activity on their functions, interests or activities;
2. Provision of reasonable opportunity for stakeholder to respond (typically 30 days);
3. Assessment of merit of objections and claims (Section 10.3.2);
4. Incorporation of feedback into EP to ensure the activity impacts and risks are consistent with the principles of ESD, ALARP and Acceptable.
5. Follow up and responses to stakeholders;
6. Ongoing consultation.

Specifically, for the revision of this EP for NOPSEMA, stakeholder consultation emails and factsheet (including fishery associations and representative bodies) were issued on the 18 August 2022 (Appendix E). In addition to consulting fishers through the appropriate fishing association or representative body, emails to all individual licence holders of the state-managed fisheries were issued by WAFIC on the 1 September 2022. Further consultation was conducted from 3 November 2022 with Yamatji Southern Regional Corporation.

The initial factsheet sent in August 2022 is provided in Appendix E of this EP. The factsheet in Appendix E was then revised to include a more information location figure and is provided in Appendix F. A more targeted factsheet for Traditional Owner Groups and eNGOs was developed and distributed to relevant persons (Appendix G). The information provided to relevant persons, such that persons are able to make an informed assessment of the possible consequences of the activity on their functions, interests or activities, includes:

- A description of the activities planned to be undertaken under this EP;
- A map and description of the activity location and timing;
- A summary of the potential impacts arising from ongoing operations; and
- A summary of how potential environmental impacts are being managed.

In addition, information about the activity has been made available via the following, such that information is available to other persons or organisations than those identified by TEO as relevant persons:

- A copy of the fact sheet was published on the TEO website from 14th November 2022 (available at: Home - Triangle Energy; a copy of the fact sheet is provided in Appendix F).
- A post and a copy of the fact sheet was shared on the TEO LinkedIn news feed ((98) Post | Feed | LinkedIn (a copy of the post is provided in Appendix H).
- Advertised in the local weekly *Dongara Rag* newspaper for four weeks, beginning 30th November 2022 (a copy of the post is provided in Appendix I).

In addition, TEO publishes regular updates about the Cliff Head Project on the company website, Twitter and the Australian Stock Exchange (ASX), such that project activities and updates are regularly in the public domain. Sufficient and Timely Information

A key requirement of Regulation 11A of the OPGGS (E) Regulations is that relevant persons are provided with sufficient information and reasonable time to make an informed decision on the possible consequences of the activity on their functions, interests or activities.

It should be noted that the initial consultation email and factsheet represents only the first step in proactive and meaningful engagement with stakeholders. Feedback received from stakeholders informs subsequent engagement. Stakeholder interest will vary and appropriate methods for consultation are considered on a case-by-case basis to ensure effective communication. Additional targeted consultation material may be developed (e.g. briefing presentation to support face-to-face engagement) to ensure sufficient information is provided and positive outcomes can be achieved.

Due to the longstanding nature of the Cliff Head offshore operations, many stakeholders have previously been consulted by TEO or the previous operators of the Cliff Head operations. These stakeholders are, therefore relatively familiar with the operation and have required less bespoke engagements to understand how their activities, functions or interests may be affected by the ongoing activity. However, additional information may be requested as part of the consultation process if necessary. Existing and newly identified relevant persons have been provided with a copy of the fact sheet and an explanation of the purpose of the engagement is provided with the covering email. Relevant persons are invited to request further information if they require it.

Consultation arrangements typically provide relevant persons a minimum of 30 days (unless otherwise agreed) to review and respond to proposed activities where relevant persons are potentially affected. TEO considers this consultation period a reasonable timeframe. In instances where no response is received, TEO has sent a follow up email reminder to these stakeholders. TEO will continue to accept feedback from stakeholders during the assessment and operational life of this EP.

10.3.2 Assessment of Merit

All feedback received from stakeholders is reviewed and any objections or claims about an adverse impact of an activity to which the EP relates are assessed for merit in accordance with the process outlined in Figure 10.1. The assessment of merit considers whether an objection or claim is substantiated, as well as review of other available data or literature for relevancy to the nature and scale of the activity outlined in the EP.

Where the objection or claim is substantiated and is assessed to have merit, it is addressed in the assessment of environmental impacts and risks (Section 6 and Section 7) and additional controls may be applied where reasonable or practical to continue to manage the activity consistent with the principles of ESD, and to reduce impacts and risks to ALARP and acceptable levels.

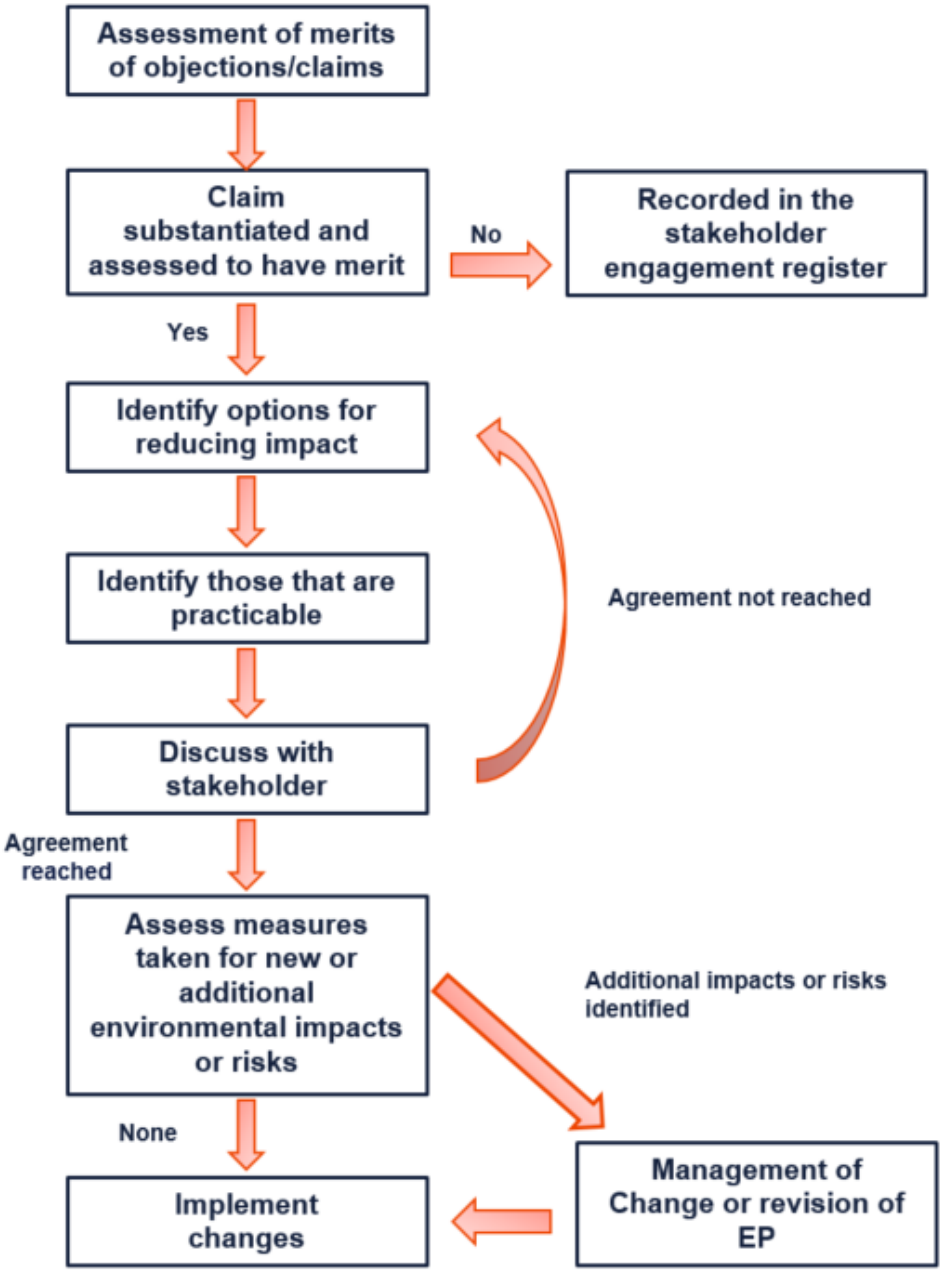


Figure 10.1: Process for assessing and evaluating ongoing stakeholder feedback throughout activities

10.3.3 Summary of Consultation Undertaken for this EP Revision

Up to the date of submission of this EP, responses from 32 relevant persons have been received from relevant persons. Feedback was assessed following the process outlined in Figure 10.1. An assessment of relevant persons and a summary of their consultation status is summarised in Table 10-4, with a more detailed consultation log provided in Appendix J. All correspondence is entered into the Stakeholder Engagement Register which includes:

- Contact details of the relevant persons;
- A log of feedback received from relevant persons;
- A log of TEO's response to the feedback;
- Actions to be completed in seeking mutual acceptance;
- An assessment of the merit of stakeholder claims and a summary of the outcomes of the correspondence (e.g. additional controls implemented as a result);
- A completed check box to be ticked once correspondence is closed out.

No other responses to this consultation have been received, and no other issues or concerns regarding the proposed activities have been raised by any other relevant persons contacted during this preparatory consultation. TEO believes that it has given each organisation/person sufficient information, time and opportunity to allow them to make an informed assessment of the possible consequences of the ongoing operations on their functions, interests or activities. Therefore, in the context of the nature and scale of the proposed activity, the environmental sensitivities and values within the environment that may be affected by planned and unplanned activities, and the outcomes of the risk assessment conducted in this EP, TEO are satisfied that further attempts to contact the relevant persons who haven't responded so far will not alter significantly the manner in which the activity will be conducted. A lack of any response from the consultation has been taken as confirmation that the organisation/person contacted has no particular issues or concerns regarding the CHA operations.

Given the nature of IMR activities however, TEO will follow up with key relevant persons following confirmation of IMR activity dates to ensure relevant persons are aware of the activity. This will include phone calls or emails to provide detailed information. In particular, the rock lobster fisheries will be informed of the dates, vessels and location to minimise potential conflicts as per the MoU with the DPFA.

Table 10-4 Relevant persons submissions

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
Commonwealth Government Department and Agencies				
Australian Fisheries Management Authority (AFMA)	On 18th of August 2022, TEO emailed AFMA advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	On 29th of August 2022, AFMA thanked TEO and explained that at this stage AFMA has no comment on the proposal. AFMA highlighted that it is important to consult with all fisheries who have entitlements to fish within the proposed area and provided links to websites where TEO can identify relevant operators.	N/A	TEO have consulted with all fisheries who have entitlements to fish within the proposed area.
Australian Hydrographic Office (AHO)	On 18th of August 2022, TEO emailed AHS advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	On 19nd of August 2022, AHO acknowledged receipt of the previous email.	N/A	No further action required.
Australian Maritime Safety Authority (AMSA)	On 18th of August 2022, TEO emailed AMSA advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	On 12th of December 2022, relevant person responded, advising that as a maritime regulatory stakeholder, AMSA should be informed of updated at all times.	N/A	No further action required.
	On 12th of December 2022, TEO thanked relevant person for their reply, and confirmed TEO will continue to keep AMSA updated at all times on TEO's ongoing operations.		N/A	No further action required.
Department of Agriculture, Fisheries and Forestry (Fisheries)	On 18th of August 2022, TEO emailed DAFF advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	No feedback received.	N/A	No further action required.
Department of Agriculture, Fisheries and Forestry (Marine Pests)	On 18th of August 2022, TEO emailed DAFF advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	On 18th of August 2022, the relevant person asked for clarification regarding if TEO would like the factsheet email to be circulated with Marine Pest Sectoral Committee (MPSC) relevant persons or is just the Secretariat.	N/A	No further action required.
	On 18th of August 2022, TEO confirmed that the factsheet should be circulated to MPSC relevant persons.	On 19th of August 2022, on behalf of TEO, MSPC circulated fact sheet to MPSC relevant persons.	N/A	No further action required.
	On 17th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	No feedback received.	N/A	No further action required.
Department of Climate Change, Energy, the Environment and Water (General)	On 18th of August 2022, TEO emailed Department of Climate Change, Energy, the Environment and Water advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to	On 13th December 2022, relevant person advised the media team at the federal Department of Climate Change Energy the Environment and Water does not want to receive these emails.	N/A	No further action required.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
	advise if they wish to receive further information on this activity.	Relevant person queried if TEO require that someone in their department see them. If so, relevant person requested TEO proved more information about the project and the relevant person will provide TEO with appropriate contact details.		
	On 13th of December 2022, TEO thanked relevant person for letting TEO know regarding their preference for no longer receiving these emails. TEO advised they don't have any further information to provide at this stage, other than the previously provided Factsheet, which TEO attached again. TEO advised they have already sent separate emails to the below: - Department of Climate Change, Energy, the Environment and Water (DCCEEW) - Underwater Cultural Heritage - Department of Climate Change, Energy, the Environment and Water (DCCEEW) – Environment Approvals Division - Department of Climate Change, Energy, the Environment and Water (Director of National Parks) TEO queried if there is another Division that might be appropriate.	On 14th December 2022, relevant person replied advising that TEO have it covered. Relevant person will share with contact in WA approvals to make sure they have it.	N/A	No further action required.
	On 14th December 2022, TEO thanked relevant person for the confirmation and for following up with WA contact.	No feedback received.	N/A	No further action required.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
Department of Climate Change, Energy, the Environment and Water (Marine Parks & Reserves)	On 18th of August 2022, TEO emailed Department of Climate Change, Energy, the Environment and Water advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	On 18th of November 2022, the relevant person noted that the planned activities do not overlap any Australian Marine Parks. The relevant person advised there are no authorisation requirements from the DNP. The relevant person further advised TEO in preparing the EP, TEO should consider the Australian marine parks and their representativeness in the context of the management plan objectives and values, and provided guidance. The relevant person also noted requirements regarding emergency responses and the DNP should be made aware of oil/gas pollution incidences which occur within a marine park or are likely to impact on a marine park as soon as possible.	N/A	No further action required.
Department of Defence	On 18th of August 2022, TEO emailed Department of Defence advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	No feedback received.	N/A	No further action required.
Department of Industry, Science and Resources	On 18th of August 2022, TEO emailed Department of Industry, Science and Resources advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
National Native Title Tribunal (NNTT)	On 18th of August 2022, TEO emailed NNTT advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	No feedback received.	N/A	No further action required.
State Government Department and Agencies				
Department of Biodiversity, Conservation and Attractions (DBCA)	On 18th of August 2022, TEO emailed DBCA advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	On 25th of August 2022, DBCA thanked TEO for providing the information regarding the EP. DBCA explained they have no comments in relation to responsibilities under the Conservation and Land Management Act 1984 and Biodiversity Conservation Act 2016.	N/A	No further action required.
Department of Primary Industries and Regional Development (DPIRD) - Fisheries	On 23rd of August 2022, TEO emailed DPIRD advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	No feedback received.	N/A	No further action required.
Department of Transport - Marine (DoTWA)	On 30th August 2022, TEO met with DoT to discuss the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the Cliff Head pipelines in Western Australian (WA) State Waters.	N/A	N/A	No further action required
	On 7th of September 2022, TEO emailed DoTWA the TEO Energy (Operations) Cliff Head Alpha Offshore Oil Pollution Emergency Plan (OPEP) and associated revised oil spill modelling report.	On 18th October 2022, relevant person provided review comments on the TEO OPEP, and thanked TEO for the opportunity to review the plan	N/A	No further action required

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
DWER (Department of Water Environment Regulation)	On 18th of August 2022, TEO emailed DWER advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	No feedback received.	N/A	No further action required.
Department of the Responsible State Minister				
Department of Mines, Industry Regulation and Safety (DMIRS)	On 17th November 2022, TEO emailed DMIRS advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	No feedback received.	N/A	No further action required.
Tourism and Recreational Operators				
Abrolhos Adventures	On 30th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.
Abrolhos Island Charters	On 24th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
Australian Recreational Fishing Foundation (ARFF)	On 18th November 2022, TEO made an online submission advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.
Australia's Coral Coast	On 18th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	On 18th November 2022, the relevant person provided TEO with a list of their members who operate between Cervantes and the Port Gregory.	N/A	TEO to consult with identified relevant persons
	On 18th November 2022, TEO thanked relevant person for the prompt reply and appreciate the information regarding operators within their area.	No feedback received.	N/A	No further action required.
Dongara Port Denison Visitor Centre	On 24th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.
Eco Abrolhos	On 24th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.
Kalbarri Visitor Centre	On 24th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.
Lobster Lunch & Boat Tours	On 30th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.
Pinnacles Visitor Centre	On 24th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.
Recfishwest	On 18th of August 2022, TEO emailed Recfishwest advising of the 5-year revision	No feedback received.	N/A	No further action required.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
	to the EP and provided a Stakeholder Factsheet (Appendix E).			
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	No feedback received.	N/A	No further action required.
Tourism Western Australia	On 18th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP.	No feedback received.	N/A	No further action required.
Turquoise Coast Visitor Centre	On 18th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP.	No feedback received.	N/A	No further action required.
Turquoise Safaris – Sea Lion Tours – Fishing Charters	On 30th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
Visit Geraldton	On 24th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.
Visit WA	On 18th of November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
Western Australia Indigenous Tourism Operators Council	On 18th of November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	On 22nd November 2022, the relevant person advise they are not personally aware of any Aboriginal Tourism Operators operating marine tourism vessels between Yanchep and Gregory (near Kalbarri). The relevant person provided a link to a website for further information. The relevant person suggested TEO get in contact with the regional tourism organisation called Australia's Coral Coast.	N/A	TEO has been in consultation with Australia's Coral Coast
	On 24th November 2022 TEO thanked WAITOC for the prompt reply regarding Aboriginal Tour Operators in the region and information on the Marine Tourism Website. TEO confirmed in their identification of relevant persons, they have been in touch with Australia's Coral Coast and identified some relevant persons that we will contact.	No feedback received.	N/A	No further action required
Western Australia Visitor Centre	On 18th of November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	On 18th November 2022, TEO received an automated response thanking them for the enquiry, advising that the relevant person will reply within 1 business day. For urgent matters, please contact us on 1800 812 808.	N/A	No further action required.
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	No feedback received.	N/A	No further action required.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
Local Government				
Shire of Carnamah	On 24th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.
Shire of Corrow	On 24th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.
Shire of Dandaragan	On 24th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.
City of Geraldton	On 18th of August 2022, TEO emailed AHS advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	No feedback received.	N/A	No further action required.
Shire of Gingin	On 24th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
Shire of Irwin	On 18th of August 2022, TEO emailed AHS advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	No feedback received.	N/A	No further action required.
Shire of Northampton	On 24th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.
Shire of Chapman Valley	On 18 January 2023, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	No feedback received.	N/A	No further action required.
Non-Government Organisations				
Northern Agricultural Catchment Council WA (NACC)	On X December 2022, TEO contacted relevant person via online portal, advising of the 5-year revision to the EP.	Relevant person responded to TEO's submission to the NACC website and requested TEO provide more information on the EP revision so they can recommend other relevant persons.	N/A	TEO provided further information on TEO's EP revision.
	TEO attached factsheet providing information on TEOs operational activities, including a map of the facilities and information on TEO's ongoing management of potential environmental impacts.	No feedback received.	N/A	No further action required.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
Commercial Fisheries				
Australian Southern Bluefin Tuna Industry Association (ASBTIA)	On 17th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.
Commonwealth Fisheries Association (CFA)	On 18th of August 2022, TEO emailed CFA advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	On 12th of December 2022, relevant person advised that CFA are not resourced to be able to provide comments on individual projects/activities on behalf of members. Relevant person encouraged TEO to deal direct with the relevant sector bodies and associations as well as individual fishers as necessary.	N/A	TEO will contact relevant sector bodies and associations as well as individual fishers as necessary
	On 12th of December 2022, TEO thanked relevant person for reply and advice on contacting sector bodies and individual fishers as appropriate	No feedback received	N/A	No further action required.
Dongara Professional Fisherman's Association	On 18th of August 2022, relevant person was contacted via Rock Lobster Council advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	No feedback received.	N/A	No further action required.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
Geraldton Professional Fishermen's Association	On 18th of August 2022, TEO emailed Geraldton Professional Fishermen's Association advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
Mackerel Managed Fishery	On 1 September 2022 WAFIC emailed Mackerel Managed Fishery advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
Marine Aquarium Fish Managed Fishery	On 1 September 2022 WAFIC emailed Marine Aquarium Fish Managed Fishery advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
Octopus Interim Managed Fishery	On 1 September 2022 WAFIC emailed Octopus Interim Managed Fishery advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
Patience Bulk Haulage (West Coast Rock Lobster Managed Fishery License Holder)	On 18th of August 2022, TEO emailed AHS advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
Pearl Producers Association of WA (PPA)	On 18th of August 2022, TEO emailed PPA advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	No feedback received.	N/A	No further action required.
	On 17th November 2022, TEO emailed relevant person advising of the 5-year	No feedback received.	N/A	No further action required.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
	revision to the EP and provided a Stakeholder Factsheet (Appendix F).			
Seafood Industry Australia	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	No feedback received.	N/A	No further action required.
Specimen Shell Managed Fishery	On 1 September 2022 WAFIC emailed Specimen Shell Managed Fishery advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
Tuna Australia	On 17th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	On 18th November 2022, the relevant person explained that the number of proposals requesting engagement is rapidly increasing in the marine space. Tuna Australia is now offering a service agreement to assist TEO with your environment plan proposals. Tuna Australia attached a service agreement for TEO's consideration.	N/A	No further action required.
	On 13th of December 2022, TEO outlined they are in the process of revising TEOs EP and have been in regular discussions with NOPSEMA with regards to appropriate Stakeholder consultation methodology. Additionally, NOPSEMA are conducting a briefing to all interested parties where they will provide an overview of the regulatory requirements and clarity on stakeholder consultation. Following the briefing an interim guideline will be published for public comment. TEO anticipates that refinements in the Stakeholder consultation process for the EP will be required which may subsequently influence ongoing consultation. We will be in touch once we	Relevant person thanked TEO for update	N/A	No further action required.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
	have confirmed our approach going forward.			
	On 23rd Jaunary 2023, TEO advised the stakeholder that following on from additional stakeholder identification and refinement of our consultation process, TEO are currently consulting with fishers in the WTBF that operate off the coast of WA as relevant to Cliff Head Operations and the wider EMBA. Therefore at this stage, Tuna Australia's services are not expected to be required. However, TEO do welcome any feedback or questions you may have regarding Cliff Head Operations from Tuna Australia as a stakeholder in their own right.	No feedback received.	N/A	No further action required.
Western Australian Fishing Industry Council (WAFIC)	On 18th of August 2022, TEO emailed WAFIC advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	On 23rd of August 2022, WAFIC attached a fee-for-service model and provided a link to offshore wind farm proposals. On 23rd of August 2022, TEO identified the fisheries within the operational area, and confirmed they would engage WAFIC on a fee-for-service basis. No further action required.	N/A	No further action required
	On 23rd of August 2022, TEO confirmed that Option A will be selected as the service requested from WAFIC, and requested a timeframe for delivery. TEO noted that the EP is due on October 4th 2022.	On 24th of August 2022, WAFIC explained that a response to the previous two emails will be provided once the western rock lobster council provides further information around communication with fishers. The relevant person confirmed that the service process would be completed in a timely fashion and would not exceed the October deadline.	N/A	No further action required
		On 29th of August 2022, WAFIC apologised for a delay in their reply. The relevant person requested the following information - 1. Preferred date and time and what information is to be distributed 2. How long the consultation process will be open for. The relevant person confirmed that they will engage with the following licence holders from the fisheries listed below:	N/A	No further action required

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
		• Marine Aquarium Fish Managed Fishery • Specimen Shell Managed Fishery • Octopus Interim Managed Fishery • West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery • West Coast Demersal Scalefish (Interim) Managed Fishery. The relevant person explained that Western Rock Lobster are separate to WAFIC, and will contact their member directly regarding the EP. On 30th of August 2022, TEO confirmed that the fisheries listed by the relevant person are to be engaged, and sent a factsheet.		
		On 30th August 2022, WAFIC confirmed that information would be sent to relevant persons on 31st August 2022 and that a response will be formalised that demonstrates consultation with relevant persons.		
		On 15th September, the relevant person confirmed that emails were sent to all relevant license holders on 1 September 2022.	N/A	No further action required
		On 28th September, the relevant person confirmed no further comments have been received	N/A	No further action required
		On 24th of November 2022 WAFIC informed TEO that they are in discussion with NOPSEMA regarding consultation with the commercial fishers for unplanned activities, once a response is received WAFIC will respond to TEO.	N/A	No further action required
		On 30th November 2022, 'WAFIC informed TEO that they will soon be putting the attachment provided on the WAFIC	Relevant matter raised-WAFIC requests that titleholders develop separate consultation	TEO will provided future consultation to WAFIC on planned events and not unplanned events

