

Tier 1 environmental risk assessment for potential release of residual contaminants into the environment during Activity Group 2 — Decommissioning Campaign #1 summary report



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Cover image: Example of a self-propelled modular transporter (SPMT) load-in operation involving the Valhall Quarter Platform (QP) topside. Image provided by Esso.

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Acknowledgement of country

Murrang is the Wiradjuri word for mud. Murrang Earth Sciences is grateful to the Wiradjuri people for their language. Our offices are proudly in Canberra on Ngunnawal and Ngambri Country. We acknowledge the Traditional Owners of the land on which we work, and their knowledge, culture, and spiritual connection to Country.

Summary

After delivering energy to Australia for over 50 years, many of the Bass Strait (Gippsland Basin) oil and gas fields are now reaching the end of their productive life. Esso Australia Resources Pty Ltd's (EARPL) planning and preparation to remove non-producing platforms during Decommissioning Campaign #1 is well underway. The platforms are in Commonwealth waters between 38 and 120 km south of Lakes Entrance, Victoria and comprise the topsides — which includes components such as the production facilities, living quarters (if present) for the personnel working on the platform and a helicopter landing pad (known as the 'topside') — and the supporting steel jacket structures (known as the 'jacket').

Decommissioning Campaign #1 includes the removal of the topsides of up to 13 platforms from 10 steel piled jackets (SPJs) and one concrete gravity structure (CGS), the removal of the upper jacket sections of those 10 SPJs, and the full removal of two monotowers, collectively referred to as 'structures'.

The removal of 10 of the 13 Decommissioning Campaign #1 structures is subject to General Direction 817 issued by National Petroleum Safety and Environment Management Authority (NOPSEMA) under Section 574 the Commonwealth *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGs Act), which includes the requirement for EARPL to "complete all preparatory decommissioning activities and commence the topside dismantling campaign as soon as reasonably practicable, and no later than 30 September 2027, for removal of all structures, property and equipment no longer in use...associated with facilities listed in Schedule 3¹ of the Direction".

The activities to be conducted in Decommissioning Campaign #1 include four components as follows:

Activities in Commonwealth waters

Operations in the Operational Area within Commonwealth waters to remove the structures — regulated by NOPSEMA under the OPGGS Act. These activities do not form part of the action and are considered a related activity for the purposes of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

¹ The facilities listed in Schedule 3 of General Direction 817 are WTA, MKA, FTA, KFA, KFB, FLA, BMA, BMB, DPA and PCA

Activities in State waters and on land (three stages)

- Stage 1 — Onshore Reception Centre early works. The activities required to establish and ready the Onshore Reception Centre to receive the removed structures at the Barry Beach Marine Terminal. This stage was referred under the EPBC Act in 2025 and determined to be not a controlled action on 8 July 2025.
- Stage 2 — Transportation and offloading operations. The activities required to transport the removed structures in State waters, offload and set-down of the structures at the laydown areas in the Onshore Reception Centre within Barry Beach Marine Terminal.
- Stage 3 — Dismantling operations. The activities required to dismantle the removed structures, segregate the materials for offsite recycling and disposal.

Stage 2 of Decommissioning Campaign #1 (the proposed action) involves the transport of structures by vessel or barge from the Victorian coastal waters limit to Barry Beach Marine Terminal for offloading, set-down and short-term storage. The indicative project area is shown in Attachment A (Figure A1).

The proposed action has three components as follows:

- Vessel/barge transportation of structures from the Coastal waters limit to Barry Beach Marine Terminal (i.e., state waters only).
- Offloading of structures from the transport vessel/barge and set-down within the Onshore Reception Centre in dedicated laydown areas.
- Short-term storage and management of structures to ensure safety and environmental compliance until the commencement of dismantling (Stage 3).

Murrang Earth Sciences Pty Ltd was commissioned by Aestra Pty Ltd to complete a desktop environmental chemical risk assessment for the proposed action. The purpose of the desktop study was to assess the risk of harm to matters protected under the EPBC Act from potential chemicals of concern that may remain after de-inventorying the topsides and jacket structures. The following provides a summary of the environmental chemical risk assessment and is in support of a referral of the project under Part 7 of the EPBC Act.