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
		website to clarify their position on consultation for unplanned events. WAFIC sought any questions. WAFIC requests that titleholders develop separate consultation strategies for unplanned events (e.g., oil spills), where titleholders are able to demonstrate that the likelihood of the activity such events occurring is extremely low. WAFIC and the commercial fishing licence holders they represent, should not be proactively consulted on unplanned events. Consultation on unplanned events should only be undertaken if an incident occurs that may affect commercial fishers.	strategies for unplanned events (e.g., oil spills), where titleholders are able to demonstrate that the likelihood of the activity such events occurring is extremely low.	
	On 20th Jaunary 2023, on behalf of TEO WAFIC contacted the WTBF license holder in WA advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	On 23 January 2023, TEO thanked WAFIC for contacting the WTBF license holder.	N/A	No further action required.
Western Rock Lobster Council	On 18th of August 2022, TEO emailed Western Rock Lobster Council advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	On 30th August 2022, the relevant person thanked TEO for making contact, and requested a copy of the current Environmental Plan. Further to this, the relevant person asked when the cut-off date would be for questions and or comments.	N/A	No further action required.
	On 30th August 2022, TEO attached the Environmental Plan as requested. TEO explained that all questions/comments would ideally be received by the 30th September 2022.	No feedback received.	N/A	No further action required.
West Coast Deep Sea Crustacean Managed Fishery	On 1 September 2022 WAFIC emailed West Coast Deep Sea Crustacean Managed Fishery advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery	On 1 September 2022 WAFIC emailed West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
West Coast Demersal Scalefish (Interim) Managed Fishery	On 1 September 2022 WAFIC emailed West Coast Demersal Scalefish (Interim) Managed Fishery advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
West Coast Rock Lobster Managed Fishery	On 1 September 2022 WAFIC emailed West Coast Rock Lobster Managed Fishery advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
Other Industry and Marine Users				
Australian Marine Oil Spill Centre (AMOSC)	On 18th of August 2022, TEO emailed AHS advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
	On 14th of October 2022, TEO provided the 5-yearly revised OPEP to AMOSC to review in terms of areas of the OPEP that involve AMOSC.	Relevant person confirmed that they have reviewed the OPEP with a search for AMOSC to confirm that all references to AMOSC are correct. Relevant person provided the Word document with track changes for TEO's consideration. The stakeholder also attached a copy of the editable PDF for completion to engage oil spill trajectory modelling.	N/A	No further action required.
Australian Communication and Media Authority (ACMA)	On 17th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	On 18th November 2022 the relevant person thanked TEO for contacting ACMA. ACMA informed TEO their enquiry has now been escalated to the relevant line area for an expert response. Should the line area require additional information they will contact TEO directly.	N/A	No further action required.
		On 22 November 2022, the relevant person provided background that ACMA regulates the submarine cable regime as set out in Schedule 3A to the Telecommunications Act 1997. ACMA permit the installation of international submarine cables in Australian waters, and domestic submarine cables inside a protection zone. Based on the information provided, ACMA did not identify any international submarine cables in the vicinity of this activity. The operational area depicted in TEO's email also appears to be close to coastal waters and not in the vicinity of any existing protection zones. Note that ACMA are not responsible for permitting the installation of submarine cables within coastal waters outside a protection zone, so cannot comment on the presence of any operational or planned	N/A	TEO have contacted the relevant WA Government authorities including the Department of Primary Industries and Regional Development.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
		domestic submarine cables. ACMA recommend TEO contact the relevant WA Government authorities including the Department of Primary Industries and Regional Development. If TEO have not done so, ACMA encourage TEO to contact the operators of any domestic submarine cables in the area.		
Mid West Ports	On 18th of August 2022, TEO emailed AHS advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	No feedback received.	N/A	No further action required.
Traditional Owner Groups				
Bundi Yamatji Aboriginal Corporation	On 5 December 2022, TEO emailed the relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	N/A	TBC
Bundi Yamatji Aboriginal Corporation	On 22nd December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	Feedback yet to be received.	N/A	TBC
Kwelena Mambakort Wedge Island Aboriginal Association	On 5th December 2022, TEO submitted an online enquiry to relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	No feedback received.	N/A	No further action required.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
Noongar Boodjar Language Cultural Aboriginal Corporation	On 5 December 2022, TEO emailed the relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	N/A	TBC
Office of the Registrar of Indigenous Corporations (ORIC)	On 5 December 2022, TEO emailed the relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	N/A	TBC
Sticks and Stones Cultural Resources Management (SandS CRM)	On 1 November 2022, TEO emailed Sands CRM requesting the appropriate person to contact for consultation with YSRC.	On 1 November SandS CRM replied with confirmed contact.	N/A	No further action required.
	On 1 November 2022, TEO thanked relevant person for reply and for making introductions	No feedback received.	N/A	No further action required.
South West Aboriginal Land and Sea Council	On 5 December 2022, TEO emailed YSRC advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	N/A	TBC
Yamatji Southern Regional Corporation (YSRC)	On 3 November 2022, TEO emailed YSRC advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	Feedback yet to be received.	N/A	Feedback provided by YSRC will be managed in accordance with Section 10.5 as part of ongoing consultation.
	On 12th December 2022, TEO emailed relevant person following up on previous email advising of the 5-year revision to the EP, requesting for relevant person to advise if they wish to receive further information on this activity.	On 12th of December relevant person requested to have a telephone catch up	N/A	No further action required.
	On 14th December 2022 TEO had a phone call with relevant person. TEO followed up with an email confirming that the 5-year Revision to the Cliff Head Offshore Operations EP will not change any of TEOs onshore activities and therefore will not	Relevant person thanked TEO for notification.	N/A	No further action required.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
	trigger any requirement to provide an Activity Notice to the YSRC as described in our Yamatji Proponent Standard Heritage Agreement (dated 19th February 2021).			
Yued Aboriginal Corporation	On 5 December 2022, TEO emailed the relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	N/A	TBC
eNGOs				
The Wilderness Society	On 18th of August 2022, TEO emailed AHS advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
WA Conservation Council	On 18th of August 2022, TEO emailed AHS advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	No feedback received.	N/A	No further action required.
Wedge Island Protection Association	On 24th November 2022, TEO emailed relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix F).	No feedback received.	N/A	No further action required.
World Wildlife Fund (WWF)	On 18th of August 2022, TEO emailed AHS advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix E).	On 19th of August 2022, WWF thanked TEO for making contact, and explained that the factsheet has been passed onto the WWF climate team for review.	N/A	No further action required.
		On 20th of August 2022, WWF confirmed that the enquiry was resolved.	N/A	No further action required.
Midwest Carbon Zero	On 5th December 2022, TEO contacted relevant person via online portal, advising of the 5-year revision to the EP.	No feedback received.	N/A	No further action required.
Abrolhos Islands: Houtman Abrolhos Conservation Network	On 5 December 2022, TEO emailed the relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	N/A	TBC

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
Australian Conservation Foundation	On 20 December 2022, TEO emailed the relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	N/A	No further action required.
Australian Conservation Foundation	On 20 December 2022, TEO emailed the relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	On 20 December 2022, relevant person sent a notification of receipt. General correspondence only	No further action required.
Australian Marine Conservation Society (AMCS)	On 20 December 2022, TEO emailed the relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	N/A	No further action required.
Birdlife Australia	On 20 December 2022, TEO emailed the relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	N/A	No further action required.
Clean Ocean Foundation	On 20 December 2022, TEO emailed the relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	N/A	No further action required.
Dolphin Research Australia	On 20 December 2022, TEO emailed the relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	N/A	No further action required.
Environmental Defenders Office	On 20 December 2022, TEO emailed the relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	N/A	No further action required.
Environmental Defenders Office	On 20 December 2022, TEO emailed the relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	On 20 December 2022, relevant person sent a notification of receipt. General correspondence only	No further action required.

Stakeholder	Information provided	Summary of consultation to date	Objections/claims assessed to have merit	TEO assessment and outcome
Flora and Fauna International	On 20 December 2022, TEO emailed the relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	N/A	No further action required.
Greenpeace Australia	On 20 December 2022, TEO emailed the relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	N/A	No further action required.
Greenpeace Australia	On 20 December 2022, TEO emailed the relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	On 20 December 2022, relevant person sent a notification of receipt. General correspondence only	No further action required.
Sea Turtle Foundation	On 20 December 2022, TEO emailed the relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	N/A	No further action required.
Sea Shepherd Conservation Society	On 20 December 2022, TEO emailed the relevant person advising of the 5-year revision to the EP and provided a Stakeholder Factsheet (Appendix G).	Feedback yet to be received.	N/A	No further action required.

10.4 Previous consultation

Consultation was undertaken in the manner detailed in Section 10.1.1 for the previous Operations EP covering the period 2016 – 2022 (10HSEQENVPL01 - Revision 9c), 12 responses were received. A summary of stakeholders that responded to TEO's consultation as part of the previous EP submission is summarised in Table 10-5.

Table 10-5: Previous stakeholder submissions

Government Agencies
DoEE (now DCCEEW)
Recfishwest
Australian Hydrographic Service (RAN)
City of Geraldton
Australia Maritime Safety Authority
WA Department of Fisheries (now DPIRD)
WA Department of Transport
WA Department of Mines and Petroleum
Australian Institute of Marine Science
Shire of Dandaragan
WA Department of Environment Regulation
WA Department of Parks and Wildlife
Environment Protection Agency
WA Department of Mines and Petroleum (now DMIRS)

10.5 Ongoing consultation

The ongoing consultation plan is outlined in Table 10-1 above and consists of the following steps:

- Annual review for additional relevant persons
- Engagement with new relevant persons identified, providing overview of the facility and activities conducted (Appendix J)
- Notification of specific relevant persons for workover or pipeline IMR activities (Section 6.1.4)
- Notification of relevant persons in event of change in activities
- TEO Senior Environmental Advisor available to correspond with rock lobster fisheries, if TEO does not receive direct responses e.g. to IMR specific notifications
- Maintenance of records in the Stakeholder Engagement Register to ensure ongoing feedback from stakeholders is assessed as appropriate
- Relevant persons who may be impacted by proposed decommissioning end-states of the pipelines and marine structures will be consulted with during decommissioning planning (Section 8.6.3).

Further details including timing and implementation are provided in Table 10-1. Furthermore, stakeholders are able to provide feedback to TEO at any time after the acceptance of this EP via the contact details provided in the consultation letter distributed (Appendix J).

All feedback will be assessed as per Figure 10.1 with a record of correspondence maintained in the Stakeholder Engagement Register. Furthermore, a system is in place to ensure that there is a response to the stakeholder's submission through the Cliff Head Stakeholder Consultation Plan (10HSEQENVPL12). This plan includes:

- Details on how to respond to an inquiry for information or a complaint
- Which roles have the responsibility of responding to the inquiry or complaint
- Process for investigating any complaint due to the site being operated outside the operating licence for the facility
- Process for reporting any complaints
- Process for logging the inquiry or complaint.

11 Term definitions and abbreviations

Term or abbreviations	Definitions
AHS	Australian Hydrographic Service
ALARP	As low as reasonably practicable
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
APIA	Australian Pipeline Industry Association
APPEA	Australian Petroleum Production & Exploration Association
ASP	Arrowsmith Stabilisation Plant
BPD	Barrels per day
BOP	Blow Out Preventer
CAMBA	China/Australia Migratory Birds Agreement
CBTA	Competency Based Training Assessment
CCR	Central control room
CCTV	Close Circuit Television
CH	Cliff Head
CHA	Cliff Head Alpha
CHD	Cliff Head Oil Development
CHOWS	Cliff Head Onshore Water Source
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CTU	Coil Tubing Unit
CO_2	Carbon Dioxide
CP	Cathodic Protection
DAWE	Department of Agriculture, Water and Environment (formerly DoEE)
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEWHA	Department of Water, Heritage and the Arts
DMP	Department of Mines and Petroleum
DMIRS	Department of Mines, Industry Regulation and Safety
DoEE	Commonwealth Department of Environment and Energy
DoFWA	Department of Fisheries WA
DPFA	Dongara Professional Fishing Association
DPIRD	Department of Primary Industries and Regional Development

Term or abbreviations	Definitions
EMBA	Environment which May Be Affected
EMP	Emergency Management Plan
EP	Environment Plan
EPBC	Environment Protection Biodiversity Conservation
EPO	Environmental Performance Objectives
EPS	Environmental Performance Standards
ESP	Electrical Submersible Pump
ESS	Emergency Shutdown System
GPFA	Geraldton Professional Fishing Association
GOR	Gas Oil Ratio
HAZID	Hazard Identification
HAZOP	Hazard and Operability Study
HSE	Health, Safety, & Environment
HSEMS	Health, Safety & Environment Management Systems
HSEQ	Health, Safety, Environment & Quality
HVAC	Heating, Ventilation & Air Conditioning
HWU	Hydraulic Workover Unit
IMCRA	Integrated Marine and Coastal Regionalisation of Australia
IMR	Inspections, Maintenance and Repair
IMS	Integrated Management System
IMT	Incident Management Team
JAMBA	Japan/Australia Migratory Birds Agreement
JHA	Job Hazard Analysis
KEFs	Key Ecological Features
km	Kilometre
KPI	Key Performance Indicator
L	Litre
m	metre
mm	millimetre
MoU	Memorandum of Understanding
MSS	Management System Standards
NGERS	National Greenhouse and Energy Reporting System
nm	Nautical mile
NNM	Not Normally Manned

Term or abbreviations	Definitions
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NORM	Naturally Occurring Radioactive Material
NPI	National Pollutant Inventory
OOSMP	Overarching Oil Spill Monitoring Plan
OPGGSA	Offshore Petroleum and Greenhouse Gas Storage Act
OPEP	Oil Pollution Emergency Plan
OSMP	Operational and Scientific Monitoring Plan
PER	Public Environment Report
PFW	Produced Formation Water
PLONOR	Pose Little or No Risk
ppm	Parts per million
PSZ	Petroleum Safety Zone
ROKAMBA	Republic of Korea – Australia Migratory Bird Agreement
SDS	Safety Data Sheet
SBV	Standby Vessel
SOPEP	Shipboard Oil Pollution Emergency Plan
SWMR	South West Marine Region
TECs	Threatened Ecological Communities
TEG	Triangle Energy Global
TEO	Triangle Energy (Operations) Pty Ltd
ToFD	Time-of-Flight Diffraction Inspection
TRSV	Tubing Retrievable Safety valve
TUTU	Topside Umbilical Termination Unit
TVD	Total Vertical Depth
WA	Western Australia

12 Document references

Document Number	Title
10BAITPC01	Document Control Procedure
10HSEQENVPC02	Controlled Use of Drains on CHA Platform
10HSEQENVPC04	Prescribed Waste Management
10HSEQENVPC06	Invasive Marine Species (IMS) Risk Assessment Procedure
10HSEQENVPC07FM01	Cliff Head Environmental Change Form
10HSEQENVPL12	Cliff Head Stakeholder Consultation Plan
10HSEQENVPL15	CHA Operations Oil Pollution Emergency Plan (OPEP)
10SPTRNTM18	CHA Comprehensive Site Induction
10HSEQGENPC15RG01	Cliff Head Contractors and Suppliers Register
10HSEQGENPC18	Cliff Head Management Of Change (MOC) Procedure
10HSEQGENPL01	Cliff Head Emergency Management Plan
10HSEQGENPL09	NORM Management Plan
10HSEQGENPL15	Cliff Head Audit Schedule
10HSEQGENPL17	Contractor and Third Party Management Plan
10OPGOPC04	Cliff Head Marine Operations Procedure
10OPGOPC06	Chemicals Management
10OPGOPC11	First and Last On-Board Checks on CHA
10OPPSPC17	Emergency Shutdown Systems
10-HSEQGENPOL3544	Management System Description
10-HSEQGENPRO1232	Risk Management procedure
4716-HS-H0113	Cliff Head Communication and Consultation framework

13 References

[AMSA] Australian Maritime Safety Authority. 2015, 'Australian Maritime Safety Authority Technical Guideline for the Preparation of Marine Pollution Contingency Plans for Marine and Coastal Facilities Australian Maritime Safety Authority', viewed 20 June 2017, https://www.amsa.gov.au/forms-and-publications/Publications/AMSA413_Contingency_Planning_Guidelines.pdf

[APASA] Asia-Pacific Applied Sciences Association (2017). Cliff Head Field: Quantitative Oil Spill Exposure Modelling. Asia-Pacific Applied Science Associates

[APGA] Australian Pipelines and Gas Association (2017). Code of Environmental Practice. Onshore Pipelines, Rev 4.

[APPEA] Australian Petroleum Production and Exploration Association, (2008). Code of Environmental Practice, Canberra.

Australian Government (2021a), National Greenhouse and Energy Reporting (Measurement) Determination 2008, Commonwealth of Australia, 1 July 2021.

Australian Government (2021b), Australia's emissions continue to fall. Available at: Australia's emissions continue to fall | Ministers for the Department of Industry, Science and Resources

Australian Government (2021c), National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015, Commonwealth of Australia, 1 July 2021.

Australian Government (2017), National Greenhouse and Energy Reporting Measurement Technical Guidelines for the estimation of emissions by facilities in Australia, Commonwealth of Australia October 2017

[CALM] Department of Conservation and Land Management, (1998). Nambung national park management plan; Wanagarren nature reserve; Nilgen nature reserve; Southern beekepers nature reserve, 1998 – 2008. For the National Parks and Nature Conservation Authority.

[CALM] Department of Conservation and Land Management, (2005). Jurien Bay Marine Park Management Plan, 2005-2015.

[CoA] Commonwealth of Australia, 2007.The South-west Marine Bioregional Plan. Bioregional Profile. A description of the ecosystem, conservation values and uses of the south-west marine region. Department of the Environment, Water, Heritage and the Arts.

[DAWE] Department of Agriculture, Water and the Environment (2020a). National Recovery Plan for the Australian Fairy Tern (*Sternula nereis nereis*). Department of Agriculture, Water and the Environment, Canberra. Available from: http://www.dcceew.gov.au/environment/biodiversity/threatened/publications/recovery/fairy-tern-2022.

[DAWE] Department of Agriculture, Water and the Environment (2020b). Wildlife Conservation Plan for Seabirds. Department of Agriculture, Water and the Environment, Canberra. Available from: Wildlife Conservation Plan for Seabirds (dcceew.gov.au)

[DEWHA] Department of the Environment, Water, Heritage and the Arts (2008). Approved Conservation Advice for Dermochelys coriacea (Leatherback Turtle). Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/1768-conservation-advice.pdf.

[DEWHA] Department of the Environment, Water, Heritage and the Arts (2009). Matters of National Environmental Significance Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999. Populations and Communities), 40.

[DNP] Director of National Parks, 2018. Australian Marine Parks. South-west Marine Parks Network Management Plan 2018.

[DoE] Department of the Environment (2012) Marine Bioregional Plan for the South West Marine Region. Australian Government, Department of Sustainability, Environment, Water, Populations and Communities.

[DoE] Department of the Environment Maritime Safety Authority (2013) SPRAT database. Australian Government, Department of the Environment.

[DoE] Department of the Environment (2014a). Recovery Plan for the Grey Nurse Shark (Carcharias taurus). Canberra, ACT: Department of the Environment. Available from: http://www.environment.gov.au/resource/recovery-plan-grey-nurse-shark-carcharias-taurus.

[DoE] Department of the Environment (2014b). Approved Conservation Advice for Pristis pristis (largetooth sawfish). Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/60756-conservation-advice.pdf. In effect under the EPBC Act from 11-Apr-2014.

[DoE] Department of the Environment (2015a). Conservation Management Plan for the Blue Whale - A Recovery Plan under the Environment Protection and Biodiversity Conservation Act 1999. Canberra, ACT: Commonwealth of Australia. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/recovery/blue-whale-conservation-management-plan. In effect under the EPBC Act from 03-Oct-2015

[DoE] Department of the Environment (2015b). Sawfish and River Sharks Multispecies Recovery Plan. Canberra, ACT: Commonwealth of Australia. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/recovery/sawfish-river-sharks-multispecies-recovery-plan.

[DoE] Department of the Environment (2015c). Conservation Advice Calidris ferruginea curlew sandpiper. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/856-conservation-advice.pdf.

[DoE] Department of the Environment (2015d). Conservation Advice Numenius madagascariensis eastern curlew. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/847-conservation-advice.pdf.

[DoE] Department of the Environment (2022a). Sphyrna lewini in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: https://www.environment.gov.au/sprat.

[DoE] Department of the Environment (2022b). Mobula birostris in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: https://www.environment.gov.au/sprat.

[DoE] Department of the Environment (2022c). Balaenoptera bonaerensis in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: https://www.environment.gov.au/sprat.

[DoE] Department of the Environment (2022d). Balaenoptera edeni in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: https://www.environment.gov.au/sprat.

[DoE] Department of the Environment (2022e). Physeter macrocephalus in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: https://www.environment.gov.au/sprat.

[DoE] Department of the Environment (2022f). Species Profile and Threats Database, Department of the Environment, Canberra. Available from: https://www.environment.gov.au/sprat.

[DoE] Department of the Environment (2022g). Anous stolidus in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: https://www.environment.gov.au/sprat.

[DoE] Department of the Environment (2022h). Apus pacificus in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: https://www.environment.gov.au/sprat.

[DoEE] Department of the Environment and Energy (2017). Recovery Plan for Marine Turtles in Australia. Australian Government, Canberra. Available from: http://www.environment.gov.au/marine/publications/recovery-plan-marine-turtles-australia-2017.

[DoEE] Department of the Environment and Energy (2018). Threat abatement plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans.

[DoFWA] Department of Fisheries Western Australia (2007). Management of the Houtman Abrolhos System: A Draft Review 2007 – 2017.

[DoFWA] Department of Fisheries Western Australia (2011). Fisheries Factsheet: Western Rock Lobster.https://www.fish.wa.gov.au/documents/recreational_fishing/fact_sheets/fact_sheet_western_rock_lobster.pdf

[DoFWA] Department of Fisheries Western Australia (2012). West Coast Rock Lobster Commercial Fishery.http://www.fish.wa.gov.au/Species/Rock-Lobster/Pages/Lobster-Commercial-Fishing.aspx

[DoF] Department of Fisheries. 2020. Pink Snapper. Available from: Pink snapper (fish.wa.gov.au)

[DoISER]. Department of Industry, Science, Energy and Resources (2022). Guideline: Offshore Petroleum Decommissioning.

[DPIRD] Department of Primary Industries and Regional Development, 2021. West Coast Demersal Scalefish Resource Harvest Strategy 2021-2025 Version 1.0. Fisheries Management Paper No. 305. Department of Primary Industries and Regional Development, Perth, Western Australia. 50p.

[DSEWPAC] Department of Sustainability, Environment, Water, Population and Communities (2011). National recovery plan for threatened albatrosses and giant petrels 2011-2016. Commonwealth of Australia, Hobart. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/national-recovery-plan-threatened-albatrosses-and-giant-petrels-2011-2016.

[DSEWPAC] Department of Sustainability, Environment, Water, Population and Communities (2012a). Marine Bioregional plan for the South-west Marine Region. Available from: https://www.environment.gov.au/system/files/pages/a73fb726-8572-4d64-9e33-1d320dd6109c/files/south-west-marine-plan.pdf.

[DSEWPAC] Department of Sustainability, Environment, Water, Population and Communities (2012b). Conservation Management Plan for the Southern Right Whale. A Recovery Plan under the Environment Protection and Biodiversity Conservation Act 1999 2011-2021. Canberra, ACT: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/resource/conservation-management-plan-southern-right-whale-recovery-plan-under-environment

[DSEWPAC] Department of Sustainability, Environment, Water, Population and Communities (2013b) Conservation Advice for Subtropical and Temperate Coastal Swamp Marsh. Canberra erra: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/118-conservation-advice.pdf. In effect under the EPBC Act from 10-Aug-2013.

[DSEWPAC] Department of Sustainability, Environment, Water, Population and Communities (2013b). Recovery Plan for the Australian Sea Lion (Neophoca cinerea). Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/resource/recovery-plan-australian-sea-lion-neophoca-cinerea.

[DSEWPAC] Department of Sustainability, Environment, Water, Population and Communities (2013c). Recovery Plan for the White Shark (Carcharodon carcharias). Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/recovery-plan-white-shark-carcharodon-carcharias.

[DSEWPAC] Department of Sustainability, Environment, Water, Population and Communities (2013d). Approved Conservation Advice for Rostratula australis (Australian painted snipe). Canberra: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/77037-conservation-advice.pdf.

[ERM] Environmental Resources Management (2021). Cliff Head Development GHG Assessment Report. Report prepared for Triangle Energy.

[IPCC] Intergovernmental Panel on Climate Change (2021). Chapter 7: The Earth's energy budget, climate feedbacks, and climate sensitivity - Supplementary Material. AR6 Climate Change 2021: The Physical Science Basis. Sixth Assessment Report of the Intergovernmental Panel on Climate Change.

[NOAA] National Oceanic and Atmospheric Administration (2022a). Sei Whale: Conservation and Management. Available from: Sei Whale | NOAA Fisheries

[NOAA] National Oceanic and Atmospheric Administration (2022b). Fin Whale: Overview. Available from: Fin Whale | NOAA Fisheries

[TSSC] Threatened Species Scientific Committee (2010). Commonwealth Listing Advice on Thunnus maccoyii (Southern Bluefin Tuna). Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/69402-listing-advice.pdf.

[TSSC] Threatened Species Scientific Committee (2011). Commonwealth Listing Advice on Sternula nereis nereis (Fairy Tern). Department of Sustainability, Environment, Water, Population and Communities. Canberra, ACT: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/82950-listing-advice.pdf.

[TSSC] Threatened Species Scientific Committee (2013). Commonwealth Listing Advice on Centrophorus zeehaani (southern dogfish). Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/82679-listing-advice.pdf.

[TSSC] Threatened Species Scientific Committee (2014). Commonwealth Listing Advice on Ardenna carneipes (flesh-footed shearwater). Canberra: Department of the Environment. Available from: http://www.environment.gov.au/resource/adrenna-carneipes-flesh-footed-shearwater.

[TSSC] Threatened Species Scientific Committee (2015a). Conservation Advice Balaenoptera borealis sei whale. Canberra: Department of the Environment. Available from:

http://www.environment.gov.au/biodiversity/threatened/species/pubs/34-conservation-advice-01102015.pdf.

[TSSC] Threatened Species Scientific Committee (2015b). Conservation Advice Balaenoptera physalus fin whale. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/37-conservation-advice-01102015.pdf.

[TSSC] Threatened Species Scientific Committee (2015c). Commonwealth Listing Advice on Rhincodon typus (Whale shark). Available from: http://www.environment.gov.au/biodiversity/threatened/species/r-typus.html.

[TSSC] Threatened Species Scientific Committee (2015d). Conservation Advice Pterodroma Mollis soft-plumaged petrel. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/1036-conservation-advice-01102015.pdf.

[TSSC] Threatened Species Scientific Committee (2015e). Conservation Advice Halobaena caerulea blue petrel. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/1059-conservation-advice-01102015.pdf.

[TSSC] Threatened Species Scientific Committee (2015f). Conservation Advice Pachyptila turtur subantarctica fairy prion (southern). Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/64445-conservation-advice-01102015.pdf.

[TSSC] Threatened Species Scientific Committee (2015g). Conservation Advice Anous tenuirostris melanops Australian lesser noddy. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/26000-conservation-advice-01102015.pdf.

[TSSC] Threatened Species Scientific Committee (2016a). Conservation Advice Limosa lapponica baueri Bar-tailed godwit (western Alaskan). Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/86380-conservation-advice-05052016.pdf.

[TSSC] Threatened Species Scientific Committee (2016b). Conservation Advice Limosa lapponica menzbieri Bar-tailed godwit (northern Siberian). Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/86432-conservation-advice-05052016.pdf.

[TSSC] Threatened Species Scientific Committee (2016c). Conservation Advice Charadrius leschenaultii Greater sand plover. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/877-conservation-advice-05052016.pdf

[TSSC] Threatened Species Scientific Committee (2016d). Conservation Advice Calidris canutus Red knot. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/855-conservation-advice-05052016.pdf.

[TSSC] Threatened Species Scientific Committee (2018). Listing Advice Sphyrna lewini scalloped hammerhead. Canberra: Department of the Environment and Energy. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/85267-listing-advice-15032018.pdf.

[WAFIC] Western Australian Fishing Industry Council, (2022a). West coast demersal scalefish fishery, West coast bioregion. Available at: https://www.wafic.org.au/fishery/west-coast-demersal-scalefish-fishery/

Amoser S. and F. Ladich (2005). Are Hearing Sensitivities of Freshwater Fish Adapted to the Ambient Noise in their Habitats. Journal of Experimental Biology 208: 3533–3542.

Australian Bureau of Statistics (2021). 2021 Census Data. https://www.abs.gov.au/census/find-census-data/search-by-area

Bannister, J., 1994, Western Australian Humpback and Right Whales: An increasing success story Western Australian Museum, 1994.

Bannister, J.L., Kemper, C.M. & Warneke, R.M., 1996, The Action Plan for Australian Cetaceans, Australian Nature Conservation Agency, Canberra.

Bax NJ (1999) Eradicating a dreissenid from Australia. Dreissena! 10:1–5

Bearzin, A.A. (1972). The Sperm Whale. Pacific Scientific Research Institute of Fisheries and Oceanography, Moscow. (Translated from Russian 1971 version by the Israel Program for Scientific Translations, Jerusalem).

Best, P.B. (1979). Social organization in sperm whales, Physter macrocephalus. Winn H.E. & B.L. Olla, eds. Behaviour of Marine Mammals. 3:227-289. New York: Plenum Press.

Blower, D. C., Pandolfi, J. M., Bruce, B. D., Gomez-Cabrera, M. D. C., & Ovenden, J. R. (2012). Population genetics of Australian white sharks reveals fine-scale spatial structure, transoceanic dispersal events and low effective population sizes. *Marine Ecology Progress Series*, *455*, 229-244.

BMT Oceania (2015). Cliff Head Facility Marine Water and Sediment Quality Baseline Report.

Bradford, R., Patterson, T. A., Rogers, P. J., McAuley, R., Mountford, S., Huveneers, C., ... & Bruce, B. D. (2020). Evidence of diverse movement strategies and habitat use by white sharks, *Carcharodon carcharias*, off southern Australia. *Marine Biology*, *167*(7), 1-12.

Branch, T Stafford, K Palacios, D Allison, C Bannister, J Burton, C Cabrera, E Carlson, C Galletti Vernazzani, B Gill, P Hucke-Gaete, R Jenner, K Jenner, M Matsuoka, K Mikhalev, Y Miyashita, T Morrice, M Nishiwaki, S Sturrock, V Tormosov, D Anderson, R Baker, A Best, P Borsa, P Brownell Jr, R Childerhouse, S Findlay, K Gerrodette, T Ilangakoon, A Joergensen, M Kahn, B Ljungblad, D Maughan, B McCauley, R McKay, S Norris, T & Rankin, S. (2007). Past and present distribution, densities and movements of blue whales Balaenoptera musculus in the Southern Hemisphere and northern Indian Ocean. Mammal Review, 37, 116-175.

Bray, D.J. (2017). Carcharhinus longimanus in Fishes of Australia. Accessed 05 Sep 2022, https://fishesofaustralia.net.au/home/species/1950

Bray, D.J. (2019). Centrophorus zeehaani in Fishes of Australia. Accessed 05 Sep 2022, https://fishesofaustralia.net.au/home/species/2610

Campbell, R. (2005). Historical distribution and abundance of the Australian sea lion (Neophoca cinerea) on the west coast of Western Australia. Fisheries Research Report no. 148. Department of Fisheries, Western Australia.

Campbell, R.A. (2003). Demography and genetic population structure of the Australian sea lion (Neophoca cinerea). Ph.D. Thesis. Department of Zoology, University of Western Australia.

Campbell, R.A., N.J. Gales, G.M. Lento & C.S. Baker (2008). Islands in the sea: extreme female natal site fidelity in the Australian sea lion, Neophoca cinerea. Biology Letters. 23, 139-142.

Chidlow J., Gaughan D. and McAuley R.B. (2006). Identification of Western Australian Grey Nurse Shark aggregation sites. Final report to the Australian Government, Department of the Environment and Heritage. Fisheries research report No. 155. Department of Fisheries, Western Australia, 48p.

Clarke, M.R. (1977). Beaks, nets and numbers. Symposium of the Zoological Society. 38:89-126.

Clarke, M.R. (1980). Cephalopods in the diet of sperm whales of the Southern Hemisphere and their bearing on sperm whale biology. Discovery Reports. 37:324.

Coffey Natural Systems (Coffey) (2007). Annual seagrass and seabed monitoring – Cliff Head Oil Field Development.

Coffey Natural Systems (Coffey) (2008). Annual seagrass and seabed monitoring – Cliff Head Oil Field Development.

Coffey Natural Systems (Coffey) (2009). Annual seagrass and seabed monitoring – Cliff Head Oil Field Development.

Commonwealth of Australia (2009). National Biofouling Management Guidance for the Petroleum Production and Exploration Industry.

Commonwealth of Australia (2012a). Species group report card – sharks: Supporting the marine bioregional plan for the South-west Marine Region.() Department of Sustainability, Environment, Water, Population and Communities, Western Australia.

Commonwealth of Australia (2012b). Species group report card – cetaceans: Supporting the marine bioregional plan for the South-west Marine Region. Department of Sustainability, Environment, Water, Population and Communities, Western Australia.

Commonwealth of Australia (2012c). Species group report card – pinnipeds: Supporting the marine bioregional plan for the South-west Marine Region. Department of Sustainability, Environment, Water, Population and Communities, Western Australia.

Commonwealth of Australia (2012d). Species group report card – seabirds: Supporting the marine bioregional plan for the South-west Marine Region. Department of Sustainability, Environment, Water, Population and Communities, Western Australia.

Commonwealth of Australia (2015). Wildlife Conservation Plan for Migratory Shorebirds. Available from: Wildlife Conservation Plan for Migratory Shorebirds (dcceew.gov.au)

Commonwealth of Australia (2021). Draft National Recovery Plan for Threatened Albatrosses and Giant Petrels 2021. Commonwealth of Australia, available from: Draft National Recovery Plan for albatrosses and petrels (2021) – DCCEEW

Commonwealth of Australia (2022). Australian Biofouling Management Requirements, Version 1.

Conservation Commission of Western Australia (2004). Turquoise Coast Island Nature Reserve Management Plan. Available from: turquoise_coast_final.pdf (dpaw.wa.gov.au)

De Lestang, S., Rossbach, M., Orme, L., and Baudains, G. 2021. West coast rock lobster resource status report 2021.

Dennis, T.E. & P.D. Shaughnessy (1996). Status of the Australian sea lion, Neophoca cinerea, in the Great Australian Bight. Wildlife Research. 23, 741-754.

Dennis, T.E. & P.D. Shaughnessy (1999). Seal survey in the Great Australian Bight region of Western Australia. Wildlife Research. 26, 383-388.

(DAWR) Department of Climate Change, Energy, the Environment and Water (2022). Sei Whale. Available from: Sei whale – Australian Antarctic Program (antarctica.gov.au)

Director of National Parks (2018). South-west Marine Parks Network Management Plan 2018, Director of National Parks, Canberra. ISBN: 978-0-9876152-4-4

Double, M. C., Andrews-Goff, V., Jenner, K. C. S., Jenner, M. N., Laverick, S. M., Branch, T. A., & Gales, N. J., 2014. Migratory movements of pygmy blue whales (Balaenoptera musculus brevicauda) between Australia and Indonesia as revealed by satellite telemetry. *PLoS One*, *9*(4), e93578.

Double, M., Gales, N., Jenner, K., Jenner, M., 2010. Satellite tracking of south-bound female humpback whales in the Kimberley region of Western Australia. Australian Marine Mammal Centre, Hobart.

Double, M., Jenner, K., Jenner, M., Ball, I., Childerhouse, S., Loverick, S., Gales, N., 2012. Satellite tracking of northbound humpback whales (Megaptera novaeangliae) off Western Australia. Australian Marine Mammal Centre, Hobart.

Duffy CAJ, Francis MP, Manning MJ, Bonfil R (2012) Regional population connectivity, oceanic habitat, and return migration revealed by satellite tagging of white sharks, *Carcharodon carcharias*, at New Zealand aggregation sites. In: Domeier ML (ed) Global perspectives on the biology and life history of the white shark. CRC Press, Boca Raton, pp 301–318 **(ISBN: 978-1-4398-4840-1)**

Duffy, R., Blay, N., and Blazeski, S. 2021. West coast nearshore and estuarine finfish resource status report 2021.

Enesar Consulting Pty Ltd (2007). Pipelines Post-Installation Seagrass and Seabed Monitoring, April 2007

Department of Fisheries Western Australia Environment Australia (1997). Report to the Minister - Public nomination to the Endangered Species Protection Act 1992: Great white shark and Grey Nurse Shark - recommended by the Endangered Species Scientific Subcommittee in the Threatened Species and Communities Section. Canberra, ACT: Environment Australia.

Evans, K., and Hindell, M. A. Evans, S.N., Konzewitsch, N., & Bellchambers, L.M. 2022. Houtman Abrolhos Islands Fish Habitat Protection Area: A Summary of Marine Resource Use and Ecological Attributes. Fisheries Research Report No. 321. Department of Primary Industries and Regional Development, Western Australia. 174pp.

Fairclough, D., and Walters, S. 2021. West coast demersal scalefish resource status report 2021.

The diet of sperm whales (Physeter macrocephalus) in southern Australian waters. ICES Journal of Marine Science, 61(8), 1313-1329.

(FFWCC) Florida Fish and Wildlife Conservation Commission. (2013) Online resource http://myfwc.com/ [accessed 2nd October 2013]

Francis, M. P., Duffy, C., & Lyon, W. (2015). Spatial and temporal habitat use by white sharks (*Carcharodon carcharias*) at an aggregation site in southern New Zealand. *Marine and Freshwater Research*, *66*(10), 900-918.

French-McCay, DP 2009, 'State-of-the-art and research needs for oil spill impact assessment modelling', Proceedings of the 32nd Arctic and Marine Oil Spill Program (AMOP) Technical Seminar, Environment Canada, Ottawa, pp. 601–653.

Gales, N.J. & Cheal, A.J. (1992). Estimating diet composition of the Australian sea-lion (Neophoca cinerea) from scat analysis: an unreliable technique. Wildlife Research. 19, 447-456.

Gales, N.J., P.D. Shaughnessy & T.E. Dennis (1994). Distribution, abundance and breeding cycle of the Australian sea lion Neophoca cinerea (Mammalia: Pinnipedia). Journal of Zoology, London. 234, 353-370.

Gaskin, D. E. (1973). Sperm whales in the western South Pacific. New Zealand Journal of Marine and Freshwater Research, 7(1-2), 1-20.Gaston, K.J., Duffy, J.P., Gaston S., Bennie J., Davies, T.W., (2014). Human alteration of natural light cycles: causes and ecological consequences. Oecologia 176: 917-931.

Gordon J., Gillespie D., Potter J., Frantzis A., Simmonds M.P., Swift R. and D. Thomson (2004). A Review of the Effects of Seismic Surveys on Marine Mammals. Marine Technology Society Journal 37: 16–34.

Hart, A., Bruce, C., and Steele, A. (2021b). State-wide specimen shell resource status report.

Hart, A., Murphy, D., Wiberg, L. (2021a). West coast octopus resource status report 2021.

Higgins, L.V. & L. Gass (1993). Birth to weaning: parturition, duration of lactation, and attendance cycles of Australian sea lions (Neophoca cinerea). Canadian Journal of Zoology. 71, 2047-2055.

Hosche A.M. and Whisson, G.J. (2016). First aggregation of grey nurse sharks (Carcharias Taurus) confirmed in Western Australia. Marine Biodiversity Records 9:17

IMCRA, 1997, Interim Marine and Coastal Regionalisation for Australia: an ecosystem based classification for marine and coastal environments, Interim Marine and Coastal Regionalisation for Australia Technical Group, Environment Australia, Canberra

IUCN (2013) IUCN Red List [10th May 2013] http://www.iucnredlist.org

Jenner KCS., Jenner M-C M., & McCabe K., 2001, Geographical and temporal movements of humpback whales in Western Australian waters. APPEA Journal 2001: pp.749-765.

Jing, L., El-Houjeiri, H.M., Monfort, JC. et al. (2020). Carbon intensity of global crude oil refining and mitigation potential. Nat. Clim. Chang. 10, 526–532.

Kangas, M., Wilkin, S., Breheny, N., Cavalli, P., Grounds, G., and Brown, S. 2021. Saucer scallop resource status report 2021.

Kirkman, H. (1997). Seagrasses of Australia. Department of Environment: pp 32-36

Last, P.R. and Stevens J.D. 2009. Sharks and Rays of Australia. CSIRO Publishing, Melbourne, pp. 550

Lewis, P., and Watt, M. 2021. Statewide large pelagic finfish resource status report 2021.

Limpus, C.J. (1995). Conservation of marine turtles in the Indo-Pacific region. Brisbane: Queensland Department of Environment and Heritage.

Longcore, T., Rich, C. (2004). Ecological light pollution. Frontiers in Ecology and theEnvironment 2: 191-198

Marquenie, J., Donners, M., Poot, H., Steckel, W. and de Wit, B. (2008). Adapting the spectral composition of artificial lighting to safeguard the environment. pp 1-6

Marsh H., Corkeron PJ., Limpus CJ., Shaughnessy PD. & Ward T., 1995. The reptiles and mammals in Australian seas: status and management. In Zann, L& Kailola, P. The State of the Marine Environment Report for Australia: Technical Annex 1: The Marine Environment, Department of Environment, Sport and Territories, Canberra, pp 151-166.

Marshall, A., Kashiwagi, T., Bennett, M.B., Deakos, M., Stevens, G., McGregor, F., Clark, T., Ishihara, H. & Sato, K. (2011). Manta alfredi. The IUCN Red List of Threatened Species 2011. Available from: e.T195459A8969079. http://dx.doi.org/10.2305/IUCN.UK.2011-2.RLTS.T195459A8969079.en

McAuley, R. (2004). Western Australian Grey Nurse Shark Pop Up Archival Tag Project. Final Report to Department of Environment and Heritage. Page(s) 55.

McCauley, R., 1998, Radiated Underwater Noise measured from the Drilling Rig Ocean General, Rig Tenders Pacific Ariki and Pacific Frontier, Fishing Vessel Reef Venture and Natural Sources in the Timor Sea, Northern Australia. A report for Shell Australia, Centre of Marine Science and Technology, Curtain University of Technology, Western Australia

McCauley, R.D., Fewtrell, J., Duncan, A.J., Jenner, C., Jenner, M-N., Penrose, J.D., Prince, R.I.T., Adhitya, A., Murdoch, J. and McCabe, K. (2000). Marine seismic surveys: analysis and propagation of air-gun signals; and effects of air-gun exposure on humpback whales, sea turtles, fishes and squid. In: Environmental implications of offshore oil and gas development in Australia: further research - A compilation of three scientific marine studies. pp. 364-521. Australian Petroleum Production and Exploration Association Limited, Canberra.

McClathie, S., Middleton, J., Pattiaratchi, C., Currie, D., Kendrick, G. (2006) The South-west marine region: Ecosystems and key species groups. Department of the Environment and Water Resources.

Meekan, M. G. , Wilson , S. G., Halford , A. and Retzel, A. (2001) A comparison of catches of fishes and invertebrates by two light trap designs, in tropical NW Australia. Marine Biology 139: 373–381.

Milicich, M. J., Meekan, M. G. and Doherty, P. J. (1992) Larval supply: a good predictor of recruitment in three species of reef fi sh (Pomacentridae). Mar Ecol Prog Ser. 86: 153-166.

Miller, A. (2019) Fine-scale variability in catch and growth rates of western rock lobsters, *Panulirus cygnus* George, reveal heterogeneous life-history parameters, Research Dissertation, School of Biological Sciences, The University of Western Australia (unpublished).

Neil, K.M., Hilliard, R., Clark, P. and Russell, B.C. 2005. A Situation and Gaps Analysis of IMS, Vectors, Nodes and Management Arrangements for the Northern Planning Area. An independent report by CRC Reef, URS Perth and the MAGNT for National Oceans Office Branch of the Department of Environment and Heritage. 177 pp.

Newman, S., Bruce, C., and Bissel, A. 2021. Statewide marine aquarium fish and hermit crab resources status report 2021.

Norriss, J., and Blazeski, S. 2021. West coast small pelagic scalefish resource status report 2021.

Otway, N.M. & P.C. Parker (2000). The Biology, Ecology, Distribution, Abundance and Identification of Marine Protected Areas for the Conservation of Threatened Grey Nurse Sharks in South-east Australian Waters. NSW Fisheries Office of Conservation.

Patterson, H., Bromhead, D., Galeano, D., Larcombe, J., Woodhams, J., and Curtotti, R. 2021. Fishery status reports 2021, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. CC BY 4.0. https://doi.org/10.25814/vahf-ng93.

Pearce, A.F. (1997) The Leeuwin Current and the Houtman Abrolhos Islands, Western Australia. In Wells, F. E. The Marine Flora and Fauna of the Houtman Abrohlos Islands, Western Australia. 1. Perth: Western Australia Museum. 11-46.

Peverell S. C. (2005) Distribution of sawfishes (Pristidae) in the Queensland Gulf of Carpentaria, Australia, with notes on sawfish ecology, Environmental Biology of Fishes, vol. 73, pp. 391–402

Phillips, B., 2002, Report to ROC Oil Company limited Report prepared by B. Collins, Curtin University of Technology on potential effects of exploration and development activities on rock lobster fisheries.

Pogonoski, J.J., D.A. Pollard & J.R. Paxton (2002). Conservation Overview and Action Plan for Australian Threatened and Potentially Threatened Marine and Estuarine Fishes. [Online]. Canberra, ACT: Environment Australia. Available from: http://www.environment.gov.au/coasts/publications/marine-fish-action/pubs/marine-fish.pdf.

Pollard, D.A., M.P. Lincoln-Smith & A.K. Smith (1996). The biology and conservation of the grey nurse shark (Carcharias taurus Rafinesque 1810) in New South Wales, Australia. Aquatic Conservation: Marine and Freshwater Ecosystems. 6.

Prince, R.I. (1994). Status of the Western Australian marine turtle populations: the Western Australian Marine Turtle Project 1986-1990. In: Russell, J., ed. Proceedings of the Australian

Marine Turtle Conservation Workshop, Gold Coast 14-17 November 1990. 1-14. Queensland Department of Environment and Heritage. Canberra, ANCA.

Reid, T.A., Hindell, M.A., Eades, D., and Newman, M. 2002. Seabird atlas of south-eastern Australian waters. Birds of Australia. January 2002.

Rice, D.W. (1989). Sperm whale Physeter macrocephalus. In: Ridgway, S.H. & R. Harrison, eds. Handbook of Marine Mammals Vol. 4: River Dolphins and the Larger Toothed Whales. Page(s) 177-233.

Richardson, W. J., Greene, C. R., Malme, C. I. and Thomson, D. H. (1995). Marine Mammals and Noise. Academic Press, San Diego, p. 576

Rigby, C.L., Barreto, R., Carlson, J., Fernando, D., Fordham, S., Francis, M.P., Jabado, R.W., Liu, K.M., Marshall, A., Pacoureau, N., Romanov, E., Sherley, R.B. & Winker, H. 2019. Isurus oxyrinchus.

The IUCN Red List of Threatened Species 2019: e.T39341A2903170. https://dx.doi.org/10.2305/IUCN.UK.2019-1.RLTS.T39341A2903170.en. Accessed on 05 September 2022.

Rigby, C.L., Barreto, R., Carlson, J., Fernando, D., Fordham, S., Francis, M.P., Jabado, R.W., Liu, K.M., Marshall, A., Pacoureau, N., Romanov, E., Sherley, R.B. & Winker, H. 2019. Isurus paucus.

Robins, J.B. (1995). Estimated catch and mortality of sea turtles from the East Coast Otter Trawl Fishery of Queensland, Australia. Biological Conservation. 74:157-167.

RPS (2022a). Triangle Energy Cliff Head Drill Cuttings Modelling. Report prepared for Triangle Energy (Operations) Pty Ltd.

RPS (2022b). Triangle Energy Cliff Head Oil Spill Modelling. Report prepared for Triangle Energy (Operations) Pty Ltd.

ROC (2004). Cliff Head Development. Public Environmental Review and Draft Public Environment Report.

Sequeira, A. M., Mellin, C., Meekan, M. G., Sims, D. W., & Bradshaw, C. J. (2013). Inferred global connectivity of whale shark Rhincodon typus populations. *Journal of Fish Biology*, *82*(2), 367-389.

Shaughnessy, P.D (1999). The action plan for Australian Seals. [13th May 2013] www.environment.gov.au/coasts/publications

Shaw, R. F., Lindquist, D. C., Benfield, M. C., Farooqi, T., Plunket, J. T., (2002) Off shore petroleum platforms: functional significance for larval fi sh across longitudinal and latitudinal gradients. Prepared by the Coastal Fisheries Institute, Louisiana State University. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2002-077, p. 107.

Simmonds M.P., Dolman S.J. and Weilgart L. (eds). 2004. Oceans of Noise [Online]. http://www.wdcs.org/submissions_bin/OceansofNoise.pdf . AWDCS Science Report Published by the Whale and Dolphin Conservation Society.

Stevens, J.D. (1999). Management of shark fisheries in northern Australia; Part 1. Shotton, R., ed. Case studies of the management of elasmobranch fisheries. FAO Fisheries Technical Paper. 378, 456-479. FAO, Rome.

Strain, L., Brown, J., and Jones, R. (2021). West coast roe's abalone resource status report 2021.

Surman, C. (2002) Survey of the marine avifauna at the Laverda-2 appraisal well (WA-271-P) Enfi eld Area Development and surrounding waters. Report prepared for Woodside Energy Ltd., Perth.

Taylor, H.A. and Rasheed, M.A. (2011). Impacts of a fuel oil spill on seagrass meadows in a subtropical port, Gladstone, Australia – The value of long-term marine habitat monitoring in high risk areas. Marine Pollution Bulletin 63: 431-437

Thiele, D. and P.C. Gill (1999). Cetacean observations during a winter voyage into Antarctic sea ice south of Australia. Antarctic Science. 11(1):48-53

Thorburn, D.C. Morgan, D.L., Rowland, A.J. & Gill, H.S. (2007) Freshwater sawfish *Pristis microdon* Latham, 1794 (Chondrichthyes: Pristidae) in the Kimberley region of Western Australia. *Zootaxa*. 1471:27-41

Thums, M., Ferreira, L. C., Jenner, C., Jenner, M., Harris, D., Davenport, A., ... & McCauley, R., 2022. Pygmy blue whale movement, distribution and important areas in the Eastern Indian Ocean. *Global Ecology and Conservation*, *35*, e02054.

UK Government (2021). Greenhouse gas reporting: conversion factors 2021. Retrieved from https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020

Wiese, F. K., Montevecci, W. A., Davoren, G. K., Huettmann, F., Diamond, A. W. and Linke, J. (2001). Seabirds at risk around off shore oil platforms in the northwest Atlantic. Marine Pollution Bulletin. 42: 1285-1290.

Wilson, S. G., Polovina, J. J., Stewart, B. S., & Meekan, M. G., 2006. Movements of whale sharks (Rhincodon typus) tagged at Ningaloo Reef, Western Australia. *Marine Biology*, *148*(5), 1157-1166.

WNI., (2000). Metocean Conditions, Tow Route NW Shelf to WA-286-P (Offshore Dongara). WNI Science and Engineering. Report No. R1023. 1 May 2000.

[WRI] World Resources Institute & [WBCSD] World Business Council for Sustainable Development (2004). The Greenhouse Gas Protocol - A Corporate Accounting and Reporting Standard – Revised Edition. World Resource Industry & World Business Council for Sustainable Development, March 2004. Retrieved 16 February 2018, from http://pdf.wri.org/ghg_protocol_2004.pdf

WRI & WBCSD (2013), Greenhouse Gas Protocol - Technical Guidance for Calculating Scope 3 Emissions, World Resource Industry & World Business Council for Sustainable Development, 2013. Retrieved from https://ghgprotocol.org/sites/default/files/standards/Scope3_Calculation_Guidance_0.pdf

Woodside (2008). Torosa South-1 Pilot Appraisal Well Environment Plan. Woodside Energy. Perth.

Zangerl, R., L.P. Hendrickson & J.R.Hendrickson (1988). A redistribution of the Australian flatback sea turtle Natator depressus. Bishop Museum Bulletins in Zoology. 1:Jan-69.

Appendix A Typical Chemical Use

Chemical Application	Proposed Chemical Product	Use Pathway	Proposed Chemical Usage	Potential Environmental Risk[5]	NOTES
Corrosion & Scale Inhibitor	SICI18140A	CHA Downhole	Continuous	LOW	250 L/day on CHA
Biocide	CORR31331A	CHA Downhole	Weekly	LOW	500 L/week for 3 weeks/month
Biocide	BIOC16733A	CHA Downhole	Monthly	LOW	230 L/week for 1 week/month
Corrosion Inhibitor	CORR22363A	ASP WI System	Continuous	LOW	75 L/day
Corrosion Inhibitor	CORR22363A	CHA Downhole & PF Pipeline	Continuous	LOW	120 L/day
Water Clarifier	CLAR 10057A	ASP Separator inlet	Continuous	LOW	75L/day
Hydrotest, oxygen scavenger, corrosion inhibitor	HSUR43670A	ASP IGF	Batch	LOW	IGF batch - 500 L/year
Mutual Solvent	EC9610A	CHA Downhole	Batch	LOW	Rarely used - 50 L/year for chemical tubi flush
Acid Cleaner	Turbo Neutralise	ASP water injection	Continuous	LOW	Non-routine for Cliff Head Onshore Wate Source (CHOWS) well water injection.
Organic Acid/Scale Dispersant	SCAL16312A	CHA Downhole	Batch	LOW	Rarely used - 500 L/year per Well treatment
Scale Inhibitor	EC6500A	ASP water injection	Continuous	LOW	Non-routine for CHOWS well water injection.
Lubricant	Safe Lube	CHA Downhole	200L batch	LOW	Pre-workover chemical treatment
Acid Corrosion Inhibitor	MSA III	CHA Downhole	Batch	LOW	Rarely used – Chemical soak (volume us 1L per Well treatment

[5] Potential environmental risk was assessed using ”Environmental Risk Assessment of Chemicals used in WA Petroleum Activities Guideline (DMP, 2013).