No specific regulatory guidelines are available with which to assess the environmental risks from oil platforms subject to onshore dismantling and recycling in Australia. Accordingly, this chemical risk assessment adapted two alternate environmental risk assessment frameworks considered fit for purpose. These were:

- the National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM) (1999, amended 2013) framework for contaminated site assessment, and

- the Koppel & Cresswell (2025)² environmental risk assessment framework for offshore decommissioning of naturally occurring radioactive material (NORM) and mercury-contaminated infrastructure.

Victoria both recognises and enforces the use of the ASC NEPM as the primary framework for assessing and managing contaminated land. This assessment integrated contaminant inventory data provided by EARPL, site and operational descriptions from relevant documents, and relevant legislative, regulatory, and policy information from both Victorian and Commonwealth jurisdictions. The proposed action will be undertaken in accordance with the requirements of the *Pollution of Waters by Oil and Noxious Substances Act 1986* (Vic), the *Environment Protection Act 2017* (Vic), and the Environment Protection Regulations 2021 (Vic), including any required EPA licencing.

Under the adopted risk assessment frameworks, a conceptual model is constructed that presents three elements—contaminant sources, transport and exposure pathway(s), and receptor(s) that could be affected by contaminants (Table 1). A conceptual model shows there is a potential for an unacceptable risk of harm only if sources, transport and exposure pathways, and receptors are present. If any component is absent or incomplete (for example, no viable transport pathway exists between a chemical source and receptor), it is concluded that there is no causal pathway and adverse effects are not reasonably expected to occur in that scenario.

Table 1. Assessment terminology

Component	Description
Source	The origin of potential contaminant(s) of concern.
Transport pathway	The physical means by which potential contaminants of concern can move from sources to receptors (e.g., erosion, aerial transport, dissolution).
Exposure pathway	The routes by which receptors may come into contact with potential contaminants of concern (e.g., direct contact, ingestion).
Receptor	An environmental feature or organism potentially affected by contaminant exposure.
Primary receptor	An environmental feature or organism that has the potential to be directly exposed to contaminants of concern.
Secondary receptor	An environmental feature or organism that has the potential to be indirectly exposed to a contaminant of concern.