Appendix B EPBC Protected Matters Search

Australian Government
Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 08-Jul-2022

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	29
Listed Migratory Species:	37

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	55
Whales and Other Cetaceans:	11
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	5
Key Ecological Features (Marine):	2
Biologically Important Areas:	10
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
EEZ and Territorial Sea

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Macronectes giganteus		
Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli		
Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pterodroma mollis		
Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Sternula nereis nereis		
Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Thalassarche carteri		
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta		
Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
FISH		
Thunnus maccoyii		
Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area
MAMMAL		

Scientific Name	Threatened Category	Presence Text
[Balaenoptera musculus](#) Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
[Eubalaena australis](#) Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
[Neophoca cinerea](#) Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat likely to occur within area
REPTILE		
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
SHARK		
[Carcharias taurus (west coast population)](#) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area
[Carcharodon carcharias](#) White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
[Pristis pristis](#) Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
[Rhincodon typus](#) Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Sphyrna lewini		
Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes		
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Diomedea amsterdamensis		
Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea epomophora		
Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans		
Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Hydroprogne caspia		
Caspian Tern [808]		Foraging, feeding or related behaviour known to occur within area
Macronectes giganteus		
Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli		
Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Onychoprion anaethetus		
Bridled Tern [82845]		Foraging, feeding or related behaviour likely to occur within area
Thalassarche carteri		
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta		
Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Carcharhinus longimanus		
Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat may occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Migratory Wetlands Species

Scientific Name	Threatened Category	Presence Text
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Foraging, feeding or related behaviour likely to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Puffinus assimilis Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area
Stercorarius skua as Catharacta skua Great Skua [823]		Species or species habitat may occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
[Thalassarche melanophris](#) Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
[Thalassarche steadi](#) White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Fish		
[Acentronura australe](#) Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
[Campichthys galei](#) Gale's Pipefish [66191]		Species or species habitat may occur within area
[Choeroichthys suillus](#) Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
[Halicampus brocki](#) Brock's Pipefish [66219]		Species or species habitat may occur within area
[Hippocampus angustus](#) Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
[Hippocampus breviceps](#) Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
[Hippocampus subelongatus](#) West Australian Seahorse [66722]		Species or species habitat may occur within area
[Lissocampus fatiloquus](#) Prophet's Pipefish [66250]		Species or species habitat may occur within area
[Maroubra perserrata](#) Sawtooth Pipefish [66252]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammal		

Scientific Name	Threatened Category	Presence Text
Arctocephalus forsteri		
Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Neophoca cinerea		
Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat likely to occur within area
Reptile		
Aipysurus pooleorum		
Shark Bay Seasnake [66061]		Species or species habitat may occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Disteira kingii		
Spectacled Seasnake [1123]		Species or species habitat may occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Pelamis platurus		
Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and Other Cetaceans		[Resource Information]
Current Scientific Name	Status	Type of Presence
Mammal		
Balaenoptera acutorostrata		
Minke Whale [33]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
construction and operation of a unmanned platform at the Cliff Head oil field, a	2003/1300	Controlled Action	Post-Approval
Not controlled action			
Cliff Head 6 appraisal well	2004/1702	Not Controlled Action	Completed
Cliff Head Appraisal Wells	2003/938	Not Controlled Action	Completed
Drilling between Kalbarri and Cliff Head	2005/2185	Not Controlled Action	Completed
Exploration drilling program located in exploration permits WA-286-P and TP/15	2002/676	Not Controlled Action	Completed

Key Ecological Features	[Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Commonwealth marine environment within and adjacent to the west coast inshore lagoons	South-west
Western rock lobster	South-west

Biologically Important Areas		
Scientific Name	Behaviour	Presence
Seabirds		
Ardenna pacifica		
Wedge-tailed Shearwater [84292]	Foraging (in high numbers)	Known to occur
Hydroprogne caspia		
Caspian Tern [808]	Foraging (provisioning young)	Known to occur
Larus pacificus		
Pacific Gull [811]	Foraging (in high numbers)	Known to occur

Scientific Name	Behaviour	Presence
[Onychoprion anaethetus](#) Bridled Tern [82845]	Foraging (in high numbers)	Known to occur
[Puffinus assimilis tunneyi](#) Little Shearwater [59363]	Foraging (in high numbers)	Known to occur
[Sternula nereis](#) Fairy Tern [82949]	Foraging (in high numbers)	Known to occur
Seals		
[Neophoca cinerea](#) Australian Sea Lion [22]	Foraging (male and female)	Known to occur
Whales		
[Balaenoptera musculus brevicauda](#) Pygmy Blue Whale [81317]	Distribution	Known to occur
[Megaptera novaeangliae](#) Humpback Whale [38]	Migration (north)	Known to occur
[Megaptera novaeangliae](#) Humpback Whale [38]	Migration (north and south)	Known to occur

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Australian Government
Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 24-Jun-2022

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	64
Listed Migratory Species:	55

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	11
Commonwealth Heritage Places:	2
Listed Marine Species:	82
Whales and Other Cetaceans:	33
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	3
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	25
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	42
Key Ecological Features (Marine):	6
Biologically Important Areas:	24
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
EEZ and Territorial Sea

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community may occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Critically Endangered	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Zanda latirostris listed as Calyptorhynchus latirostris Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
FISH		
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area
MAMMAL		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat likely to occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Breeding known to occur within area
Parantechinus apicalis Dibbler [313]	Endangered	Species or species habitat known to occur within area
PLANT		

Scientific Name	Threatened Category	Presence Text
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Androcalva bivillosa Straggling Androcalva [87807]	Critically Endangered	Species or species habitat likely to occur within area
Caladenia bryceana subsp. cracens Northern Dwarf Spider-orchid [64556]	Vulnerable	Species or species habitat known to occur within area
Caladenia elegans Elegant Spider-orchid [56775]	Endangered	Species or species habitat likely to occur within area
Caladenia hoffmanii Hoffman's Spider-orchid [56719]	Endangered	Species or species habitat likely to occur within area
Chorizema humile Prostrate Flame Pea [32573]	Endangered	Species or species habitat may occur within area
Conostylis micrantha Small-flowered Conostylis [17635]	Endangered	Species or species habitat may occur within area
Drummondita ericoides Morseby Range Drummondita [9193]	Endangered	Species or species habitat likely to occur within area
Eucalyptus argutifolia Yanchep Mallee, Wabling Hill Mallee [24263]	Vulnerable	Species or species habitat may occur within area
Eucalyptus cuprea Mallee Box [56773]	Endangered	Species or species habitat may occur within area
Hemiandra gardneri Red Snakebush [7945]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Leucopogon marginatus Thick-margined Leucopogon [12527]	Endangered	Species or species habitat may occur within area
Leucopogon obtectus Hidden Beard-heath [19614]	Endangered	Species or species habitat may occur within area
Stachystemon nematophorus Three-flowered Stachystemon [81447]	Vulnerable	Species or species habitat may occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat may occur within area
Wurmbea tubulosa Long-flowered Nancy [12739]	Endangered	Species or species habitat known to occur within area
REPTILE		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Ctenotus lancelini Lancelin Island Skink [1482]	Vulnerable	Translocated population known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Egernia stokesii badia Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Liopholis pulchra longicauda		
Jurien Bay Skink, Jurien Bay Rock-skink [83162]	Vulnerable	Species or species habitat known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
SHARK		
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Centrophorus zeehaani		
Southern Dogfish, Endeavour Dogfish, Little Gulper Shark [82679]	Conservation Dependent	Species or species habitat likely to occur within area
Pristis pristis		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sphyrna lewini		
Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Defence	
Defence - GERALDTON TRAINING DEPOT "A" Company 16th Battalion [50196]	WA
Defence - GERALDTON TRAINING DEPOT "A" Company 16th Battalion [50197]	WA
Defence - GERALDTON TRAINING DEPOT "A" Company 16th Battalion [50195]	WA
Defence - GREENOUGH RIFLE RANGE [50234]	WA
Unknown	
Commonwealth Land - [50379]	WA
Commonwealth Land - [51886]	WA
Commonwealth Land - [50373]	WA
Commonwealth Land - [50377]	WA
Commonwealth Land - [50370]	WA
Commonwealth Land - [50368]	WA
Commonwealth Land - [50369]	WA

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Historic		
Geraldton Drill Hall Complex	WA	Listed place
Natural		
Lancelin Defence Training Area	WA	Listed place

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Ardenna pacifica as Puffinus pacificus Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Chalcites osculans as Chrysococcyx osculans		
Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area
Charadrius leschenaultii		
Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Chroicocephalus novaehollandiae as Larus novaehollandiae		
Silver Gull [82326]		Breeding known to occur within area
Diomedea amsterdamensis		
Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora		
Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans		
Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel		
Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Halobaena caerulea		
Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Hydroprogne caspia as Sterna caspia		
Caspian Tern [808]		Breeding known to occur within area
Larus pacificus		
Pacific Gull [811]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Breeding likely to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma macroptera Great-winged Petrel [1035]		Foraging, feeding or related behaviour known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Puffinus assimilis Little Shearwater [59363]		Breeding known to occur within area
Puffinus huttoni Hutton's Shearwater [1025]		Foraging, feeding or related behaviour known to occur within area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area
Stercorarius skua as Catharacta skua Great Skua [823]		Species or species habitat may occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons as Sterna albifrons Little Tern [82849]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Sternula nereis as Sterna nereis		
Fairy Tern [82949]		Breeding known to occur within area
Thalassarche carteri		
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche cauta		
Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Thalasseus bergii as Sterna bergii		
Greater Crested Tern [83000]		Breeding known to occur within area
Thinornis cucullatus as Thinornis rubricollis		
Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area
Fish		
Acentronura australe		
Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Campichthys galei		
Gale's Pipefish [66191]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus subelongatus West Australian Seahorse [66722]		Species or species habitat may occur within area
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
[Pugnaso curtirostris](#) Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
[Solegnathus lettiensis](#) Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
[Stigmatopora argus](#) Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
[Stigmatopora nigra](#) Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
[Syngnathoides biaculeatus](#) Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
[Urocampus carinirostris](#) Hairy Pipefish [66282]		Species or species habitat may occur within area
[Vanacampus margaritifer](#) Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammal		
[Arctocephalus forsteri](#) Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
[Neophoca cinerea](#) Australian Sea-lion, Australian Sea Lion [22]	Endangered	Breeding known to occur within area
Reptile		
[Aipysurus pooleorum](#) Shark Bay Seasnake [66061]		Species or species habitat may occur within area
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and Other Cetaceans		[Resource Information]
Current Scientific Name	Status	Type of Presence
Mammal		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area

Current Scientific Name	Status	Type of Presence
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia sima as Kogia simus Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Lissodelphis peronii Southern Right Whale Dolphin [44]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area
Mesoplodon bowdoini Andrew's Beaked Whale [73]		Species or species habitat may occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area
Mesoplodon mirus True's Beaked Whale [54]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area

Current Scientific Name	Status	Type of Presence
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks	[Resource Information]
Park Name	Zone & IUCN Categories
Two Rocks	Multiple Use Zone (IUCN VI)
Abrolhos	Special Purpose Zone (IUCN VI)
Jurien	Special Purpose Zone (IUCN VI)

Extra Information

State and Territory Reserves		[Resource Information]
Protected Area Name	Reserve Type	State
Abrolhos Islands	Fish Habitat Protection Area	WA
Beagle Islands	Nature Reserve	WA

Protected Area Name	Reserve Type	State
Beekeepers	Nature Reserve	WA
Boullanger, Whitlock, Favourite, Tern And Osprey Islands	Nature Reserve	WA
Buller, Whittell And Green Islands	Nature Reserve	WA
Cervantes Islands	Nature Reserve	WA
Dongara	Nature Reserve	WA
Escape Island	Nature Reserve	WA
Essex Rocks	Nature Reserve	WA
Fisherman Islands	Nature Reserve	WA
Houtman Abrolhos Islands	National Park	WA
Jurien Bay	Marine Park	WA
Lipfert, Milligan, Etc Islands	Nature Reserve	WA
Nambung	National Park	WA
Outer Rocks	Nature Reserve	WA
Port Gregory	NRS Addition - Gazettal in Progress	WA
Ronsard Rocks	Nature Reserve	WA
Sandland Island	Nature Reserve	WA
Southern Beekeepers	Nature Reserve	WA
Unnamed WA33799	Nature Reserve	WA
Unnamed WA34039	5(1)(h) Reserve	WA
Unnamed WA44682	5(1)(h) Reserve	WA
Unnamed WA48858	Nature Reserve	WA
Wanagarren	Nature Reserve	WA
Wedge Island	Nature Reserve	WA

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Coburn Mineral Sand Project	2003/1221	Controlled Action	Post-Approval
construction and operation of a unmanned platform at the Cliff Head oil field, a	2003/1300	Controlled Action	Post-Approval
Construction of the Oakajee Port and Rail Project	2011/5797	Controlled Action	Post-Approval
Hematite (iron ore) Mine and Beneficiation Plant	2001/542	Controlled Action	Completed
Karara Magnetite Project	2006/3017	Controlled Action	Post-Approval
Mount Gibson Iron Ore Pellet Project	2000/95	Controlled Action	Completed
Nava-1 Cable System	2001/510	Controlled Action	Completed
Oakajee Rail Development	2010/5500	Controlled Action	Post-Approval
open cut mine & assoc infrastructure	2005/2381	Controlled Action	Post-Approval
Port Enhancement Project	2001/266	Controlled Action	Post-Approval
Yogi Magnetite Project, 225km east, northeast of Geraldton, WA	2017/8124	Controlled Action	Assessment Approach
Not controlled action			
APX-West Fibre-optic telecommunications cable system, WA to Singapore	2013/7102	Not Controlled Action	Completed
Cliff Head 6 appraisal well	2004/1702	Not Controlled Action	Completed
Cliff Head Appraisal Wells	2003/938	Not Controlled Action	Completed
Construction of several passing lanes between Lancelin and Jurien Bay, WA	2015/7509	Not Controlled Action	Completed
Drilling between Kalbarri and Cliff Head	2005/2185	Not Controlled Action	Completed
Exploration drilling program located in exploration permits WA-286-P and TP/15	2002/676	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Glenfield Beach Project	2012/6359	Not Controlled Action	Completed
Hadda 1,Flying Foam 1,Magnat 1 exploration drill	2004/1697	Not Controlled Action	Completed
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
Indian Ocean Drive Passing Lane and Widening 52-258 SLK	2017/7884	Not Controlled Action	Completed
INDIGO West Submarine Telecommunications Cable, WA	2017/8126	Not Controlled Action	Completed
Maintenance Dredging in the Geraldton Port Outer Channel	2010/5488	Not Controlled Action	Completed
Scientific Sonar Trial	2002/680	Not Controlled Action	Completed
WA-286-P Exploration Drilling Programme	2007/3863	Not Controlled Action	Completed
Yellowfin Tuna Aquaculture Trial	2003/1115	Not Controlled Action	Completed
Not controlled action (particular manner)			
2D Marine Seismic Survey in Permit Area WA-337-P	2003/1158	Not Controlled Action (Particular Manner)	Post-Approval
2D seismic survey	2008/4493	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey	2007/3800	Not Controlled Action (Particular Manner)	Post-Approval
Australian Square Kilometre Array Pathfinder telescope & infrastructure	2009/4891	Not Controlled Action (Particular Manner)	Post-Approval
develop and operate a new deepwater port	2010/5760	Not Controlled Action (Particular Manner)	Post-Approval
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Laying a submarine optical fibre telecommunications cable, Perth to Singapore and Jakarta	2014/7332	Not Controlled Action (Particular Manner)	Post-Approval
Marine reconnaissance survey	2008/4466	Not Controlled Action (Particular Manner)	Post-Approval
Marine Seismic Survey for oil and gas in Commonwealth waters off the WA coast.	2004/1802	Not Controlled Action (Particular Manner)	Post-Approval
Marine Seismic Survey in Permit WA-481P	2012/6626	Not Controlled Action (Particular Manner)	Post-Approval
North Perth Marine Survey	2011/6067	Not Controlled Action (Particular Manner)	Post-Approval
Study of behavioural responses of Austn Humpback Whales to seismic surveys, offshore Dongara, WA	2013/6927	Not Controlled Action (Particular Manner)	Post-Approval
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
3D Marine Seismic survey	2007/3729	Referral Decision	Completed
Exploration Drilling 2014/2015 WA-481-P	2013/7043	Referral Decision	Completed
Proposed exploration drilling activities, Abrolhos Commonwealth Marine Reserve	2013/6949	Referral Decision	Completed

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Ancient coastline at 90-120m depth	South-west
Commonwealth marine environment surrounding the Houtman Abrolhos Islands	South-west

Name	Region
Commonwealth marine environment within and adjacent to the west coast inshore lagoons	South-west
Perth Canyon and adjacent shelf break, and other west coast canyons	South-west
Western demersal slope and associated fish communities	South-west
Western rock lobster	South-west

Biologically Important Areas

Scientific Name	Behaviour	Presence
Seabirds		
Anous stolidus Common Noddy [825]	Foraging	Known to occur
Anous stolidus Common Noddy [825]	Foraging (provisioning young)	Known to occur
Anous tenuirorstris melanops Australian Lesser Noddy [26000]	Foraging (provisioning young)	Known to occur
Ardenna pacifica Wedge-tailed Shearwater [84292]	Foraging (in high numbers)	Known to occur
Hydroprogne caspia Caspian Tern [808]	Foraging (provisioning young)	Known to occur
Larus pacificus Pacific Gull [811]	Foraging (in high numbers)	Former Range
Larus pacificus Pacific Gull [811]	Foraging (in high numbers)	Known to occur
Onychoprion anaethetus Bridled Tern [82845]	Foraging (in high numbers)	Known to occur
Onychoprion fuscata Sooty Tern [82847]	Foraging	Known to occur

Scientific Name	Behaviour	Presence
Pelagodroma marina White-faced Storm petrel [1016]	Foraging (in high numbers)	Known to occur
Pterodroma mollis Soft-plumaged Petrel [1036]	Foraging (in high numbers)	Known to occur
Puffinus assimilis tunneyi Little Shearwater [59363]	Foraging (in high numbers)	Known to occur
Sterna dougallii Roseate Tern [817]	Foraging	Known to occur
Sterna dougallii Roseate Tern [817]	Foraging (provisioning young)	Known to occur
Sternula nereis Fairy Tern [82949]	Foraging (in high numbers)	Known to occur
Seals		
Neophoca cinerea Australian Sea Lion [22]	Foraging (male)	Likely to occur
Neophoca cinerea Australian Sea Lion [22]	Foraging (male and female)	Known to occur
Sharks		
Carcharodon carcharias White Shark [64470]	Foraging	Known to occur
Whales		
Balaenoptera musculus Blue and Pygmy Blue Whale [36]	Foraging (on migration)	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Distribution	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Known Foraging Area	Known to occur

Scientific Name	Behaviour	Presence
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration (north)	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration (north and south)	Known to occur

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Appendix C Aboriginal Heritage Inquiry System Search

Aboriginal Heritage Inquiry System

List of Registered Aboriginal Sites

Search Criteria

No Registered Aboriginal Sites in Shapefile - Operational_Area_20220708

Disclaimer

The Aboriginal Heritage Act 1972 preserves all Aboriginal sites in Western Australia whether or not they are registered. Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Planning, Lands and Heritage by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you email the details to the Department at AboriginalHeritage@dplh.wa.gov.au and we will make every effort to rectify it as soon as possible.

Copyright

Coordinate Accuracy

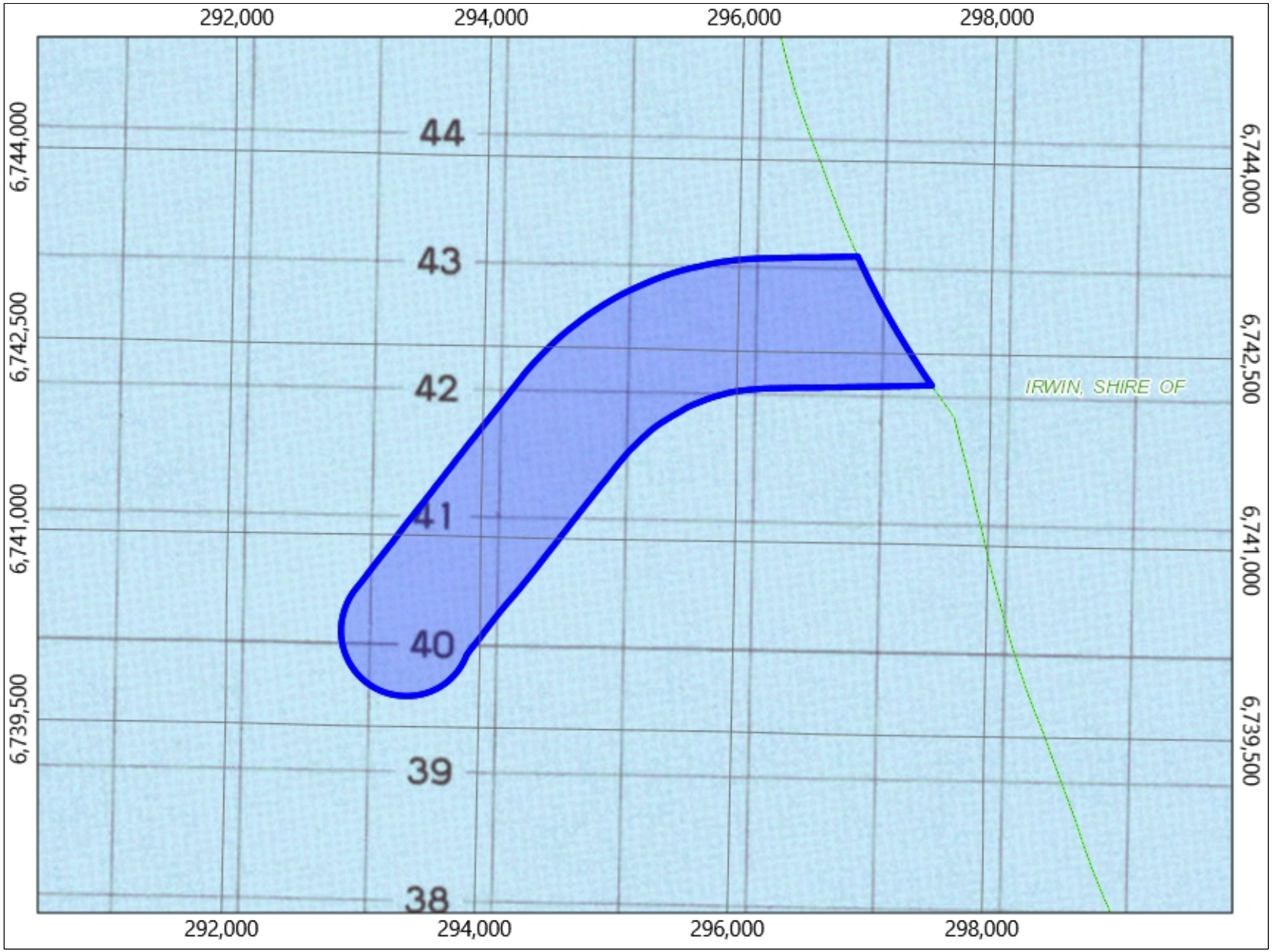
Coordinates (Easting/Northing metres) are based on the GDA 94 Datum. Accuracy is shown as a code in brackets following the coordinates.

Department of Planning, Lands and Heritage

Aboriginal Heritage Inquiry System

Map of Registered Aboriginal Sites

For further important information on using this information please see the Department of Planning, Lands and Heritage's Disclaimer statement at https://www.dplh.wa.gov.au/about-this-website



Legend

- Registered Aboriginal Site
- Search Area
- Town
- Road
- River
- Local Government Authority

1.73 kilometres

Map Scale 1 : 52,400

MGA Zone 50 (GDA94)

Aboriginal Heritage Inquiry System

List of Other Heritage Places

Search Criteria

No Other Heritage Places in Shapefile - Operational_Area_20220708

Disclaimer

The Aboriginal Heritage Act 1972 preserves all Aboriginal sites in Western Australia whether or not they are registered. Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Planning, Lands and Heritage by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you email the details to the Department at AboriginalHeritage@dplh.wa.gov.au and we will make every effort to rectify it as soon as possible.

Copyright

Coordinate Accuracy

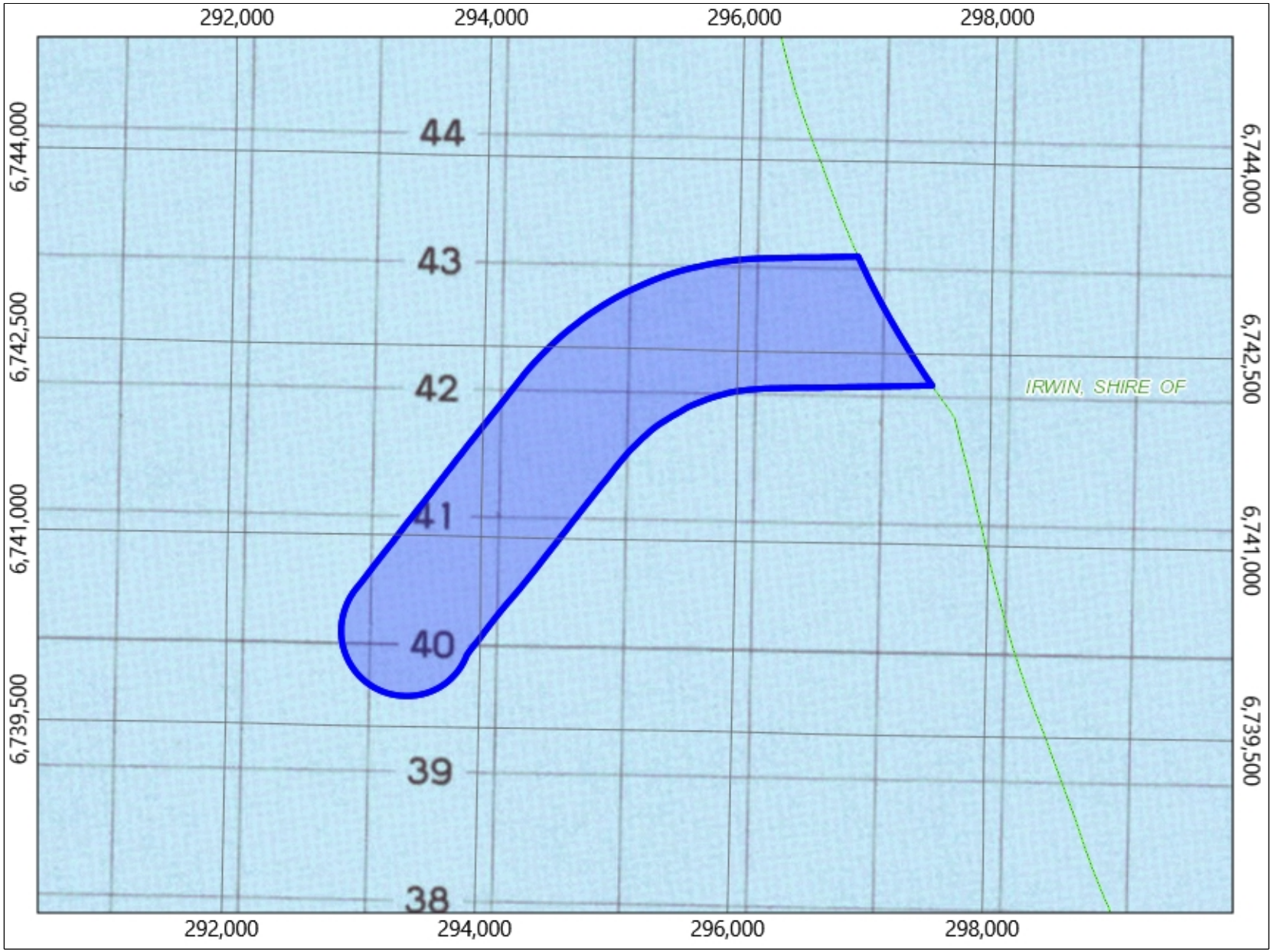
Coordinates (Easting/Northing metres) are based on the GDA 94 Datum. Accuracy is shown as a code in brackets following the coordinates.

Department of Planning, Lands and Heritage

Aboriginal Heritage Inquiry System

Map of Other Heritage Places

For further important information on using this information please see the Department of Planning, Lands and Heritage's Disclaimer statement at https://www.dplh.wa.gov.au/about-this-website



Legend

- Other Heritage Place
- Search Area
- Town
- Road
- River
- Local Government Authority

1.73 kilometres

Map Scale 1 : 52,400

MGA Zone 50 (GDA94)

Aboriginal Heritage Inquiry System

List of Registered Aboriginal Sites

Search Criteria

23 Registered Aboriginal Sites in Shapefile - EMBA. Warning: Search area complex so results may be inaccurate. Contact DPLH for assistance.

Disclaimer

The Aboriginal Heritage Act 1972 preserves all Aboriginal sites in Western Australia whether or not they are registered. Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Planning, Lands and Heritage by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you email the details to the Department at AboriginalHeritage@dplh.wa.gov.au and we will make every effort to rectify it as soon as possible.

South West Settlement ILUA Disclaimer

Your heritage enquiry is on land within or adjacent to the following Indigenous Land Use Agreement(s): Yued Indigenous Land Use Agreement.

On 8 June 2015, six identical Indigenous Land Use Agreements (ILUAs) were executed across the South West by the Western Australian Government and, respectively, the Yued, Whadjuk People, Gnaala Karla Booja, Ballardong People, South West Boojarah #2 and Wagyl Kaip & Southern Noongar groups, and the South West Aboriginal Land and Sea Council (SWALSC).

The ILUAs bind the parties (including 'the State', which encompasses all State Government Departments and certain State Government agencies) to enter into a Noongar Standard Heritage Agreement (NSHA) when conducting Aboriginal Heritage Surveys in the ILUA areas, unless they have an existing heritage agreement. It is also intended that other State agencies and instrumentalities enter into the NSHA when conducting Aboriginal Heritage Surveys in the ILUA areas. It is recommended a NSHA is entered into, and an 'Activity Notice' issued under the NSHA, if there is a risk that an activity will 'impact' (i.e. by excavating, damaging, destroying or altering in any way) an Aboriginal heritage site. The Aboriginal Heritage Due Diligence Guidelines, which are referenced by the NSHA, provide guidance on how to assess the potential risk to Aboriginal heritage.

Likewise, from 8 June 2015 the Department of Mines, Industry Regulation and Safety (DMIRS) in granting Mineral, Petroleum and related Access Authority tenures within the South West Settlement ILUA areas, will place a condition on these tenures requiring a heritage agreement or a NSHA before any rights can be exercised.

If you are a State Government Department, Agency or Instrumentality, or have a heritage condition placed on your mineral or petroleum title by DMIRS, you should seek advice as to the requirement to use the NSHA for your proposed activity. The full ILUA documents, maps of the ILUA areas and the NSHA template can be found at https://www.wa.gov.au/organisation/department-of-the-premier-and-cabinet/south-west-native-title-settlement.

Further advice can also be sought from the Department of Planning, Lands and Heritage at AboriginalHeritage@dplh.wa.gov.au.

Copyright

Coordinate Accuracy

Coordinates (Easting/Northing metres) are based on the GDA 94 Datum. Accuracy is shown as a code in brackets following the coordinates.

Terminology (NB that some terminology has varied over the life of the legislation)

Place ID/Site ID: This a unique ID assigned by the Department of Planning, Lands and Heritage to the place.

Status:

- Registered Site: The place has been assessed as meeting Section 5 of the Aboriginal Heritage Act 1972.
- Other Heritage Place which includes:
  - Stored Data / Not a Site: The place has been assessed as not meeting Section 5 of the Aboriginal Heritage Act 1972.
  - Lodged: Information has been received in relation to the place, but an assessment has not been completed at this stage to determine if it meets Section 5 of the Aboriginal Heritage Act 1972.

Access and Restrictions:

- File Restricted = No: Availability of information that the Department of Planning, Lands and Heritage holds in relation to the place is not restricted in any way.
- File Restricted = Yes: Some of the information that the Department of Planning, Lands and Heritage holds in relation to the place is restricted if it is considered culturally sensitive. This information will only be made available if the Department of Planning, Lands and Heritage receives written approval from the informants who provided the information. To request access please contact AboriginalHeritage@dplh.wa.gov.au.
- Boundary Restricted = No: Place location is shown as accurately as the information lodged with the Registrar allows.
- Boundary Restricted = Yes: To preserve confidentiality the exact location and extent of the place is not displayed on the map. However, the shaded region (generally with an area of at least 4km²) provides a general indication of where the place is located. If you are a landowner and wish to find out more about the exact location of the place, please contact the Department of Planning, Lands and Heritage.
- Restrictions:
  - No Restrictions: Anyone can view the information.
  - Male Access Only: Only males can view restricted information.
  - Female Access Only: Only females can view restricted information.

Legacy ID: This is the former unique number that the former Department of Aboriginal Sites assigned to the place. This has been replaced by the Place ID / Site ID.

Aboriginal Heritage Inquiry System

List of Registered Aboriginal Sites

ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
1063	GREENOUGH RIVER MIDDEN.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Midden / Scatter, Camp	*Registered Knowledge Holder names available from DPL	269079mE 6806349mN Zone 50 [Unreliable]	S02850
4532	BULLER RIVER NORTH REBURIAL	Yes	Yes	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DPL	Not available when location is restricted	S02593
4631	GREENOUGH FLATS BURIAL	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DPL	279638mE 6793651mN Zone 50 [Unreliable]	S02366
4667	GREENOUGH RIVER	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DPL	271638mE 6801651mN Zone 50 [Unreliable]	S02275
4940	BOWES RIVER MOUTH SOUTH.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Skeletal Material / Burial, Camp, Other: ?	*Registered Knowledge Holder names available from DPL	250738mE 6854751mN Zone 50 [Unreliable]	S01714
5279	FLAT ROCKS	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	283638mE 6788651mN Zone 50 [Unreliable]	S01001
5280	LEANDER POINT DENI.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	297457mE 6759474mN Zone 50 [Reliable]	S01002
5287	SOUTH GATES BURIAL SITE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DPL	268738mE 6808451mN Zone 50 [Unreliable]	S01009
5465	DRUMMONDS COVE	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DPL	265638mE 6829651mN Zone 50 [Unreliable]	S00668
5467	WOOLAWAR GULLY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DPL	258738mE 6845451mN Zone 50 [Reliable]	S00734
5558	HORROCKS BEACH.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp	*Registered Knowledge Holder names available from DPL	251138mE 6854551mN Zone 50 [Unreliable]	S00003
15015	SOUTH OAKAJEE 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	265908mE 6830386mN Zone 50 [Reliable]	S03037

Aboriginal Heritage Inquiry System

List of Registered Aboriginal Sites

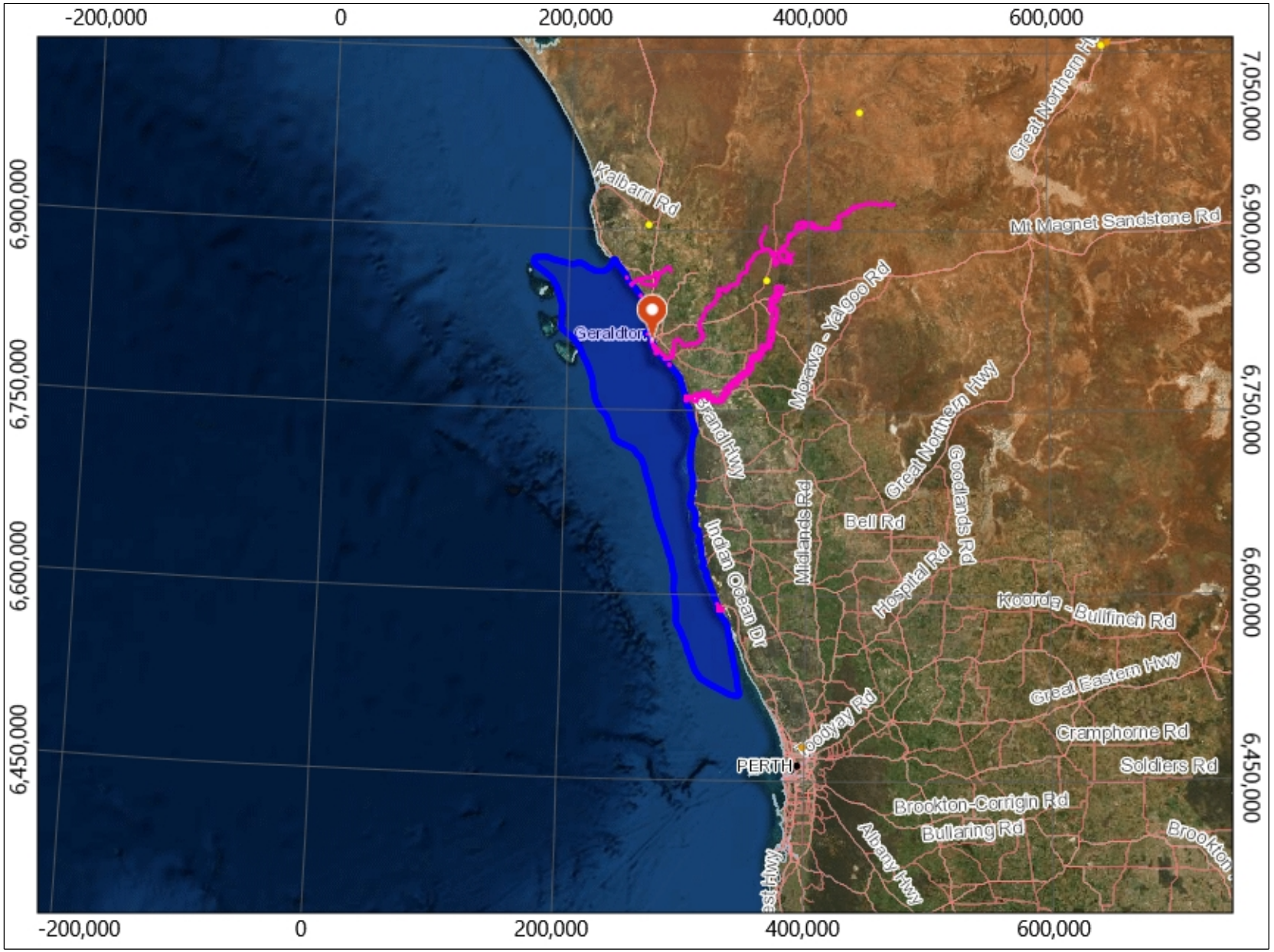
ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
15857	BULLER RIVER AREA	No	No	No Gender Restrictions	Registered Site	Camp, Hunting Place, Water Source	*Registered Knowledge Holder names available from DPL	265929mE 6830326mN Zone 50 [Reliable]	
17164	Horrocks Beach	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell, Water Source	*Registered Knowledge Holder names available from DPL	246772mE 6860129mN Zone 50 [Reliable]	
17958	SGA-2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	270388mE 6802800mN Zone 50 [Reliable]	
18794	Westbank Beach Burial	Yes	Yes	No Gender Restrictions	Registered Site	Skeletal Material / Burial, Other: Isolated Artefacts	*Registered Knowledge Holder names available from DPL	Not available when location is restricted	
18907	Irwin River (SC04)	Yes	Yes	No Gender Restrictions	Registered Site	Historical, Mythological, Camp, Natural Feature, Water Source	*Registered Knowledge Holder names available from DPL	Not available when location is restricted	
20051	Kwelena Mambakort - Wedge Island	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Grinding Patches / Grooves, Historical, Midden / Scatter, Rockshelter, Arch Deposit, Camp, Hunting Place, Meeting Place, Shell, Water Source	*Registered Knowledge Holder names available from DPL	Not available when location is restricted	
20052	Wedge Island Coast Sandune Quinilup Springs/ Yonga Kep Wari	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Historical, Midden / Scatter, Camp, Hunting Place, Meeting Place, Named Place, Water Source	*Registered Knowledge Holder names available from DPL	326413mE 6593758mN Zone 50 [Unreliable]	
20853	Geraldton Southern Transport Corridor Field Site 04	No	No	No Gender Restrictions	Registered Site	Natural Feature	*Registered Knowledge Holder names available from DPL	264906mE 6813588mN Zone 50 [Reliable]	
24414	Oakajee River	No	No	No Gender Restrictions	Registered Site	Mythological, Natural Feature	*Registered Knowledge Holder names available from DPL	266935mE 6838314mN Zone 50 [Reliable]	
24416	Bowes River	No	No	No Gender Restrictions	Registered Site	Mythological, Natural Feature	*Registered Knowledge Holder names available from DPL	266821mE 6860041mN Zone 50 [Reliable]	
24761	Greenough River	No	No	No Gender Restrictions	Registered Site	Mythological, Natural Feature	*Registered Knowledge Holder names available from DPL	389523mE 6893919mN Zone 50 [Reliable]	

Department of Planning, Lands and Heritage

Aboriginal Heritage Inquiry System

Map of Registered Aboriginal Sites

For further important information on using this information please see the Department of Planning, Lands and Heritage's Disclaimer statement at https://www.dplh.wa.gov.au/about-this-website



Legend

- Registered Aboriginal Site
- Search Area
- Town
- Road
- River
- Local Government Authority

181.21 kilometres

Map Scale 1 : 5,490,000

MGA Zone 50 (GDA94)

Aboriginal Heritage Inquiry System

List of Other Heritage Places

Search Criteria

24 Other Heritage Places in Shapefile - EMBA

Disclaimer

The *Aboriginal Heritage Act 1972* preserves all Aboriginal sites in Western Australia whether or not they are registered. Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Planning, Lands and Heritage by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you email the details to the Department at AboriginalHeritage@dplh.wa.gov.au and we will make every effort to rectify it as soon as possible.

South West Settlement ILUA Disclaimer

Your heritage enquiry is on land **within or adjacent to** the following Indigenous Land Use Agreement(s): Yued Indigenous Land Use Agreement.

On 8 June 2015, six identical Indigenous Land Use Agreements (ILUAs) were executed across the South West by the Western Australian Government and, respectively, the Yued, Whadjuk People, Gnaala Karla Booja, Ballardong People, South West Boojarah #2 and Wagyl Kaip & Southern Noongar groups, and the South West Aboriginal Land and Sea Council (SWALSC).

The ILUAs bind the parties (including 'the State', which encompasses all State Government Departments and certain State Government agencies) to enter into a Noongar Standard Heritage Agreement (NSHA) when conducting Aboriginal Heritage Surveys in the ILUA areas, unless they have an existing heritage agreement. It is also intended that other State agencies and instrumentalities enter into the NSHA when conducting Aboriginal Heritage Surveys in the ILUA areas. It is recommended a NSHA is entered into, and an 'Activity Notice' issued under the NSHA, if there is a risk that an activity will 'impact' (i.e. by excavating, damaging, destroying or altering in any way) an Aboriginal heritage site. The Aboriginal Heritage Due Diligence Guidelines, which are referenced by the NSHA, provide guidance on how to assess the potential risk to Aboriginal heritage.

Likewise, from 8 June 2015 the Department of Mines, Industry Regulation and Safety (DMIRS) in granting Mineral, Petroleum and related Access Authority tenures within the South West Settlement ILUA areas, will place a condition on these tenures requiring a heritage agreement or a NSHA before any rights can be exercised.

If you are a State Government Department, Agency or Instrumentality, or have a heritage condition placed on your mineral or petroleum title by DMIRS, you should seek advice as to the requirement to use the NSHA for your proposed activity. The full ILUA documents, maps of the ILUA areas and the NSHA template can be found at https://www.wa.gov.au/organisation/department-of-the-premier-and-cabinet/south-west-native-title-settlement.

Further advice can also be sought from the Department of Planning, Lands and Heritage at AboriginalHeritage@dplh.wa.gov.au.

Copyright

Coordinate Accuracy

Coordinates (Easting/Northing metres) are based on the GDA 94 Datum. Accuracy is shown as a code in brackets following the coordinates.

Terminology (NB that some terminology has varied over the life of the legislation)

Place ID/Site ID: This a unique ID assigned by the Department of Planning, Lands and Heritage to the place.

Status:

- **Registered Site**: The place has been assessed as meeting Section 5 of the *Aboriginal Heritage Act 1972.*
- **Other Heritage Place which includes:**
  - **Stored Data / Not a Site:** The place has been assessed as not meeting Section 5 of the *Aboriginal Heritage Act 1972.*
  - **Lodged:** Information has been received in relation to the place, but an assessment has not been completed at this *stage* to determine if it meets Section 5 of the *Aboriginal Heritage Act 1972.*

Access and Restrictions:

- **File Restricted = No:** Availability of information that the Department of Planning, Lands and Heritage holds in relation to the place is not restricted in any way.
- **File Restricted = Yes:** Some of the information that the Department of Planning, Lands and Heritage holds in relation to the place is restricted if it is considered culturally sensitive. This information will only be made available if the Department of Planning, Lands and Heritage receives written approval from the informants who provided the information. To request access please contact AboriginalHeritage@dplh.wa.gov.au.
- **Boundary Restricted = No:** Place location is shown as accurately as the information lodged with the Registrar allows.
- **Boundary Restricted = Yes:** To preserve confidentiality the exact location and extent of the place is not displayed on the map. However, the shaded region (generally with an area of at least 4km²) provides a general indication of where the place is located. If you are a landowner and wish to find out more about the exact location of the place, please contact the Department of Planning, Lands and Heritage.
- **Restrictions:**
  - **No Restrictions:** *Anyone* can view the information.
  - **Male Access Only:** Only *males* can view restricted information.
  - **Female Access Only:** *Only* females can view restricted information.

Legacy ID: This is the former unique number that the former Department of Aboriginal Sites assigned to the place. This has been replaced by the Place ID / Site ID.

Aboriginal Heritage Inquiry System

List of Other Heritage Places

ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
1064	SOUTHGATE DUNE	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	268638mE 6806651mN Zone 50 [Unreliable]	S02851
1067	GREENOUGH RIVER WELL.	No	No	No Gender Restrictions	Lodged	Camp, Water Source, Other: SOURCE	*Registered Knowledge Holder names available from DPL	269538mE 6805051mN Zone 50 [Unreliable]	S02854
4515	GREENHEAD MIDDEN	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	303672mE 6671892mN Zone 50 [Reliable]	S02657
4669	GREENOUGH MOUTH	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	268638mE 6807651mN Zone 50 [Unreliable]	S02280
4761	GREENOUGH MIDDEN	No	No	No Gender Restrictions	Lodged	Midden / Scatter	*Registered Knowledge Holder names available from DPL	270428mE 6803106mN Zone 50 [Unreliable]	S01964
5281	GREENHEAD	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	303690mE 6671575mN Zone 50 [Reliable]	S01003
5282	SANDLAND ISLAND	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	307638mE 6655650mN Zone 50 [Unreliable]	S01004
5630	BOWES RIVER 1	No	No	No Gender Restrictions	Stored Data / Not a Site	Midden / Scatter	*Registered Knowledge Holder names available from DPL	251638mE 6853651mN Zone 50 [Unreliable]	S00512
5749	BOWES RIVER, NORTHAMPTON	No	No	No Gender Restrictions	Lodged	Skeletal Material / Burial	*Registered Knowledge Holder names available from DPL	250138mE 6854951mN Zone 50 [Reliable]	S00403
15297	ENEABBA WEST.	No	No	No Gender Restrictions	Stored Data / Not a Site	Ceremonial, Fish Trap, Camp, Water Source, Other: TRACK	*Registered Knowledge Holder names available from DPL	305214mE 6704425mN Zone 50 [Reliable]	S03045
15859	CORONATION BEACH AREA	No	No	No Gender Restrictions	Lodged	Camp, Hunting Place	*Registered Knowledge Holder names available from DPL	262410mE 6839091mN Zone 50 [Reliable]	
17464	HORROCKS-NORTHAMPTON ROAD	No	No	No Gender Restrictions	Lodged	Skeletal Material / Burial	*Registered Knowledge Holder names available from DPL	250650mE 6855222mN Zone 50 [Reliable]	

Aboriginal Heritage Inquiry System

List of Other Heritage Places

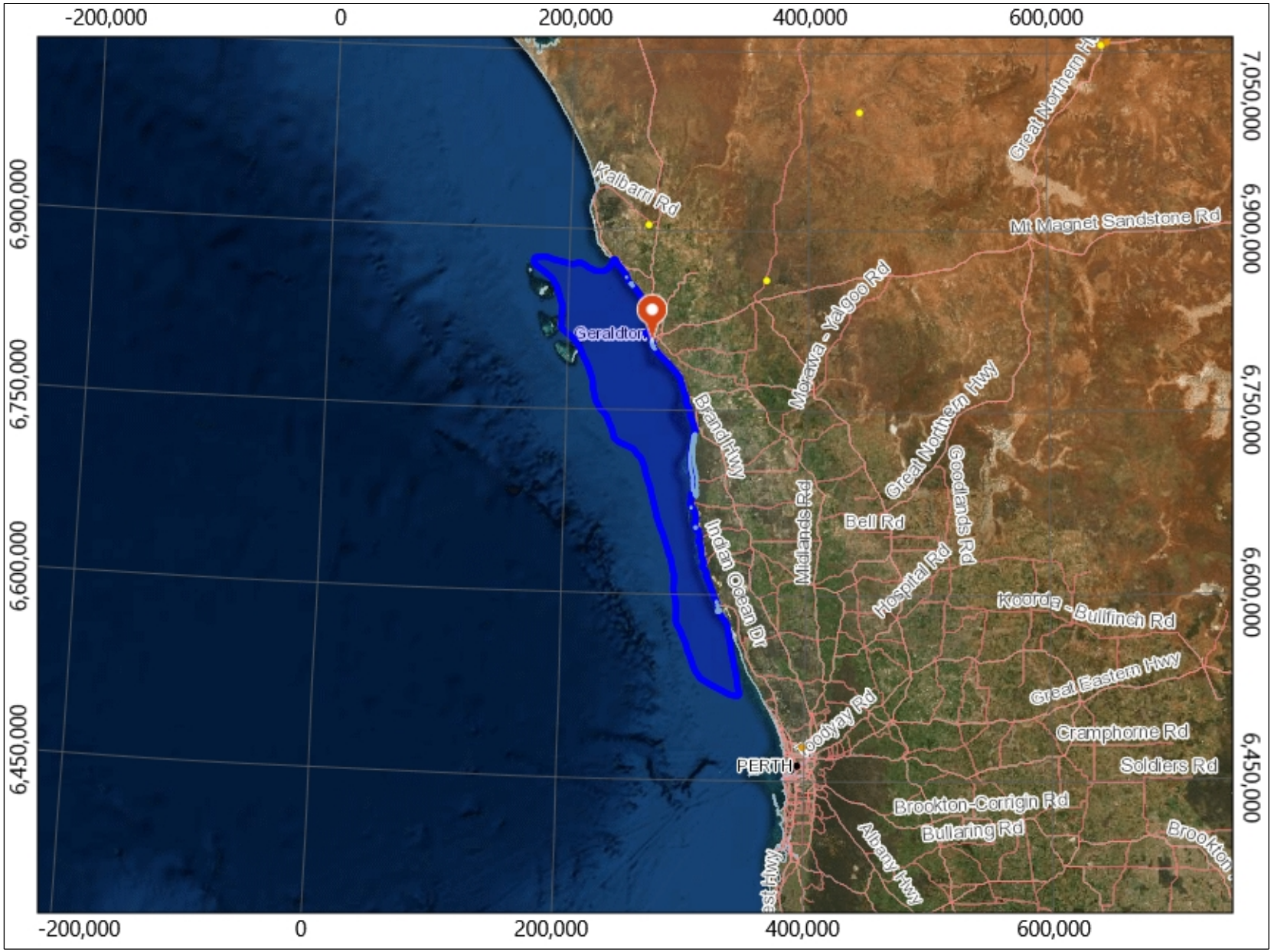
ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
17960	SGA-4	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter, Midden / Scatter, Shell	*Registered Knowledge Holder names available from DPL	269320mE 6804150mN Zone 50 [Reliable]	
17962	SGS-1	No	No	No Gender Restrictions	Lodged	Shell	*Registered Knowledge Holder names available from DPL	268538mE 6806550mN Zone 50 [Reliable]	
17963	SGS-2	No	No	No Gender Restrictions	Lodged	Shell	*Registered Knowledge Holder names available from DPL	268638mE 6806150mN Zone 50 [Reliable]	
17965	SGS-4	No	No	No Gender Restrictions	Lodged	Shell	*Registered Knowledge Holder names available from DPL	269350mE 6803700mN Zone 50 [Reliable]	
17966	SGS-5	No	No	No Gender Restrictions	Lodged	Shell	*Registered Knowledge Holder names available from DPL	269900mE 6803000mN Zone 50 [Reliable]	
17967	SGS-6	No	No	No Gender Restrictions	Lodged	Shell	*Registered Knowledge Holder names available from DPL	271338mE 6801600mN Zone 50 [Reliable]	
18433	Horrocks Midden	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter, Midden / Scatter, Ochre	*Registered Knowledge Holder names available from DPL	246543mE 6860371mN Zone 50 [Reliable]	
20053	Wedge Island Camping Ground Shell Middens	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter, Historical, Midden / Scatter, Camp	*Registered Knowledge Holder names available from DPL	326883mE 6592327mN Zone 50 [Unreliable]	
24731	Kornt Gil-Git	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter, Fish Trap, Midden / Scatter, Camp, Shell	*Registered Knowledge Holder names available from DPL	325870mE 6595318mN Zone 50 [Reliable]	
26191	Chillion Kornt, Wetj Boya	Yes	Yes	No Gender Restrictions	Lodged	Artefacts / Scatter, Fish Trap, Midden / Scatter, Rockshelter	*Registered Knowledge Holder names available from DPL	Not available when location is restricted	
32715	Oakajee South Dune System	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter, Historical, Midden / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DPL	264587mE 6833948mN Zone 50 [Unreliable]	
38814	Wedj Noongar Koorl	Yes	Yes	Male Access Only	Lodged	Artefacts / Scatter, Grinding Patches / Grooves, Camp, Shell	*Registered Knowledge Holder names available from DPL	Not available when location is restricted	

Department of Planning, Lands and Heritage

Aboriginal Heritage Inquiry System

Map of Other Heritage Places

For further important information on using this information please see the Department of Planning, Lands and Heritage's Disclaimer statement at https://www.dplh.wa.gov.au/about-this-website



Legend

- Other Heritage Place
- Search Area
- Town
- Road
- River
- Local Government Authority

181.21 kilometres

Map Scale 1 : 5,490,000

MGA Zone 50 (GDA94)

Appendix D TEO Risk Matrix

Appendix B TEO Risk Ranking

Consequence

The consequence terms to be used to describe worst case scenario for the risk, assuming the risk event occurs, and mitigating controls fail.

		Injury / Health Effect	Regulatory	Environment	Asset / Production Loss	Business Reputation
6	**Catastrophic**	Multiple fatalities or severe and irreversible illness / disability (>30%) to multiple personnel.	Potential jail terms for executives and/or catastrophic fines for company. Or Prolonged litigation. Loss of operating licences.	Extremely severe environmental impact with significant recovery work over a few years.	Catastrophic >$5M	Catastrophic adverse public, political or media outcry, resulting in international coverage. Critical impact on business reputation & future.
5	**Severe**	Single fatality or severe irreversible illness / disability (>30%) to 1 person.	Severe fines or prosecutions. Or Issue of show cause notice	Severe environmental impact with significant site impact and recovery work over a few months.	Severe $ 2.5M to <$5M	Severe adverse national media /public / political attention.
4	**Major**	Permanent disability / illness (<30%) to 1 person.	Major prosecution and fines. Or Major litigation, including class actions.	Major environmental impact with off-site impact and recovery work over a few weeks.	Major $1M to < $2.5M	Major impact on business reputation and/or national media exposure.
3	**Serious**	Serious injury or serious health effects resulting in more than 5 days lost time or more than 1-month alternate / restricted duties.	Serious breach of legislation. Or Prohibition Notice and/or fines issued by Regulator.	Serious environmental impact with some on-site impact and recovery work over a few days.	Serious $300k to < $1M	Serious, adverse local public or media attention or complaints.
2	**Moderate**	Injury / health effect to individual requiring medical treatment by a medically qualified person with less than 5 days lost time or less than 1-month alternate / restricted duties.	Breach of legislation with investigation required by Regulator. Or Direction / Improvement Notice issued by Regulator	Moderate or slight environmental impact, negligible remedial / recovery work.	Moderate $30k to < $300k	Moderate or slight impact. Public awareness, but no public concern.
1	**Minor**	Injury or illness requiring first aid (no lost time or alternate / restricted duties).	Minor regulatory breach Or Compulsory reporting of incident.	Negligible environmental impact, effect contained locally.	$0k to < $30k	Negligible impact on reputation.

Likelihood

The likelihood terms to be used to describe the likelihood from the description that best fits the probability or chance of the selected consequence occurring, based on controls currently in place. For exposure to risk in the future, select the likelihood based on controls which will be in place at the time of exposure to the risk.

A **Extremely unlikely**	B **Very unlikely**	C **Unlikely**	D **Likely**	E **Very likely**	F **Almost certain**
Less than once per 100 years Not known to occur in a comparable activity internationally but plausible	Between once per 100 years and once per 10 years Known to occur in a comparable activity internationally but unlikely	Between once per 10 years and once per year Has occurred or could occur in a comparable activity in Australia	Between once every year and 4 times a year Has occurred once or twice in the company	At least once per month Has occurred frequently in the company	At least once per week Has occurred frequently at the facility

Risk Ranking

The residual risk rating is determined by considering the potential consequences and the likelihood of occurrence or potential occurrence.

			Likelihood					
		Level	**A**	**B**	**C**	**D**	**E**	**F**
Consequence	**Catastrophic**	**6**	High (11)	High (12)	Very High (18)	Very High (24)	Extreme (30)	Extreme (36)
	Severe	**5**	Medium (5)	High (12)	High (15)	Very High (20)	Very High (25)	Extreme (30)
	Major	**4**	Medium (4)	Medium (8)	High (12)	High (16)	Very High (20)	Very High (24)
	Serious	**3**	Low (3)	Medium (6)	Medium (9)	High (12)	High (15)	Very High (18)
	Moderate	**2**	Low (2)	Low (4)	Medium (6)	Medium (8)	High (12)	High (12)
	Minor	**1**	Low (1)	Low (2)	Low (3)	Medium (4)	Medium (5)	High (11)

Appendix E August Stakeholder Factsheet

STAKEHOLDER CONSULTATION INFORMATION SHEET

Cliff Head Offshore Operations Environment Plan Revision

August 2022

In accordance with the Commonwealth's Offshore Petroleum and Greenhouse Gas Storage (OPGGS) (Environment) Regulations 2009, Triangle Energy (Operations) Pty Ltd (TEO) is required to develop and implement a 5-year revision of its current Environment Plan (EP) for the ongoing offshore operation and maintenance of the Cliff Head Alpha (CHA) platform and subsea pipelines in Commonwealth waters.