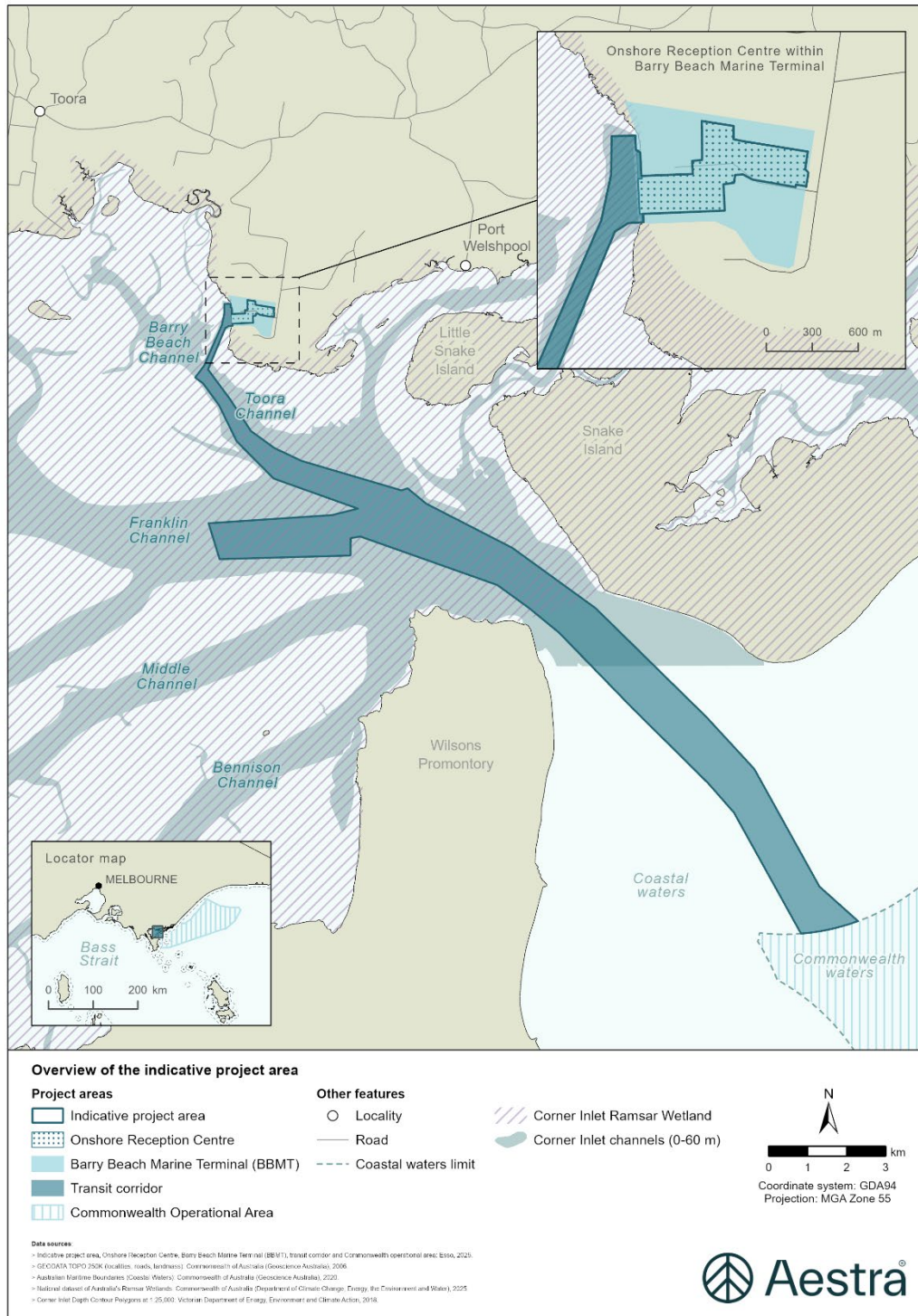
² Koppel, D. and Cresswell, T. (2025) *Environmental risk assessment framework for the offshore decommissioning of NORM and mercury contaminated oil and gas infrastructure*. Centre of Offshore Decommissioning Australia, p. 89.

Conceptual models were developed for the proposed action relating to both jackets and topsides by mapping source–pathway–receptor linkages under planned operations. These linkages were considered in the context of controls—that is, engineered, procedural, or regulatory measures that prevent complete source-pathway-receptor linkages. Controls were identified for both Victorian State Waters and Onshore Reception Centre scenarios (Attachment B). The assessment notes that platform equipment will be shut down and fully de-energised, that structures will be transported under ambient temperature and low-pressure conditions, and that no de-isolation or dismantling is planned until Stage 3 commences. Conceptual models are presented for the transportation of the structures in Victorian State Waters (Attachment C) and the offloading and temporary storage of the structures at the Onshore Reception Centre (Attachment D).

This assessment determined that realistic, complete source–pathway–receptor linkages are unlikely to occur as a result of the proposed action during transit in Victorian State Waters or during the offloading and temporary storage of the structures at the Onshore Reception Centre. Based on the lack of transport pathways between sources of potential contaminants of concern and receptors within both Victorian State Waters and during the offloading and temporary storage at the Onshore Reception Centre, the risk of unacceptable harm as a result of the proposed action is considered minimal.