WHO IS TRIANGLE ENERGY?

Triangle Energy, through its subsidiary TEO is an oil exploration and production company based in Perth, Western Australia. The company is the majority owner (78.75%) and registered operator of the Cliff Head Oil Field and Arrowsmith Stabilisation Plant (ASP), which are the only offshore and operating onshore crude oil facilities in the Perth Basin (**Figure 1**).

WHERE IS THE PROJECT LOCATED?

The Cliff Head Oil Field is located in Commonwealth waters in the Perth Basin, about 270 kilometres (km) north of Perth and 20 km south-southwest off the coast of Dongara, Western Australia (WA; **Figure 2**). The oil field includes production and injection wells, and the CHA unmanned offshore wellhead platform.

The CHA is connected to the onshore ASP via twin 14 km production and injection pipelines, a subsea power and control cable and a chemical supply umbilical strapped to the production pipeline. The pipelines extend from the platform to the shore; crossing beneath the shoreline via a horizontal directionally drilled hole located about 500 m offshore. Approximately 4.9 km of the subsea pipelines lie in Commonwealth waters.

FIGURE 1. Cliff Head Alpha Offshore Platform

WHAT OPERATIONAL ACTIVITIES ARE COVERED BY THE EP?

Production: Production will continue from the Cliff Head facilities, which at present produces approximately 95m^3/d (700 barrels of oil per day) from the Cliff Head field. The oil is heavy and waxy and the reservoir has very low pressure resulting in a very low environmental spill risk. Reservoir fluid, both oil and water, is produced from five production wells using electrical submersible pump (ESP) wells.

Offshore Platform and Wellhead: Inspection, maintenance and repair (IMR) will be carried out at regularly as required. Typical inspection activities include visual surveys via a remotely operated vehicle, side scan sonar surveillance, cathodic protection measurements and ultrasonic condition checks. Maintenance of infrastructure is required at regular and/or planned intervals to maintain performance reliability and prevent deterioration or failure of equipment. Repair activities are those required when a subsea system or component is degraded or damaged as defined by design codes. Workover activities will be conducted intermittently as required, e.g. to replace an ESP or production tubing.

Sidetrack Drilling: Sidetrack activities are planned for at least one production well, which will include abandonment of the existing production interval. A new sidetrack hole will be drilled to the new reservoir target with a blowout preventer and riser in place. Drilling will use water-based fluids and cuttings will be retrieved to the surface. The well will be completed with an ESP run on production tubing. The well will then be brought online with production managed through the existing Xmas tree and surface pipework and production safety systems.

Offshore Pipeline: IMR activities will be undertaken periodically on the pipelines including freespan rectification works, visual inspection by ROV or diver, ultrasonic inspection, inspection and rectification of cathodic protection, emergency clamping and umbilical or subsea repair. Helicopter surveillance of the pipeline is carried out every 21 days.

Activity Vessels: Operations support vessels will be used to undertake IMR and support activities. The vessel size and type will be dependent on the work scope. All vessels used in relation to CHA operations will be commercial vessels with a suitable survey class for the activities required.

Decommissioning: Ongoing maintenance of the Cliff Head facilities will be continued under the Operations Environment Plan until decommissioning activities commence. An overview of decommissioning planning will be provided in the Operations EP in line with TEO's obligations to maintain and remove structures, equipment and property brought onto the title under Section 572 of the OPGGS Act. TEO notes that alternative options to complete removal may be considered providing equal or better environmental, safety and well integrity outcomes can be demonstrated, and that the alternative approach complies with all other legislative and regulatory requirements. Decommissioning arrangements will be the subject of a separate EP and stakeholder feedback will be sought by TEO during the decommissioning planning process.

HOW DO THE OFFSHORE OPERATIONS AFFECT FISHING & OTHER VESSEL ACTIVITIES?

The 500 m area around the platform is an exclusion zone and a gazetted Petroleum Safety Zone, which excludes other vessels and fishing activities from occurring in this area. Additionally, the operational area extends 500 m either side of the pipelines. The location of the pipelines are marked on nautical charts available from the Australian Hydrographic Office with the general advice that vessels should not anchor or trawl in the vicinity. However, TEO has a memorandum of understanding (MOU) in place with the Dongara Professional Fisherman's Association that allows traps to be placed along the pipeline for rock lobster fishing.

In addition to a helicopter survey every 3 weeks, a vessel will conduct an inspection along the pipeline every two years. In the unlikely event that any significant maintenance or repair work is required to the pipeline, a vessel may be moored on site. An additional vessel may then be required to transit to and from the site to service the works. Though no formal exclusion zones apply around project vessels, other vessels and fishers may be asked to keep away from the immediate vicinity while the works are taking place. Fishers and other relevant stakeholders will be notified prior to any maintenance or repair activities taking place.

HOW ARE POTENTIAL ENVIRONMENTAL IMPACTS BEING MANAGED?

The environmental risks and impacts from the continued Cliff Head operations in Commonwealth waters are managed in accordance with the Cliff Head Offshore Operations EP. Key control measures include:

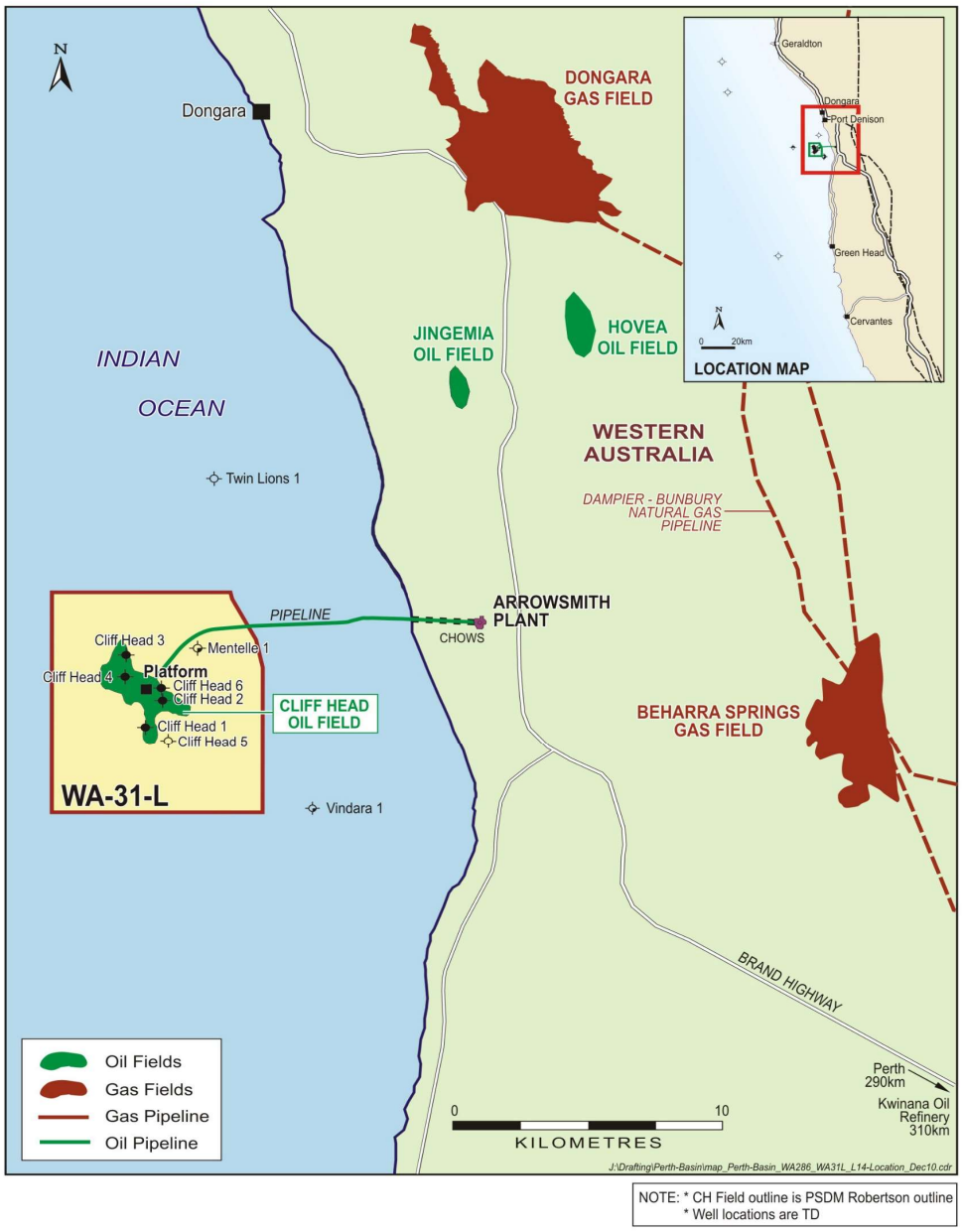
- Maintenance of the Petroleum Safety Zone around the platform to prevent vessel collisions.
- Implementation of the Cliff Head Asset Integrity Management Plan, to ensure the integrity of the Cliff Head assets are maintained.
- Corrosion control system in place to prevent corrosion of pipeline and subsequent leaks.
- Aerial surveys undertaken every 21 days to allow early detection of leaks from pipelines.
- All project vessels managed in accordance with in compliance with the *Navigation Act 2012* and associated Marine Orders.

WILL THE EP BE PUBLICLY DISCLOSED?

In accordance with regulatory requirements, the revised EP will be publicly available on the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) website.

TEO encourages your feedback and input into the revision of this EP, and is committed to maintaining your confidentiality. All communications will be logged, assessed and acknowledged with a response, and incorporated into the EP. Information determined to be sensitive will not be made public. Stakeholders are advised to inform TEO if any information provided is confidential and not to be published.

FIGURE 2. Location of the Cliff Head oil field, showing the platform in Commonwealth waters, and the subsea pipelines linking the platform to the onshore Arrowsmith Stabilisation Plant



If you would like to provide comment or seek further information on the Cliff Head Offshore Operations, please contact Bryce Donaldson:

Email: SC@triangleenergy.com.au

Phone: +61 8 9219 7111

Post: Suite 2, Ground Floor
100 Havelock Street
Perth, WA 6000

TriangleEnergy

Appendix F November Stakeholder Factsheet

STAKEHOLDER CONSULTATION INFORMATION SHEET

Cliff Head Offshore Operations Environment Plan Revision

November 2022

In accordance with the Commonwealth's Offshore Petroleum and Greenhouse Gas Storage (OPGGS) (Environment) Regulations 2009, Triangle Energy (Operations) Pty Ltd (TEO) is required to develop and implement a 5-year revision of its current Environment Plan (EP) for the ongoing offshore operation and maintenance of the Cliff Head Alpha (CHA) platform and subsea pipelines in Commonwealth waters.

WHO IS TRIANGLE ENERGY?

Triangle Energy, through its subsidiary TEO is an oil exploration and production company based in Perth, Western Australia. The company is the majority owner (78.75%) and registered operator of the Cliff Head Oil Field and Arrowsmith Stabilisation Plant (ASP), which are the only offshore and operating onshore crude oil facilities in the Perth Basin (**Figure 1**).

WHERE IS THE PROJECT LOCATED?

The Cliff Head Oil Field is located in Commonwealth waters in the Perth Basin, about 270 kilometres (km) north of Perth and 20 km south-southwest off the coast of Dongara, Western Australia (WA; **Figure 2**). The oil field includes production and injection wells, and the CHA unmanned offshore wellhead platform.

The CHA is connected to the onshore ASP via twin 14 km production and injection pipelines, a subsea power and control cable and a chemical supply umbilical strapped to the production pipeline. The pipelines extend from the platform to the shore; crossing beneath the shoreline via a horizontal directionally drilled hole located about 500 m offshore. Approximately 4.9 km of the subsea pipelines lie in Commonwealth waters.

FIGURE 1. Cliff Head Alpha Offshore Platform

WHAT OPERATIONAL ACTIVITIES ARE COVERED BY THE EP?

Production: Production will continue from the Cliff Head facilities, which at present produces approximately 95m^3/d (700 barrels of oil per day) from the Cliff Head field. The oil is heavy and waxy and the reservoir has very low pressure resulting in a very low environmental spill risk. Reservoir fluid, both oil and water, is produced from five production wells using electrical submersible pump (ESP) wells.

Offshore Platform and Wellhead: Inspection, maintenance and repair (IMR) will be carried out at regularly as required. Typical inspection activities include visual surveys via a remotely operated vehicle, side scan sonar surveillance, cathodic protection measurements and ultrasonic condition checks. Maintenance of infrastructure is required at regular and/or planned intervals to maintain performance reliability and prevent deterioration or failure of equipment. Repair activities are those required when a subsea system or component is degraded or damaged as defined by design codes. Workover activities will be conducted intermittently as required, e.g. to replace an ESP or production tubing.

Sidetrack Drilling: Sidetrack activities are planned for at least one production well, which will include abandonment of the existing production interval. A new sidetrack hole will be drilled to the new reservoir target with a blowout preventer and riser in place. Drilling will use water-based fluids and cuttings will be retrieved to the surface. The well will be completed with an ESP run on production tubing. The well will then be brought online with production managed through the existing Xmas tree and surface pipework and production safety systems.

Offshore Pipeline: IMR activities will be undertaken periodically on the pipelines including freespan rectification works, visual inspection by ROV or diver, ultrasonic inspection, inspection and rectification of cathodic protection, emergency clamping and umbilical or subsea repair. Helicopter surveillance of the pipeline is carried out every 21 days.

Activity Vessels: Operations support vessels will be used to undertake IMR and support activities. The vessel size and type will be dependent on the work scope. All vessels used in relation to CHA operations will be commercial vessels with a suitable survey class for the activities required.

Decommissioning: Ongoing maintenance of the Cliff Head facilities will be continued under the Operations Environment Plan until decommissioning activities commence. An overview of decommissioning planning will be provided in the Operations EP in line with TEO's obligations to maintain and remove structures, equipment and property brought onto the title under Section 572 of the OPGGS Act. TEO notes that alternative options to complete removal may be considered providing equal or better environmental, safety and well integrity outcomes can be demonstrated, and that the alternative approach complies with all other legislative and regulatory requirements. Decommissioning arrangements will be the subject of a separate EP and stakeholder feedback will be sought by TEO during the decommissioning planning process.

HOW DO THE OFFSHORE OPERATIONS AFFECT FISHING & OTHER VESSEL ACTIVITIES?

The 500 m area around the platform is an exclusion zone and a gazetted Petroleum Safety Zone, which excludes other vessels and fishing activities from occurring in this area. Additionally, the operational area extends 500 m either side of the pipelines. The location of the pipelines are marked on nautical charts available from the Australian Hydrographic Office with the general advice that vessels should not anchor or trawl in the vicinity. However, TEO has a memorandum of understanding (MOU) in place with the Dongara Professional Fisherman's Association that allows traps to be placed along the pipeline for rock lobster fishing.

In addition to a helicopter survey every 3 weeks, a vessel will conduct an inspection along the pipeline every two years. In the unlikely event that any significant maintenance or repair work is required to the pipeline, a vessel may be moored on site. An additional vessel may then be required to transit to and from the site to service the works. Though no formal exclusion zones apply around project vessels, other vessels and fishers may be asked to keep away from the immediate vicinity while the works are taking place. Fishers and other relevant stakeholders will be notified prior to any maintenance or repair activities taking place.

HOW ARE POTENTIAL ENVIRONMENTAL IMPACTS BEING MANAGED?

The environmental risks and impacts from the continued Cliff Head operations in Commonwealth waters are managed in accordance with the Cliff Head Offshore Operations EP. Key control measures include:

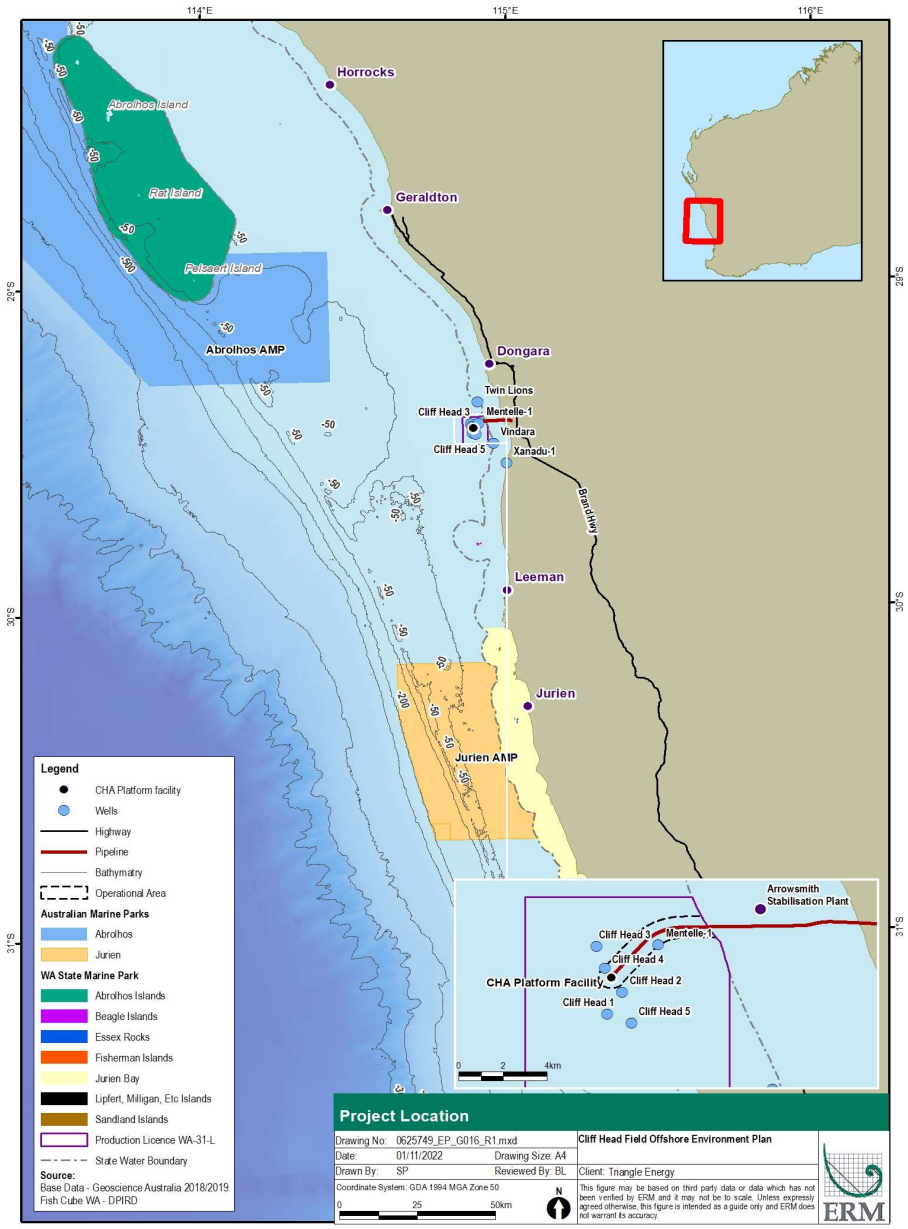
- Maintenance of the Petroleum Safety Zone around the platform to prevent vessel collisions.
- Implementation of the Cliff Head Asset Integrity Management Plan, to ensure the integrity of the Cliff Head assets are maintained.
- Corrosion control system in place to prevent corrosion of pipeline and subsequent leaks.
- Aerial surveys undertaken every 21 days to allow early detection of leaks from pipelines.
- All project vessels managed in accordance with in compliance with the *Navigation Act 2012* and associated Marine Orders.

WILL THE EP BE PUBLICLY DISCLOSED?

In accordance with regulatory requirements, the revised EP will be publicly available on the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) website.

TEO encourages your feedback and input into the revision of this EP, and is committed to maintaining your confidentiality. All communications will be logged, assessed and acknowledged with a response, and incorporated into the EP. Information determined to be sensitive will not be made public. Stakeholders are advised to inform TEO if any information provided is confidential and not to be published.

FIGURE 2. Location of the Cliff Head oil field, showing the platform in Commonwealth waters, and the subsea pipelines linking the platform to the onshore Arrowsmith Stabilisation Plant



If you would like to provide comment or seek further information on the Cliff Head Offshore Operations, please contact Bryce Donaldson:

Email: SC@triangleenergy.com.au

Phone: +61 8 9219 7111

Post: Suite 2, Ground Floor
100 Havelock Street
Perth, WA 6000

TriangleEnergy

Appendix G December Stakeholder Factsheet: Traditional Owner Groups and eNGOs

STAKEHOLDER CONSULTATION INFORMATION SHEET

Cliff Head Offshore Operations Environment Plan Revision

December 2022

In accordance with the Commonwealth's Offshore Petroleum and Greenhouse Gas Storage (OPGGS) (Environment) Regulations 2009, Triangle Energy (Operations) Pty Ltd (TEO) is required to develop and implement a 5-year revision of its current Environment Plan (EP) for the ongoing offshore operation and maintenance of the Cliff Head Alpha (CHA) platform and subsea pipelines in Commonwealth waters.

WHO IS TRIANGLE ENERGY?

Triangle Energy, through its subsidiary TEO is an oil exploration and production company based in Perth, Western Australia. The company is the majority owner (78.75%) and registered operator of the Cliff Head Oil Field and Arrowsmith Stabilisation Plant (ASP), which are the only offshore and operating onshore crude oil facilities in the Perth Basin (**Figure 1**).

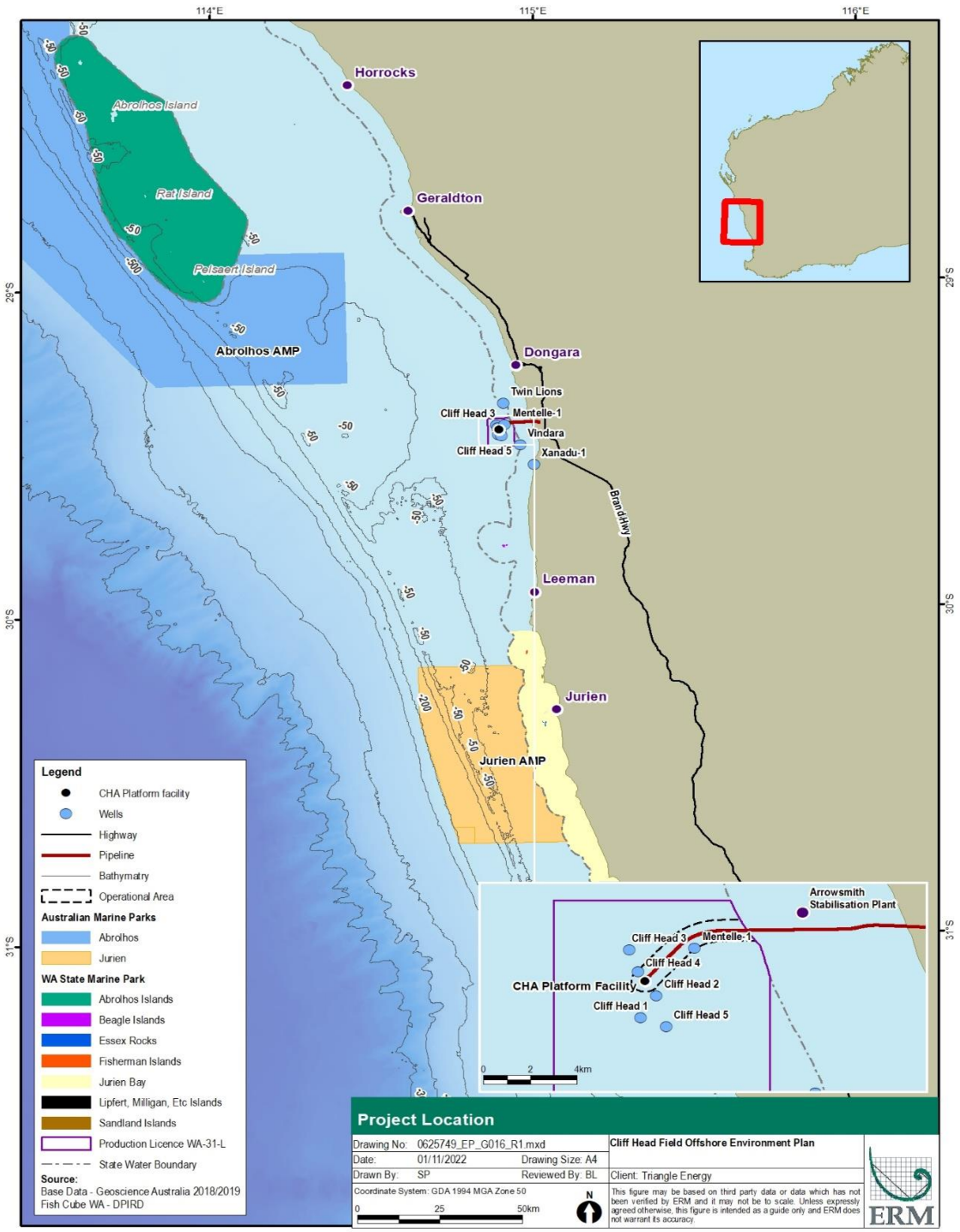
WHERE IS THE PROJECT LOCATED?

The Cliff Head Oil Field is located in Commonwealth waters in the Perth Basin, about 270 kilometres (km) north of Perth and 20 km south-southwest off the coast of Dongara, Western Australia (WA; **Figure 2**). The oil field includes production and injection wells, and the CHA unmanned offshore wellhead platform.

The CHA platform is connected to the onshore ASP via twin 14 km production and injection pipelines, a subsea power and control cable and a chemical supply umbilical strapped to the production pipeline. The pipelines extend from the platform to the shore; crossing beneath the shoreline via a horizontal directionally drilled hole located about 500 m offshore. Approximately 4.9 km of the subsea pipelines lie in Commonwealth waters. Infrastructure located onshore and within State Waters is the subject of separate Environment approvals.

FIGURE 1. Cliff Head Alpha Offshore Platform

FIGURE 2. Location of the Cliff Head oil field, showing the platform in Commonwealth waters, and the subsea pipelines linking the platform to the onshore Arrowsmith Stabilisation Plant



WHAT OPERATIONAL ACTIVITIES ARE COVERED BY THE EP?

Production: Production will continue from the Cliff Head facilities, which at present produces approximately 95m^3/d (700 barrels of oil per day) from the Cliff Head field. The oil is heavy and waxy and the reservoir has very low pressure resulting in a very low environmental spill risk. Reservoir fluid, both oil and water, is produced from five production wells using electrical submersible pump (ESP) wells.

Offshore Platform and Wellhead: Inspection, maintenance and repair (IMR) will be carried out at regularly as required. Typical inspection activities include visual surveys via a remotely operated vehicle, side scan sonar surveillance, cathodic protection measurements and ultrasonic condition checks. Maintenance of infrastructure is required at regular and/or planned intervals to maintain performance reliability and prevent deterioration or failure of equipment. Repair activities are those required when a subsea system or component is degraded or damaged as defined by design codes. Workover activities will be conducted intermittently as required, e.g. to replace an ESP or production tubing.

Sidetrack Drilling: Sidetrack activities are planned for at least one production well, which will include abandonment of the existing production interval. A new sidetrack hole will be drilled to the new reservoir target with a blowout preventer and riser in place. Drilling will use water-based fluids and cuttings will be retrieved to the surface. The well will be completed with an ESP run on production tubing. The well will then be brought online with production managed through the existing Xmas tree and surface pipework and production safety systems.

Offshore Pipeline: IMR activities will be undertaken periodically on the pipelines including freespan rectification works, visual inspection by ROV or diver, ultrasonic inspection, inspection and rectification of cathodic protection, emergency clamping and umbilical or subsea repair. Helicopter surveillance of the pipeline is carried out every 21 days.

Activity Vessels: Operations support vessels will be used to undertake IMR and support activities. The vessel size and type will be dependent on the work scope. All vessels used in relation to CHA operations will be commercial vessels with a suitable survey class for the activities required.

Decommissioning: Ongoing maintenance of the Cliff Head facilities will be continued under the Operations Environment Plan until decommissioning activities commence. An overview of decommissioning planning will be provided in the Operations EP in line with TEO's obligations to maintain and remove structures, equipment and property brought onto the title under Section 572 of the OPGGS Act. TEO notes that alternative options to complete removal may be considered providing equal or better environmental, safety and well integrity outcomes can be demonstrated, and that the alternative approach complies with all other legislative and regulatory requirements. Decommissioning arrangements will be the subject of a separate EP and stakeholder feedback will be sought by TEO during the decommissioning planning process.

ENVIRONMENT AND SOCIAL IMPACTS

A number of studies have been undertaken to inform the environmental impact and risk assessment for planned and unplanned activities. The Cliff Head platform is 48 km to the Abrolhos Australian Marine Park (AMP), and 80 km to the Jurien Bay AMP. There are no registered Aboriginal sites protected under the Aboriginal Heritage Act 1972 located within the area of operations. The closest registered site is the Irwin River (18907), located onshore approximately 19 km north-west of the area of operations. Given these distances to protected areas and places, and controls in place to minimise impacts generated from planned activities, the risk to the marine environment is considered low. TEO have detailed emergency planning in place to both prevent and respond to unplanned events such as oil spills, in order to minimise environmental impacts and disruption to other users of the offshore environment.

HOW ARE POTENTIAL ENVIRONMENTAL IMPACTS BEING MANAGED?

The environmental risks and impacts from the continued Cliff Head operations in Commonwealth waters are managed in accordance with the Cliff Head Offshore Operations EP. Management measures have been developed to reduce impacts and risks to as low as reasonably practicable (ALARP) and acceptable levels. Key control measures include:

- Maintenance of the Petroleum Safety Zone around the platform to prevent vessel collisions.
- Implementation of the Cliff Head Asset Integrity Management Plan, to ensure the integrity of the Cliff Head assets are maintained.
- Corrosion control system in place to prevent corrosion of pipeline and subsequent leaks.
- Aerial surveys undertaken every 21 days to allow early detection of leaks from pipelines.
- Equipment that produces air emissions is maintained to ensure efficient operation thus minimise air emissions.

WILL THE EP BE PUBLICLY DISCLOSED?

In accordance with regulatory requirements, the revised EP will be publicly available on the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) website.

TEO encourages your feedback and input into the revision of this EP, and is committed to maintaining your confidentiality. All communications will be logged, assessed and acknowledged with a response, and incorporated into the EP. Information determined to be sensitive will not be made public. Stakeholders are advised to inform TEO if any information provided is confidential and not to be published.

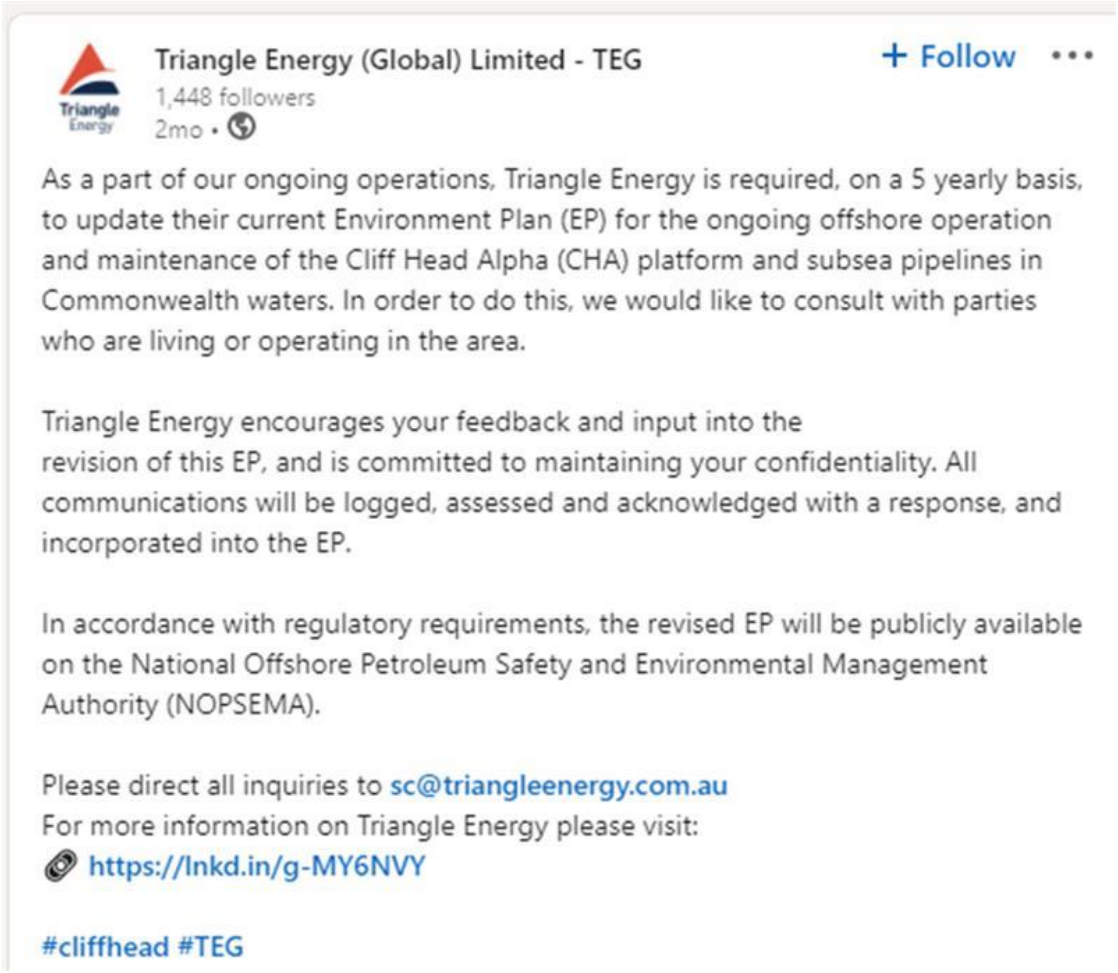
If you would like to provide comment or seek further information on the Cliff Head Offshore Operations, please contact Bryce Donaldson:

Email: SC@triangleenergy.com.au

Phone: +61 8 9219 7111
Post: Suite 2, Ground Floor
100 Havelock Street
Perth, WA 6000

TriangleEnergy

Appendix H LinkedIn Post



Triangle Energy (Global) Limited - TEG
1,448 followers
2mo •

+ Follow •••

As a part of our ongoing operations, Triangle Energy is required, on a 5 yearly basis, to update their current Environment Plan (EP) for the ongoing offshore operation and maintenance of the Cliff Head Alpha (CHA) platform and subsea pipelines in Commonwealth waters. In order to do this, we would like to consult with parties who are living or operating in the area.

Triangle Energy encourages your feedback and input into the revision of this EP, and is committed to maintaining your confidentiality. All communications will be logged, assessed and acknowledged with a response, and incorporated into the EP.

In accordance with regulatory requirements, the revised EP will be publicly available on the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

Please direct all inquiries to sc@triangleenergy.com.au
For more information on Triangle Energy please visit:
https://lnkd.in/g-MY6NVY

#cliffhead #TEG

Appendix I Dongara Rag

TriangleEnergy

Triangle Energy (Operations) are currently developing and implementing a 5-year revision of our Environment Plan (EP) for the ongoing Cliff Head operations in Commonwealth waters, and we are using this as an opportunity to reach out to stakeholders who may have an interest in our activities. The Cliff Head Oil Field is located in Commonwealth waters in the Perth Basin, about 20 km south-southwest off the coast of Dongara, Western Australia.

In accordance with regulatory requirements, the revised EP will be publicly available on the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA)website.

Triangle Energy encourages your feedback and input into the revision of this EP, and is committed to maintaining your confidentiality. All communications will be logged, assessed and acknowledged with a response and incorporated into the EP. Information determined to be sensitive will not be made public. Stakeholders are advised to inform TEO if any information provided is confidential and not to be published.

Further information can be found at
https://triangleenergy.com.au/or email SC@triangleenergy.com.au

mnd Western Australia

MND Assoc of WA - Dongara Vintage High-Tea Fundraiser Sat 12 Nov 22

Congratulations & Thank You SO MUCH, to our small Team of dynamic womanii

Special thanks to Graeme Hay for being our muscles & assisted whenever we needed "Man Power"!

AMAZING TEAM
- SUE HICK
- JUDY KAPOR
- LYN WILLIAMS
- SIL FROM
- STEPH BLIGH-LEE
- SARAH WHITMARSH
- ANDREA CAMPBELL

GERALDTON Team
- WENDY NORRIS
- DI MILLER
- DEB FRY
- SANDRA WATTS

MUSIC
- SHANE CROKE

DOOR PRIZE DONOR
- LOIS THOMAS

VIP GUEST SPEAKER
- DR SASHER RISINGER

MNDA of WA Speaker
- SARAH WILEY

BAR TEAM
- GRAEME HAY
- BEAU HAY
- MALCOLM KAPOR
- CHRIS WILLIAMS

VOLUNTEERS AND COOKING DONATIONS

* Rona Hay * Peta Hick * Mandy Reidy - what a pocket rocket xo
* Botanical Den & Tarts n Co * Baked by Brigette * Jenny Thomas
* Denayh Coyne * Ebony Hood * Shalice Baker * Steph Ross
* Ros Gillam * Di Brown * Verna Black * Pene Noble * Gene Burton
* Mary Inwards * Leonie Andrews * Tracie & Colin Gton * Tiffany Davis
* Virg McGuiness * Deb Dempster * Wynne Bishop * Kim Montgomery
* Sue Barnett * Pam Clinch * Dawn Cull * Glenys Johnson * Elaine Mears
* Robyn Patten * Jan Townsend * Lesley Parker * Vicki Smith * Steph Ross
* Majella Brogden * Bev Agar * Judy Watters * Pam Clinch * Lynley Murtha
* Virginia McGuiness * Di Holtmeulen * Deb Dempster * Cally Clarkson
* Donna Summers * Elizabeth Dempster * Glenys Johnson * Joany Rule
* Karina Bergsma * Karen Catchard * Elizabeth Neervoort

****

A very SPECIAL THANK YOU to all our VOLUNTEERS for making this event so SUCCESSFUL xo
If we have forgotten someone, please accept our sincere apologies, as so many people assisted that I may have omitted your name in error :(

All helpers were so appreciated - Sharon Johns & Team

Appendix J Stakeholder Submissions

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
Australian Fisheries Management Authority (AFMA)	Commonwealth Department	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Australian Fisheries Management Authority (AFMA)	Commonwealth Department	29/08/2022	Email/Letter from relevant person	The relevant person thanked Triangle for providing the information regarding the EP, and explained that at this stage AFMA has no comment on the proposal. The relevant person went on to highlight that it is important to consult with all fishers who have entitlements to fish within the proposed area, and provided links to websites where Triangle can identify relevant operators. The relevant person explained that they are able to provide individual contact details, and that there would be a cost associated with this service should they be engaged.	N	N/A
Australian Hydrographic Office (AHO)	Commonwealth Department	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Australian Hydrographic Office (AHO)	Commonwealth Department	19/08/2022	Email/Letter from relevant person	The relevant person acknowledged receipt of the previous email.	N	N/A
Australian Maritime Safety Authority (AMSA)	Commonwealth Department	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Australian Maritime Safety Authority (AMSA)	Commonwealth Department	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
Australian Maritime Safety Authority (AMSA)	Commonwealth Department	12/12/2022	Email/Letter from relevant person	Relevant person responded, advising that as a maritime regulatory stakeholder, AMSA should be informed of updated at all times.	N	N/A
Australian Maritime Safety Authority (AMSA)	Commonwealth Department	12/12/2022	Email/Letter to relevant person	TEO thanked relevant person for their reply, and confirmed TEO will continue to keep AMSA updated at all times on TEO's ongoing operations.	N	N/A
Department of Agriculture, Fisheries and Forestry (Marine Pests)	Commonwealth Department	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Department of Agriculture, Fisheries and Forestry (Marine Pests)	Commonwealth Department	18/08/2022	Email/Letter from relevant person	The relevant person asked for clarification regarding if Triangle would like the factsheet email to be circulated with Marine Pest Sectoral Committee (MPSC) relevant persons or is just the Secretariat	N	N/A
Department of Agriculture, Fisheries and Forestry (Marine Pests)	Commonwealth Department	18/08/2022	Email/Letter to relevant person	Triangle thanked the relevant person for their reply, and confirmed that the factsheet should be circulated to MPSC relevant persons.	N	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
Department of Agriculture, Fisheries and Forestry (Marine Pests)	Commonwealth Department	19/08/2022	Email/Letter to relevant person	On behalf of TEO, MPSC circulated factsheet to MSPC relevant persons.	Y - Factsheet	N/A
Department of Agriculture, Fisheries and Forestry (Marine Pests)	Commonwealth Department	17/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Department of Agriculture, Fisheries and Forestry (Marine Pests)	Commonwealth Department	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
Department of Agriculture, Fisheries and Forestry (Fisheries)	Commonwealth Department	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Department of Agriculture, Fisheries and Forestry (Fisheries)	Commonwealth Department	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
Department of Climate Change, Energy, the Environment and Water (DCCEEW) (Marine Parks & Reserves)	Commonwealth Department	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Department of Climate Change, Energy, the Environment and Water (DCCEEW) (Marine Parks & Reserves)	Commonwealth Department	18/11/2022	Email/Letter from relevant person	The Director of National Parks (DNP) thanked TEO for the opportunity to comment on the information sheet about the revised EP for Cliff Head Offshore Operations in WA-31-L. Based on the information provided, DNP noted that the planned activities do not overlap any Australian Marine Parks. While not identified in this information sheet, the previously accepted EP outlines that the operational area is approximately 80km north north-west of the Abrolhos Marine Park and south-west of Jurien Marine Park. Therefore there are no authorisation requirements from the DNP. DNP further advised TEO in preparing the EP, TEO should consider the Australian marine parks and their representativeness in the context of the management plan objectives and values, and provided guidance. DNP also noted requirements regarding emergency responses and the DNP should be made aware of oil/gas pollution incidences which occur within a marine park or are likely to impact on a marine park as soon as possible.	N	N/A
Department of Climate Change, Energy, the Environment and Water (DCCEEW) (Marine Parks & Reserves)	Commonwealth Department	21/11/2022	Phone call to relevant person	Toe thanked the relevant person for their reply and information provided regarding Australian Marine Parks and petroleum activities. Triangle Energy confirmed they have considered the NOPSEMA guidance note in preparation of our 5-year EP revision and have included details for Emergency response arrangements and notifications. Triangle Energy will be in contact if any operational activity changes result in overlap with a marine park.	N	N/A
Department of Climate Change, Energy, the Environment and Water (DCCEEW) (General)	Commonwealth Department	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
Department of Climate Change, Energy, the Environment and Water (DCCEEW) (General)	Commonwealth Department	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
Department of Climate Change, Energy, the Environment and Water (DCCEEW) (General)	Commonwealth Department	13/12/2022	Email/Letter from relevant person	Relevant person advised the media team at the federal Department of Climate Change Energy the Environment and Water does not want to receive these emails. Relevant person queried if TEO require that someone in their department see them. If so, relevant person requested TEO provide more information about the project and the relevant person will provide TEO with appropriate contact details.	N	N/A
Department of Climate Change, Energy, the Environment and Water (DCCEEW) (General)	Commonwealth Department	13/12/2022	Email/Letter to relevant person	TEO thanked relevant person for letting TEO know regarding their preference for no longer receiving these emails. TEO advised they don't have any further information to provide at this stage, other than the previously provided Factsheet, which TEO attached again. TEO advised they have already sent separate emails to the below: - Department of Climate Change, Energy, the Environment and Water (DCCEEW) - Underwater Cultural Heritage - Department of Climate Change, Energy, the Environment and Water (DCCEEW) – Environment Approvals Division - Department of Climate Change, Energy, the Environment and Water (Director of National Parks) TEO queried if there is another Division that might be appropriate.	Y - Factsheet	N/A
Department of Climate Change, Energy, the Environment and Water (DCCEEW) (General)	Commonwealth Department	14/12/2022	Email/Letter from relevant person	Relevant person replied advising that TEO have it covered. Relevant person will share with contact in WA approvals to make sure they have it.	N	N/A
Department of Climate Change, Energy, the Environment and Water (DCCEEW) (General)	Commonwealth Department	14/12/2022	Email/Letter to relevant person	TEO thanked relevant person for the confirmation and for following up with WA contact.	N	N/A
Department of Industry, Science and Resources	Commonwealth Department	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Department of Defence	Commonwealth Department	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Department of Defence	Commonwealth Department	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
National Native Title Tribunal (NNTT)	Commonwealth Department	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
National Native Title Tribunal (NNTT)	Commonwealth Department	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
WA Department of Mines, Industry Regulation and Safety (DMIRS)	State Department	17/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP. TEO confirmed they are providing DMIRS with this notification of TEO's ongoing activities as the Department has been identified as the 'Department of the responsible State Minister' for waters offshore from WA, in accordance with OPGGS (E) Regulation 11A(1). TEO confirms that DMIRS will be notified in the event of a reportable incident (in accordance with OPGGS (E) Regulation 26 and 26A) and prior to commencement of any drilling activities (in accordance with OPGGS (E) Regulation 30).	Y - Factsheet	N/A
WA Department of Mines, Industry Regulation and Safety (DMIRS)	State Department	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
Department of Primary Industries and Regional Development (DPIRD) - Fisheries	WA State Departments	23/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Department of Primary Industries and Regional Development (DPIRD) - Fisheries	WA State Departments	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
Department of Biodiversity, Conservation and Attractions (DBCA)	WA State Departments	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Department of Biodiversity, Conservation and Attractions (DBCA)	WA State Departments	25/08/2022	Email/Letter from relevant person	The relevant person thanked Triangle for providing the information regarding the EP. The relevant person explained that they have no comments in relation to responsibilities under the Conservation and Land Management Act 1984 and Biodiversity Conservation Act 2016.	N	N/A
DWER (Department of Water Environment Regulation)	WA State Departments	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
DWER (Department of Water Environment Regulation)	WA State Departments	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
Department of Transport - Marine (DoTWA)	WA State Departments	30/08/2022	Meeting with relevant person	Triangle met with the DoT to discuss the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the Cliff Head pipelines in Western Australian (WA) State Waters.	N	N/A
Department of Transport - Marine (DoTWA)	WA State Departments	7/09/2022	Email/Letter to relevant person	Triangle attached the documents requested by the relevant person during the meeting on August 30th, and provided contact details incase further information was required.	Y - Triangle Energy (Operations) Cliff Head Alpha Offshore Oil Pollution Emergency Plan (OPEP) - Revised oil spill modelling report	N/A
Department of Transport - Marine (DoTWA)	WA State Departments	18/10/2022	Email/Letter From relevant person	DoT provided review comments on the Triangle Energy (Operations) Cliff Head Alpha Offshore Oil Pollution Emergency Plan (OPEP). DoT thanked TEO for the opportunity to review the plan.	Y - DoT OPEP Review Comments	N/A
Western Australian Fishing Industry Council (WAFIC)	State Organisation	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Western Australian Fishing Industry Council (WAFIC)	State Organisation	23/08/2022	Email/Letter from relevant person	relevant person attached a fee-for-service model and provided a link to offshore wind farm proposals.	Y - Fee for service model	relevant person has provided information and/or requested additional information. No objections or concerns were raised.
Western Australian Fishing Industry Council (WAFIC)	State Organisation	23/08/2022	Email/Letter to relevant person	Triangle identified the fisheries within the operational area, and confirmed they would engage WAFIC on a fee-for-service basis.	N	N/A
Western Australian Fishing Industry Council (WAFIC)	State Organisation	23/08/2022	Email/Letter to relevant person	Triangle confirmed that Option A will be selected as the service requested from WAFIC, and requested a timeframe for delivery. Triangle noted that the EP is due on October 4th 2022.	N	N/A
Western Australian Fishing Industry Council (WAFIC)	State Organisation	24/08/2022	Email/Letter from relevant person	The relevant person explained that a response to the previous two emails will be provided once the western rock lobster council provides further information around communication with fishers. The relevant person confirmed that the service process would be completed in a timely fashion and would not exceed the October deadline.	N	relevant person has provided information and/or requested additional information. No objections or concerns were raised.
Western Australian Fishing Industry Council (WAFIC)	State Organisation	29/08/2022	Email/Letter from relevant person	WAFIC apologised for a delay in their reply. The relevant person requested the following information - 1. Preferred date and time and what information is to be distributed 2. How long the consultation process will be open for. The relevant person confirmed that they will engage with the following licence holders from the fisheries listed below: •Marine Aquarium Fish Managed Fishery •Specimen Shell Managed Fishery •Octopus Interim Managed Fishery •West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery •West Coast Demersal Scalefish (Interim) Managed Fishery The relevant person explained that Western Rock Lobster are separate to WAFIC, and will contact their member directly regarding the EP.	N	relevant person has provided information and/or requested additional information. No objections or concerns were raised.
Western Australian Fishing Industry Council (WAFIC)	State Organisation	30/08/2022	Email/Letter to relevant person	Triangle confirmed that the fisheries listed by the relevant person are to be engaged, and sent a factsheet (no other information at this stage). Triangle highlighted that the factsheet should be distributed as soon as possible to ensure consultation is received by 30th September 2022.	N	N/A
Western Australian Fishing Industry Council (WAFIC)	State Organisation	30/08/2022	Email/Letter from relevant person	The relevant person confirmed that information would be sent to relevant persons on 31st August 2022 and that a response will be formalised that demonstrates consultation with relevant persons.	N	relevant person has provided information and/or requested additional information. No objections or concerns were raised.
Western Australian Fishing Industry Council (WAFIC)	State Organisation	15/09/2022	Email/Letter from relevant person	The relevant person advised that an email was sent to 148 fishers within 7 fisheries on the 1st September regarding the revision of the Offshore Operations EP. The relevant person advised that only one comment had been received so far from fishers and that the Dongara Professional Fisherman's Association would likely cover the Western Rock Lobster licence holders. The relevant person explained that they have no specific comments or concerns in relation to the revision for the Cliff Head Offshore Operations Environment Plan.	N	relevant person has provided information and/or requested additional information. No objections or concerns were raised.
Western Australian Fishing Industry Council (WAFIC)	State Organisation	28/09/2022	Email/Letter from relevant person	The relevant person confirmed no additional comments were received from fishers regarding the Cliff Head Offshore Operations.		relevant person has provided information and/or requested additional information. No objections or concerns were raised.