Attachment A

Indicative project area



Overview of Indicative Project Area

Figure A1. The indicative project area for EARPL's Decommissioning Campaign #1 Stage 2

Attachment B

Control Points

ID	Control
1	Preparation activities will be completed under the Bass Strait Environment Plan prior to removal, including flushing, purging and/or isolation of pipework so that structures are free of bulk hydrocarbons associated with the main hydrocarbon systems; hydrocarbon processing, methanol and diesel systems
2	No transfer of fuel between vessels (vessel to vessel bunkering) will occur within State waters.
3	All activities in State Waters will be compliant with <i>Pollution of Waters by Oils and Noxious Substances Act 1986</i> , as the State legislation giving effect to MARPOL. Vessels must comply with the Harbour Masters Directions and Port Information Handbook for the Port of Corner Inlet and Port Albert for port-controlled waters
4	All wastes generated during transit and offloading will be handled in accordance with Waste Management Plans (WMPs). All waste streams will be managed in accordance with applicable regulatory requirements.
5	During the temporary storage of structures, regular inspections will be conducted to ensure any waste which may dislodge from the structures is managed in accordance with Waste Management Plans and in accordance with applicable regulatory requirements.
6	An emergency preparedness and response plan will be in place for the management of oil spill events and other unplanned leaks or releases, providing detail on protocols for coordination with response agencies, responsibilities, resources, and response strategies to be implemented depending on the size, location, and nature of the spill.
7	Chemicals, fuels, and oils on vessels will be stored appropriately to prevent the release of hazardous materials to the marine environment. Spill clean-up kits will be available and maintained on all vessels.
8	Chemicals that have the potential to be discharged into the marine environment will be screened to promote the selection of chemicals with the lowest possible toxicity for use, to reduce the potential environmental impact of a discharge or unplanned release.
9	Jacket structures will be placed onto vessels longitudinally (lengthways) to ensure there is minimal overhang of the structures outside of the vessel, where there is a potential for marine growth to drop during transit.
10	Buildup of marine growth which falls from jacket structures on to hardstand areas of the ORC during load-in and temporary storage will be monitored, periodically collected, and taken offsite for composting or disposal in accordance with EPA Victoria regulations.
11	Marine growth that collects on the deck of the vessel from the jacket will be collected, where safe to do so, and taken onshore for composting or disposal in accordance with EPA Victoria regulations. Residual marine growth that cannot be collected will be washed off the deck to ensure a safe and hygienic working environment for vessel crew.
12	<ul style="list-style-type: none"> - Drip containment will be installed around selected jacket legs that were used for bulk storage or skimmer pile service. - The drip containment structures will have sufficient volume to contain any potential residual leakage from the skimmer piles as well as rainfall for the duration of temporary storage.

ID	Control
	<ul style="list-style-type: none"> - These containment areas will be monitored for residual leaks, with actions taken to rectify any issues if they occur. - The level of captured fluids within the drip containment will be regularly monitored, and if necessary, fluids will be drained and taken offsite to a licensed waste facility in accordance with EPA Victoria regulations.
13	<p>The environmental management of onshore activities including load-in, set-down and short-term storage and management of structures at the Onshore Reception Centre will be in accordance with (but not limited to) the existing:</p> <ul style="list-style-type: none"> - EPA Operating Licence (OL000010294) - EPA Registration (R000310564) - Barry Beach Marine Terminal Environmental Management Plan (SHSMS-QPB-BBMT-07-PLN-0015) and subordinate plans and procedures - Barry Beach Marine Terminal Environmental Monitoring Plan (SHSMS.QPB.BBMT.07.PLN.0005) - Barry Beach Marine Terminal Emergency Response Plan (SHSMS.QPB.BBMT.07.PLN.0002) and any amendments to these plans and licences or conditions of new licenses or permits.

Attachment C

Conceptual models for Victorian State Waters

Table C1. Conceptual model of source–pathway–receptor linkages for potential contaminants of concern associated with topsides and the means by which receptors connected to Stage 2 works within the Victorian State waters may be exposed to them

Source (Medium)	Potential Contaminants of Concern	Release Mechanisms	Transport Pathways	Potential Receptors	Exposure Mechanisms	Causal-pathway	Realistic Complete Pathway?
Residual PCB resin (potentially contained in capacitors in old light fittings) and potential mercury in old lighting tubes	<ul style="list-style-type: none"> • PCBs resin • Potential mercury 	<ul style="list-style-type: none"> • Accidental structural failure 	<ul style="list-style-type: none"> • Falling from infrastructure direct to marine waters 	Primary receptor/s: <ul style="list-style-type: none"> • Adjacent marine waters Secondary receptor/s: <ul style="list-style-type: none"> • Sediments and seagrass beds • Aquatic biota and fisheries • Wetlands of international significance • Listed threatened species and ecological communities • Listed migratory species 	<ul style="list-style-type: none"> • Aquatic uptake • Direct contact • Bioaccumulation and biomagnification 	Release of potential residual PCB resin or mercury during transport in coastal marine waters can only occur in the event of accidental structural failure. Only in the event of such accidental structural failure could residual PCBs or mercury be released and transported to receptors.	No—There are no plausible release mechanisms for PCBs and mercury from light fittings into coastal marine waters except in the event of accidental structural failure. There are no confirmed sources of PCBs or mercury within topsides.
Residual chemicals in pipes, process vessels, and equipment	<ul style="list-style-type: none"> • Residual petroleum hydrocarbons • Corrosion inhibitor • Demulsifiers • Biocides • Trace NORM scale • Iron sulfide scale • Trace mercury scale 	<ul style="list-style-type: none"> • Accidental structural failure 	<ul style="list-style-type: none"> • Falling from infrastructure direct to marine waters • Drips to surfaces 	Primary receptor/s: <ul style="list-style-type: none"> • Adjacent marine waters Secondary receptor/s: <ul style="list-style-type: none"> • Sediments and seagrass beds • Aquatic biota and fisheries • Wetlands of international significance • Listed threatened species and ecological communities • Listed migratory species 	<ul style="list-style-type: none"> • Aquatic uptake • Direct contact • Bioaccumulation and biomagnification 	Pipes, process vessels and equipment are emptied as far as reasonably practicable and isolated during decommissioning works and transported at ambient temperature. Residual petroleum hydrocarbon, corrosion inhibitors, demulsifiers, biocides, potential trace iron sulfide, NORM, or mercury scale could only be released to environmental receptors associated with coastal marine waters if there is accidental structural failure. Only in the event of accidental failure could the potential contaminants of concern be released and transported to receptors associated with coastal marine waters.	No—There are no plausible release mechanisms for residual petroleum hydrocarbons, corrosion inhibitor, demulsifiers, biocides, trace NORM, or mercury scale contained in pipes, process vessels or equipment into the coastal marine waters except in the event of accidental structural failure. Trace NORM and mercury residues are contained in the form of internal scale. These residues are not mobile and are not considered to pose a hazard during transit.
Residual chemicals in chemical tanks, dosing equipment and lines	<ul style="list-style-type: none"> • Corrosion inhibitor • Biocides • Scale inhibitor • Lube oil • Hydraulic fluids • Methanol • Glycol 	<ul style="list-style-type: none"> • Accidental structural failure 	<ul style="list-style-type: none"> • Drips to surfaces • Falling from infrastructure direct to marine waters 	Primary receptor/s: <ul style="list-style-type: none"> • Adjacent marine waters Secondary receptor/s: <ul style="list-style-type: none"> • Sediments and seagrass beds • Aquatic biota and fisheries • Wetlands of international significance • Listed threatened species and ecological communities • Listed migratory species 	<ul style="list-style-type: none"> • Aquatic uptake • Direct contact 	Tanks, dosing equipment and lines are emptied as far as reasonably practicable, and isolated during de-inventory works in Commonwealth waters. Residual corrosion inhibitor, biocides, lube oil, hydraulic fluids, methanol or glycol could only be released to the environment if there is an accidental structural failure that allows release of remaining residues. Only in the event of accidental failure could the potential contaminants of concern be released and transported to receptors associated with coastal marine waters.	No—There are no plausible release mechanisms for residual biocides, lube oil, hydraulic fluids, methanol or glycol contained in chemical tanks, dosing equipment and lines into coastal marine waters except in the event of accidental structural failure.
ACM (vinyl floors, cement, gaskets, insulation board)	<ul style="list-style-type: none"> • Chrysotile asbestos • Minor amosite 	<ul style="list-style-type: none"> • Accidental structural failure 	<ul style="list-style-type: none"> • Airborne dust/particle transport 	N/A —humans outside scope	N/A—asbestos exposure requires aerial transport	If there is an accidental structural failure and ACM fibres are released, they could become airborne, presenting a human health hazard. ACM fibres are considered to not be a hazard to receptors identified in this report.	No—There are no relevant receptors of ACM fibres in coastal marine waters. There is no realistic complete pathway that could result in impacts to receptors from ACM contained in the topsides.