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
Western Australian Fishing Industry Council (WAFIC)	State Organisation	21/11/2022	Email/Letter to relevant person	Based on some comments from NOPSEMA on the EP, TEO informed WAFIC they have had to broaden their approach for relevant person ID and consultation and identified the below additional Fisheries that will require notification for the revised EP: • Western Deepwater Trawl Fishery • West Coast Pure Seine Managed Fishery • Abrolhos Islands and Mid West Trawl Managed Fishery TEO provided WAFIC with a draft email for circulation with the relevant fishers. TEO requested WAFIC's thoughts on feedback on the approach.	N	N/A
Western Australian Fishing Industry Council (WAFIC)	State Organisation	24/11/2022	Email/Letter from relevant person	WAFIC informed TEO that they are in discussion with NOPSEMA regarding consultation with the commercial fishers for unplanned activities, once a response is received WAFIC will respond to TEO.	N	N/A
Western Australian Fishing Industry Council (WAFIC)	State Organisation	30/11/2022	Email/Letter from relevant person	WAFIC informed TEO that they will soon be putting the attachment provided on the WAFIC website to clarify their position on consultation for unplanned events. WAFIC sought any questions. WAFIC WAFIC requests that titleholders develop separate consultation strategies for unplanned events (e.g., oil spills), where titleholders are able to demonstrate that the likelihood of the activity such events occurring is extremely low. WAFIC and the commercial fishing licence holders they represent, should not be proactively consulted on unplanned events. Consultation on unplanned events should only be undertaken if an incident occurs that may affect commercial fishers.	Y	relevant person has provided information and/or requested additional information. No objections or concerns were raised.
Western Australian Fishing Industry Council (WAFIC)	State Organisation	20/01/2023	Email/Letter from relevant person	On behalf of TEO WAFIC contacted the WTBF license holder in WA advising of the 5-year revision to the EP and provided a Stakeholder Factsheet .	Y - Factsheet	N/A
Western Australian Fishing Industry Council (WAFIC)	State Organisation	23/01/2023	Phone call to relevant person	TEO thanked WAFIC for reaching out to the only WTBF license holder that fishes off the WA coast relevant to TEO's Operational Area.	N	N/A
Pearl Producers Association of WA (PPA)	Commonwealth Fishery	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet/Letter	N/A
Pearl Producers Association of WA (PPA)	Commonwealth Fishery	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
Commonwealth Fisheries Association (CFA)	Commonwealth Fishery	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Commonwealth Fisheries Association (CFA)	Commonwealth Fishery	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
Western Rock Lobster Council	State Fishery	19/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Western Rock Lobster Council	State Fishery	30/08/2022	Email/Letter from relevant person	The relevant person thanked Triangle for making contact, and requested a copy of the current Environmental Plan. Further to this, the relevant person asked when the cut-off date would be for questions and or comments.	N	N/A
Western Rock Lobster Council	State Fishery	30/08/2022	Email/Letter to relevant person	Triangle thanked the relevant person for their reply, and attached the Environmental Plan as requested. Triangle explained that all questions/comments would ideally be received by the 30th September 2022.	Y - Current Environmental Plan (under revision)	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
Dongara Professional Fisherman's Association	State Fishery	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet/Letter	N/A
Dongara Professional Fisherman's Association	State Fishery	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
Geraldton Professional Fishermen's Association	State Fishery	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Recfishwest	State Organisation	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Recfishwest	State Organisation	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
Marine Aquarium Fish Managed Fishery	State Fishery	1/09/2022	Email/Letter to relevant person	Triangle contacted the licence holders to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the Cliff Head pipelines in Western Australian (WA) State Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested any feedback be provided prior to 26 September 2022.	Y - Factsheet	N/A
Specimen Shell Managed Fishery	State Fishery	1/09/2022	Email/Letter to relevant person	Triangle contacted the licence holders to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the Cliff Head pipelines in Western Australian (WA) State Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested any feedback be provided prior to 26 September 2022.	Y - Factsheet	N/A
Octopus Interim Managed Fishery	State Fishery	1/09/2022	Email/Letter to relevant person	Triangle contacted the licence holders to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the Cliff Head pipelines in Western Australian (WA) State Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested any feedback be provided prior to 26 September 2022.	Y - Factsheet	N/A
West Coast Deep Sea Crustacean Managed Fishery	State Fishery	1/09/2022	Email/Letter to relevant person	Triangle contacted the licence holders to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the Cliff Head pipelines in Western Australian (WA) State Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested any feedback be provided prior to 26 September 2022.	Y - Factsheet	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery	State Fishery	1/09/2022	Email/Letter to relevant person	Triangle contacted the licence holders to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the Cliff Head pipelines in Western Australian (WA) State Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested any feedback be provided prior to 26 September 2022.	Y - Factsheet	N/A
West Coast Demersal Scalefish (Interim) Managed Fishery	State Fishery	1/09/2022	Email/Letter to relevant person	Triangle contacted the licence holders to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the Cliff Head pipelines in Western Australian (WA) State Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested any feedback be provided prior to 26 September 2022.	Y - Factsheet	N/A
Mackerel Managed Fishery	State Fishery	1/09/2022	Email/Letter to relevant person	Triangle contacted the licence holders to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the Cliff Head pipelines in Western Australian (WA) State Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested any feedback be provided prior to 26 September 2022.	Y - Factsheet	N/A
West Coast Rock Lobster Managed Fishery	State Fishery	1/09/2022	Email/Letter to relevant person	Triangle contacted the licence holders for zones A and B to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the Cliff Head pipelines in Western Australian (WA) State Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested any feedback be provided prior to 30 September 2022.		N/A
Patience Bulk Haulage (West Coast Rock Lobster Managed Fishery License Holder)	State Fishery	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet/Letter	N/A
Australian Marine Oil Spill Centre (AMOSC)	Oil & Gas Industry / Other Industry	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Australian Marine Oil Spill Centre (AMOSC)	Oil & Gas Industry / Other Industry	14/10/2022	Email/Letter to relevant person	Triangle provided the 5-yearly revised OPEP to AMOSC to review in terms of areas of the OPEP that involve AMOSC.	Y - Appendix E CHA Operations Oil Pollution Emergency Plan (OPEP) 2022 Update_Revision 4	N/A
Australian Marine Oil Spill Centre (AMOSC)	Oil & Gas Industry / Other Industry	14/10/2022	Email/Letter from relevant person	Relevant person confirmed that they have reviewed the OPEP with a search for AMOSC to confirm that all references to AMOSC are correct. Relevant person provided the Word document with track changes for Triangle's consideration. The stakeholder also attached a copy of the editable PDF for completion to engage oil spill trajectory modelling.	Y - Appendix F Cliff Head Operations OPEP 2022 Update_Revision 4_AMOSC review Appendix G Procedure for Initiating Spill Modelling – for Oil Spills	N/A
Mid West Ports	Oil & Gas Industry / Other Industry	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Mid West Ports	Oil & Gas Industry / Other Industry	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
City of Geraldton	Local Government	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
City of Geraldton	Local Government	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
Shire of Irwin	Local Government	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Shire of Irwin	Local Government	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
Shire of Chapman Creek	Local Government	18/01/2023	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	Y - Factsheet	N/A
WA Conservation Council	NGO	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
World Wildlife Fund for Nature (WWF)	NGO	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
World Wildlife Fund for Nature (WWF)	NGO	19/08/2022	Email/Letter from relevant person	The relevant person thanked Triangle for making contact, and explained that the factsheet has been passed onto the WWF climate team for review.	N	N/A
World Wildlife Fund for Nature (WWF)	NGO	20/08/2022	Email/Letter from relevant person	The relevant person confirmed that the enquiry was resolved.	N	N/A
The Wilderness Society	NGO	18/08/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
Yamatji Southern Regional Corporation (YSRC)	Traditional Owner Group	3/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. Triangle Energy (Operations) (TEO) engaged with YSRC in late 2020/early 2021 to prepare the Yamatji Proponent Standard Heritage Agreement, which was agreed and signed on 19th February 2021. TEO acknowledges the Yamatji people and their continuing connections to land and sea, including the waters in which CHA operations take place. We also recognise that CHA operations take place in waters within the Yamatji Indigenous Land Use Agreement (ILUA) Area. Requested feedback in a timely manner; to review, respond and incorporate in the EP.	Y - Factsheet	N/A
Yamatji Southern Regional Corporation (YSRC)	Traditional Owner Group	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
Yamatji Southern Regional Corporation (YSRC)	Traditional Owner Group	12/12/2022	Email/Letter from relevant person	Relevant person requested to have a telephone catchup with TEO	N	N/A
Yamatji Southern Regional Corporation (YSRC)	Traditional Owner Group	12/12/2022	Email/Letter to relevant person	TEO agreed to a discussion and requested a time	N	N/A
Yamatji Southern Regional Corporation (YSRC)	Traditional Owner Group	12/12/2022	Email/Letter from relevant person	Relevant person agree with set time for teams catch up.	N	N/A
Yamatji Southern Regional Corporation (YSRC)	Traditional Owner Group	14/12/2022	Email/Letter to relevant person	TEO thanked relevant person for phone call and confirmed that the 5-year Revision to the Cliff Head Offshore Operations EP, will not change any of TEOs onshore activities and therefore will not trigger any requirement to provide an Activity Notice to the YSRC as described in our Yamatji Proponent Standard Heritage Agreement (dated 19th February 2021). TEO advised they will be in further contact if any notification s are required. TEO requested relevant person contact TEO if they have any questions.	N	N/A
Yamatji Southern Regional Corporation (YSRC)	Traditional Owner Group	14/12/2022	Email/Letter from relevant person	Relevant person thanked TEO for notification	N	N/A
Sticks and Stones Cultural Resources Management (SandS CRM)	NGO	1/11/2022	Email/Letter to relevant person	TEO contacted SandS CRM to confirm the appropriate person to contact for consultation with YSRC TEO explained they preparing our 5-year revision of the Cliff Head Operations Environment Plan (Commonwealth Waters) for submission to NOPSEMA and wanted to confirm correct contact channels prior to sending an email and relevant person Factsheet.	N	N/A
Sticks and Stones Cultural Resources Management (SandS CRM)	NGO	1/11/2022	Email/Letter from relevant person	Sands CRM representative confirmed he would send an introductory email with the YSRC contacts and hopefully that will be a great place to start.	N	N/A
Sticks and Stones Cultural Resources Management (SandS CRM)	NGO	1/11/2022	Email/Letter to relevant person	TEO thanked the relevant person for the reply and for making the introductions.	N	N/A
Australian Communication and Media Authority (ACMA)	Commonwealth Department	17/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO would appreciate understanding from ACMA if there are any operational or planned subsea cables located near the Operational Area or in waters offshore from the WA coastline between Gregory and Yanchep.	Y - Factsheet	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
Australian Communication and Media Authority (ACMA)	Commonwealth Department	18/11/2022	Email/Letter from relevant person	ACMA thanked TEO for contacting the Australian Communications and Media Authority (ACMA). ACMA informed TEO their enquiry has now been escalated to the relevant line area for an expert response. Should the line area require additional information they will contact TEO directly.	N	N/A
Australian Communication and Media Authority (ACMA)	Commonwealth Department	22/11/2022	Email/Letter from relevant person	ACMA provided background that ACMA regulates the submarine cable regime as set out in Schedule 3A to the Telecommunications Act 1997. ACMA permit the installation of international submarine cables in Australian waters, and domestic submarine cables inside a protection zone. Based on the information provided, ACMA did not identify any international submarine cables in the vicinity of this activity. The operational area depicted in TEO's email also appears to be close to coastal waters and not in the vicinity of any existing protection zones. Note that ACMA are not responsible for permitting the installation of submarine cables within coastal waters outside a protection zone, so cannot comment on the presence of any operational or planned domestic submarine cables. ACMA recommend TEO contact the relevant WA Government authorities including the Department of Primary Industries and Regional Development. If TEO have not done so, ACMA encourage TEO to contact the operators of any domestic submarine cables in the area.	N	N/A
Seafood Industry Australia	Commonwealth Fishing Industry Associations	17/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures.	Y - Factsheet	N/A
Seafood Industry Australia	Commonwealth Fishing Industry Associations	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
Tuna Australia	Commonwealth Fishing Industry Associations	17/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures.	Y - Factsheet	N/A
Tuna Australia	Commonwealth Fishing Industry Associations	18/11/2022	Email/Letter from relevant person	The relevant person thanked TEO for their email and update on Triangle Energy proposed activities. The relevant person explained that the number of proposals requesting engagement is rapidly increasing in the marine space. Tuna Australia is now offering a service agreement to assist TEO with your environment plan proposals. Tuna Australia attached a service agreement for TEO's consideration.	Y- Service agreement	Relevant person has provided information and/or requested additional information. No objections or concerns were raised.
Tuna Australia	Commonwealth Fishing Industry Associations	13/12/2022	Email/Letter to relevant person	TEO outlined they are in the process of revising TEOs EP and have been in regular discussions with NOPSEMA with regards to appropriate Stakeholder consultation methodology. Additionally, NOPSEMA are conducting a briefing to all interested parties where they will provide an overview of the regulatory requirements and clarity on stakeholder consultation. Following the briefing an interim guideline will be published for public comment. TEO anticipates that refinements in the Stakeholder consultation process for the EP will be required which may subsequently influence ongoing consultation. We will be in touch once we have confirmed our approach going forward.	N	N/A
Tuna Australia	Commonwealth Fishing Industry Associations	15/12/2022	Email/Letter from relevant person	Relevant person thanked TEO for update	N	N/A
Tuna Australia	Commonwealth Fishing Industry Associations	23/01/2023	Email/Letter to relevant person	TEO advised the stakeholder that following on from additional stakeholder identification and refinement of our consultation process, TEO are currently consulting with fishers in the WTBF that operate off the coast of WA as relevant to Cliff Head Operations and the wider EMBA. Therefore at this stage, Tuna Australia's services are not expected to be required. However, TEO do welcome any feedback or questions you may have regarding Cliff Head Operations from Tuna Australia as a stakeholder in their own right.	N	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
Australian Southern Bluefin Tuna Industry Association (ASBTIA)	Commonwealth Fishing Industry Associations	17/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO also noted that no fishing effort by the Southern Bluefin Tuna Fishery occurs near the Operational Area, and that fishing primarily takes place off SA and in the Tasman Sea. However, TEO also understand that juvenile southern bluefin tuna migrate down the coast of WA, therefore, should the relevant person have an interest in our activities and require further information, please let TEO know. TEO also asked if they can inform TEO of any licence holders in the Southern Bluefin Tuna Fishery, with whom they should consult directly.	Y - Factsheet	N/A
Tourism Western Australia	Tourism Association	18/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO is attempting to identify registered tour operators who operate in marine waters or on the beaches between Gregory and Yanchep, who may have an interest in our activities. We would appreciate it if you can assist us in identifying any relevant tour operators to us.	Y - Factsheet	N/A
Tourism Western Australia	Tourism Association	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
Turquoise Coast Visitor Centre	Tourism Association	18/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO is attempting to identify registered tour operators who operate in marine waters or on the beaches between Gregory and Yanchep, who may have an interest in our activities. We would appreciate it if you can assist us in identifying any relevant tour operators to us.	Y - Factsheet	N/A
Turquoise Coast Visitor Centre	Tourism Association	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
Australia's Coral Coast	Tourism Association	18/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO is attempting to identify registered tour operators who operate in marine waters or on the beaches between Gregory and Yanchep, who may have an interest in our activities. We would appreciate it if you can assist us in identifying any relevant tour operators to us.	Y - Factsheet	N/A
Australia's Coral Coast	Tourism Association	18/11/2022	Email/Letter from relevant person	The relevant person provided TEO with a list of their members who operate between Cervantes and the Port Gregory.	N	N/A
Australia's Coral Coast	Tourism Association	18/11/2022	Email/Letter to relevant person	TEO thanked them for the prompt reply and appreciate the information regarding operators within their area.	N	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
Western Australia Visitor Centre	Tourism Association	18/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO is attempting to identify registered tour operators who operate in marine waters or on the beaches between Gregory and Yanchep, who may have an interest in our activities. We would appreciate it if you can assist us in identifying any relevant tour operators to us.	Y - Factsheet	N/A
Western Australia Visitor Centre	Tourism Association	18/11/2022	Email/Letter from relevant person	TEO received an automated response thanking them for the enquiry, we will reply to you within 1 business day. For urgent matters, please contact us on 1800 812 808.	N	N/A
Western Australia Visitor Centre	Tourism Association	12/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
Western Australia Indigenous Tourism Operators Council	Tourism Association	18/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO is attempting to identify registered tour operators who operate in marine waters or on the beaches between Gregory and Yanchep, who may have an interest in our activities. We would appreciate it if you can assist us in identifying any relevant tour operators to us.	Y - Factsheet	N/A
Western Australia Indigenous Tourism Operators Council	Tourism Association	22/11/2022	Email/Letter from relevant person	The relevant person thanked TEO for contacting WAITOC, WA's peak body representing over 150 Authentic Aboriginal Tourism operators. The relevant person isn't personally aware of any Aboriginal Tourism Operators operating marine tourism vessels between Yanchep and Gregory (near Kalbarri), but provided the following website you might like to reach out to: https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.marinetourismwa.com.au%2Fmembers.html&data=05%7C01%7CBethwyn.Lewis%40erm.com%7Cdcefe04b76914550b1b408dacc4eb54f%7Cf2fe6bd39c4a485bae69e18820a88130%7C0%7C0%7C638046935713428120%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=72Za%2BVvDEPiVjHX0SycJsqB%2F6nI%2F5o8X9kJFgBUkNyQ%3D&reserved=0 They also suggest get in touch with the official regional tourism organisation called Australia's Coral Coast and if you take a look at their website you can see a list of water tour operators. The Coral Coast tourism boundary takes in the coast between Cervantes to Exmouth https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.australiascoralcoast.com%2Fbusiness%2Ftours-water&data=05%7C01%7CBethwyn.Lewis%40erm.com%7Cdcefe04b76914550b1b408dacc4eb54f%7Cf2fe6bd39c4a485bae69e18820a88130%7C0%7C0%7C638046935713428120%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=e6MqQize03HWuyfVC877cv0m0dK5mlCnI1y2cQMjAZg%3D&reserved=0	N	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
Western Australia Indigenous Tourism Operators Council	Tourism Association	24/11/2022	Phone call to relevant person	TEO thanked WAITOC for the prompt reply regarding Aboriginal Tour Operators in the region and information on the Marine Tourism Website. TEO confirmed in their identification of relevant persons, they have been in touch with Australia's Coral Coast and identified some relevant persons that we will contact.	N	N/A
Visit WA	Tourism Association	18/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO is attempting to identify registered tour operators who operate in marine waters or on the beaches between Gregory and Yanchep, who may have an interest in our activities. We would appreciate it if you can assist us in identifying any relevant tour operators to us.	Y - Factsheet	N/A
Australian Recreational Fishing Foundation (ARFF)	Commonwealth Fishing Industry Associations	18/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO also requested assistance in identifying any recreational fishing clubs or associations who may have an interest in TEO's activities.	Y - Factsheet	N/A
Shire of Carnamah	LGA	24/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO also requested assistance in identifying any recreational fishing clubs or associations who may have an interest in TEO's activities. TEO informed the stakeholder that given the location of the Cliff Head Oil Field and associated facilities, TEO's planned operations are not expected to directly affect them. However, in the highly unlikely event of an unplanned occurrence that has the potential to impact their interests or activities (e.g. an oil spill) Triangle will notify them as soon as practicable. Triangle added they have detailed emergency planning in place to both prevent and respond to unplanned occurrences such as oil spills, in order to minimise environmental impacts and disruption to other users of the offshore environment.	Y - Factsheet	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
Shire of Northampton	LGA	24/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO also requested assistance in identifying any recreational fishing clubs or associations who may have an interest in TEO's activities. TEO informed the stakeholder that given the location of the Cliff Head Oil Field and associated facilities, TEO's planned operations are not expected to directly affect them. However, in the highly unlikely event of an unplanned occurrence that has the potential to impact their interests or activities (e.g. an oil spill) Triangle will notify them as soon as practicable. Triangle added they have detailed emergency planning in place to both prevent and respond to unplanned occurrences such as oil spills, in order to minimise environmental impacts and disruption to other users of the offshore environment.	Y - Factsheet	N/A
Shire of Corrow	LGA	24/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO also requested assistance in identifying any recreational fishing clubs or associations who may have an interest in TEO's activities. TEO informed the stakeholder that given the location of the Cliff Head Oil Field and associated facilities, TEO's planned operations are not expected to directly affect them. However, in the highly unlikely event of an unplanned occurrence that has the potential to impact their interests or activities (e.g. an oil spill) Triangle will notify them as soon as practicable. Triangle added they have detailed emergency planning in place to both prevent and respond to unplanned occurrences such as oil spills, in order to minimise environmental impacts and disruption to other users of the offshore environment.	Y - Factsheet	N/A
Shire of Gingin	LGA	24/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO also requested assistance in identifying any recreational fishing clubs or associations who may have an interest in TEO's activities. TEO informed the stakeholder that given the location of the Cliff Head Oil Field and associated facilities, TEO's planned operations are not expected to directly affect them. However, in the highly unlikely event of an unplanned occurrence that has the potential to impact their interests or activities (e.g. an oil spill) Triangle will notify them as soon as practicable. Triangle added they have detailed emergency planning in place to both prevent and respond to unplanned occurrences such as oil spills, in order to minimise environmental impacts and disruption to other users of the offshore environment.	Y - Factsheet	N/A
Shire of Dandaragan	LGA	24/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO also requested assistance in identifying any recreational fishing clubs or associations who may have an interest in TEO's activities. TEO informed the stakeholder that given the location of the Cliff Head Oil Field and associated facilities, TEO's planned operations are not expected to directly affect them. However, in the highly unlikely event of an unplanned occurrence that has the potential to impact their interests or activities (e.g. an oil spill) Triangle will notify them as soon as practicable. Triangle added they have detailed emergency planning in place to both prevent and respond to unplanned occurrences such as oil spills, in order to minimise environmental impacts and disruption to other users of the offshore environment.	Y - Factsheet	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
Eco Abrolhos	Tour Operator	24/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO also requested assistance in identifying any recreational fishing clubs or associations who may have an interest in TEO's activities. TEO informed the stakeholder that given the location of the Cliff Head Oil Field and associated facilities, TEO's planned operations are not expected to directly affect them. However, in the highly unlikely event of an unplanned occurrence that has the potential to impact their interests or activities (e.g. an oil spill) Triangle will notify them as soon as practicable. Triangle added they have detailed emergency planning in place to both prevent and respond to unplanned occurrences such as oil spills, in order to minimise environmental impacts and disruption to other users of the offshore environment.	Y - Factsheet	N/A
Kalbarri Visitor Centre	Tourism Association	24/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO is attempting to identify registered tour operators who operate in marine waters or on the beaches between Gregory and Yanchep, who may have an interest in our activities. We would appreciate it if you can assist us in identifying any relevant tour operators to us.	Y - Factsheet	N/A
Pinnacles Visitor Centre	Tourism Association	24/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO is attempting to identify registered tour operators who operate in marine waters or on the beaches between Gregory and Yanchep, who may have an interest in our activities. We would appreciate it if you can assist us in identifying any relevant tour operators to us.	Y - Factsheet	N/A
Visit Geraldton	Tourism Association	24/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO is attempting to identify registered tour operators who operate in marine waters or on the beaches between Gregory and Yanchep, who may have an interest in our activities. We would appreciate it if you can assist us in identifying any relevant tour operators to us.	Y - Factsheet	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
Dongara Port Denison Visitor Centre	Tourism Association	24/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO is attempting to identify registered tour operators who operate in marine waters or on the beaches between Gregory and Yanchep, who may have an interest in our activities. We would appreciate it if you can assist us in identifying any relevant tour operators to us.	Y - Factsheet	N/A
Wedge Island Protection Association	Tourism Association	24/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO is attempting to identify registered tour operators who operate in marine waters or on the beaches between Gregory and Yanchep, who may have an interest in our activities. We would appreciate it if you can assist us in identifying any relevant tour operators to us.	Y - Factsheet	N/A
Abrolhos Island Charters	Tour Operator	24/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO also requested assistance in identifying any recreational fishing clubs or associations who may have an interest in TEO's activities. TEO informed the stakeholder that given the location of the Cliff Head Oil Field and associated facilities, TEO's planned operations are not expected to directly affect them. However, in the highly unlikely event of an unplanned occurrence that has the potential to impact their interests or activities (e.g. an oil spill) Triangle will notify them as soon as practicable. Triangle added they have detailed emergency planning in place to both prevent and respond to unplanned occurrences such as oil spills, in order to minimise environmental impacts and disruption to other users of the offshore environment.	Y - Factsheet	N/A
Lobster Lunch & Boat Tours	Tour Operator	30/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO also requested assistance in identifying any recreational fishing clubs or associations who may have an interest in TEO's activities. TEO informed the stakeholder that given the location of the Cliff Head Oil Field and associated facilities, TEO's planned operations are not expected to directly affect them. However, in the highly unlikely event of an unplanned occurrence that has the potential to impact their interests or activities (e.g. an oil spill) Triangle will notify them as soon as practicable. Triangle added they have detailed emergency planning in place to both prevent and respond to unplanned occurrences such as oil spills, in order to minimise environmental impacts and disruption to other users of the offshore environment.	Y - Factsheet	N/A
Abrolhos Adventures	Tour Operator	30/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO also requested assistance in identifying any recreational fishing clubs or associations who may have an interest in TEO's activities. TEO informed the stakeholder that given the location of the Cliff Head Oil Field and associated facilities, TEO's planned operations are not expected to directly affect them. However, in the highly unlikely event of an unplanned occurrence that has the potential to impact their interests or activities (e.g. an oil spill) Triangle will notify them as soon as practicable. Triangle added they have detailed emergency planning in place to both prevent and respond to unplanned occurrences such as oil spills, in order to minimise environmental impacts and disruption to other users of the offshore environment.	Y - Factsheet	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
Turquoise Safaris - Sea Lion Tours - Fishing Charters	Tour Operator	30/11/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; · impacts to fishing and other vessels; and · environmental control measures. TEO also requested assistance in identifying any recreational fishing clubs or associations who may have an interest in TEO's activities. TEO informed the stakeholder that given the location of the Cliff Head Oil Field and associated facilities, TEO's planned operations are not expected to directly affect them. However, in the highly unlikely event of an unplanned occurrence that has the potential to impact their interests or activities (e.g. an oil spill) Triangle will notify them as soon as practicable. Triangle added they have detailed emergency planning in place to both prevent and respond to unplanned occurrences such as oil spills, in order to minimise environmental impacts and disruption to other users of the offshore environment.	Y - Factsheet	N/A
South West Aboriginal Land and Sea Council	NGO	05/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; ·potential environment and social impacts; and · environmental control measures. TEO also requested assistance in identifying any relevant persons who may have an interest in TEO's activities.	Y - Factsheet	N/A
Noongar Boodjar Language Cultural Aboriginal Corporation	NGO	05/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; ·potential environment and social impacts; and · environmental control measures. TEO also requested assistance in identifying any relevant persons who may have an interest in TEO's activities.	Y - Factsheet	N/A
Yued Aboriginal Corporation	NGO	05/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; ·potential environment and social impacts; and · environmental control measures. TEO also requested assistance in identifying any relevant persons who may have an interest in TEO's activities.	Y - Factsheet	N/A
Office of the Registrar of Indigenous Corporations (ORIC)	NGO	05/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; ·potential environment and social impacts; and · environmental control measures. TEO also requested assistance in identifying any relevant persons who may have an interest in TEO's activities.	Y - Factsheet	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
Office of the Registrar of Indigenous Corporations (ORIC)	NGO	05/12/2022	Email/Letter from relevant person	ORIC thanked TEO for their email and advised the role of ORIC is as an independent federal regulator of Aboriginal and Torres Strait Islander Corporations registered under the Corporations (Aboriginal and Torres Strait Islander) Act 2006 and will not be able to assist with TEO's request.	N	N/A
Bundi Yamatji Aboriginal Corporation	NGO	05/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; ·potential environment and social impacts; and · environmental control measures. TEO also requested assistance in identifying any relevant persons who may have an interest in TEO's activities.	Y - Factsheet	N/A
Bundi Yamatji Aboriginal Corporation	NGO	22/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person following up on previous email sent to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. TEO requested the relevant person advise if they would like to receive further information regarding the project.	N	N/A
Abrolhos Islands: Houtman Abrolhos Conservation Network	eNGO	05/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; ·potential environment and social impacts; and · environmental control measures.	Y - Factsheet	N/A
Kwelena Mambakort Wedge Island Aboriginal Association	NGO	05/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; ·potential environment and social impacts; and · environmental control measures. TEO also requested assistance in identifying any relevant persons who may have an interest in TEO's activities.	Y - Factsheet	N/A
Midwest Carbon Zero	NGO	05/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; ·potential environment and social impacts; and · environmental control measures.	Y - Factsheet	N/A
Northern Agricultural Catchments Council WA (NACC)	NGO	24/11/2022	Email/Letter to relevant person	TEO made a submission to the NACC website, advising of TEO's 5-year revision of their current Environmental Plan.	N	N/A
Northern Agricultural Catchments Council WA (NACC)	NGO	07/12/2022	Email/Letter from relevant person	Relevant person responded to TEO's submission to the NACC website and requested to be provided more information on TEO's EP revision so they can recommend other relevant persons.	N	N/A
Northern Agricultural Catchments Council WA (NACC)	NGO	08/12/2022	Email/Letter to relevant person	TEO thanked relevant person for reply, TEO attached factsheet providing information on TEOs operational activities, including a map of the facilities and information on TEO's ongoing management of potential environmental impacts. TEO requested relevant person advise if they would like to receive any additional information regarding the project.	Y - Factsheet	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
Australian Conservation Foundation	eNGO	20/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; ·potential environment and social impacts; and · environmental control measures. If the relevant person would like to receive more information regarding the project TEO requested they reply to this email.	Y - Factsheet	N/A
Australian Conservation Foundation	eNGO	20/12/2022	Email/Letter from relevant person	Notification of receipt. General correspondence only	N	N/A
Australian Marine Conservation Society (AMCS	eNGO	20/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; ·potential environment and social impacts; and · environmental control measures. If the relevant person would like to receive more information regarding the project TEO requested they reply to this email.	Y - Factsheet	N/A
Birdlife Australia	eNGO	20/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; ·potential environment and social impacts; and · environmental control measures. If the relevant person would like to receive more information regarding the project TEO requested they reply to this email.	Y - Factsheet	N/A
Clean Ocean Foundation	eNGO	20/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; ·potential environment and social impacts; and · environmental control measures. If the relevant person would like to receive more information regarding the project TEO requested they reply to this email.	Y - Factsheet	N/A
Dolphin Research Australia	eNGO	20/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; ·potential environment and social impacts; and · environmental control measures. If the relevant person would like to receive more information regarding the project TEO requested they reply to this email.	Y - Factsheet	N/A

Relevant Person	Category	Date of Correspondence	Type of Correspondence	Summary of Correspondence	Attachments	Assessment of Merit (Objection or Claim)
Environmental Defenders Office	eNGO	20/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; ·potential environment and social impacts; and · environmental control measures. If the relevant person would like to receive more information regarding the project TEO requested they reply to this email.	Y - Factsheet	N/A
Environmental Defenders Office	eNGO	20/12/2022	Email/Letter from relevant person	Notification of Receipt. General Correspondence only.	N	N/A
Flora and Fauna International	eNGO	20/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; ·potential environment and social impacts; and · environmental control measures. If the relevant person would like to receive more information regarding the project TEO requested they reply to this email.	Y - Factsheet	N/A
Greenpeace Australia	eNGO	20/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; ·potential environment and social impacts; and · environmental control measures. If the relevant person would like to receive more information regarding the project TEO requested they reply to this email.	Y - Factsheet	N/A
Greenpeace Australia	eNGO	20/12/2022	Email/Letter from relevant person	Notification of Receipt. General Correspondence only.	N	N/A
Sea Turtle Foundation	eNGO	20/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; ·potential environment and social impacts; and · environmental control measures. If the relevant person would like to receive more information regarding the project TEO requested they reply to this email.	Y - Factsheet	N/A
Sea Shepherd Conservation Society	eNGO	20/12/2022	Email/Letter to relevant person	Triangle contacted the relevant person to provide information on the 5-year revision of its current Environment Plan (EP) for the ongoing operation of the CHA Platform & Pipelines in Commonwealth Waters. No changes to current activities are expected. The attached Factsheet provided information on: · the location, schedule and description of activities; ·potential environment and social impacts; and · environmental control measures. If the relevant person would like to receive more information regarding the project TEO requested they reply to this email.	Y - Factsheet	N/A