Table C2. Conceptual model of source–pathway–receptor of potential contaminants of concern associated with jackets and the means by which receptors connected to Stage 2 works within the Victorian State waters may be exposed to them

Source (Medium)	Potential Contaminants of Concern	Release Mechanisms	Transport Pathways	Potential Receptors	Exposure Mechanisms	Causal-pathway	Realistic Complete Pathway?
Residual petroleum hydrocarbons, corrosion inhibitor, and biocides (residues on internal walls) in open & closed drain skimmer piles	<ul style="list-style-type: none"> Residual petroleum hydrocarbons Corrosion inhibitors Biocides 	<ul style="list-style-type: none"> Accidental structural failure 	<ul style="list-style-type: none"> Drips to surfaces Deck wash from wave action to marine waters Falling from infrastructure direct to marine waters 	<p>Primary receptor/s:</p> <ul style="list-style-type: none"> Adjacent marine waters <p>Secondary receptor/s:</p> <ul style="list-style-type: none"> Sediments and seagrass beds Aquatic biota and fisheries Wetlands of international significance Listed threatened species and ecological communities Listed migratory species 	<ul style="list-style-type: none"> Aquatic uptake Direct contact 	All open and closed drain skimmer piles are to be de-inventoried and cleaned in Commonwealth Waters, as far as reasonably practicable. Residual petroleum hydrocarbons, corrosion inhibitor, and biocides (in residues within internal walls) in skimmer piles after de-inventory are possible. Residual hydrocarbons that have the potential to occur are considered likely to be of low volume. Residual petroleum hydrocarbons, corrosion inhibitors, and biocides could only be released to environmental receptors in the event of accidental structural failure and if control measures to contain any potential leakage fail.	No—There are no plausible release mechanisms for residual hydrocarbons, corrosion inhibitors, and biocides into coastal marine waters except in the event of accidental structural failure and if control measures to contain any potential leakage fail.
Potential trace NORM scale, residual petroleum hydrocarbons, corrosion inhibitor, and biocides in pipeline risers	<ul style="list-style-type: none"> Residual petroleum hydrocarbons Corrosion inhibitors Biocides Trace NORM scale 	<ul style="list-style-type: none"> Accidental structural failure 	<ul style="list-style-type: none"> Drips to surfaces Falling from infrastructure direct to marine waters Deck wash from wave action to marine waters 	<p>Primary receptor/s:</p> <ul style="list-style-type: none"> Adjacent marine waters <p>Secondary receptor/s:</p> <ul style="list-style-type: none"> Sediments and seagrass beds Aquatic biota and fisheries Wetlands of international significance Listed threatened species and ecological communities Listed migratory species 	<ul style="list-style-type: none"> Aquatic uptake Direct contact 	Pipeline risers are to be cleaned as far as reasonably practicable in Commonwealth waters, prior to decommissioning. Pathways for contaminant transport to the coastal marine waters exist only if there is accidental structural failure.	No—There are no plausible release mechanisms for residual petroleum hydrocarbons, corrosion inhibitors, biocides into coastal marine waters except in the event of accidental structural failure.
Potential residual hydraulic fluids in umbilicals	<ul style="list-style-type: none"> Residual hydraulic fluids 	<ul style="list-style-type: none"> Accidental structural failure 	<ul style="list-style-type: none"> Drips to surfaces Deck wash from wave action to marine waters 	<p>Primary receptor/s:</p> <ul style="list-style-type: none"> Adjacent marine waters <p>Secondary receptor/s:</p> <ul style="list-style-type: none"> Sediments and seagrass beds Aquatic biota and fisheries Critically endangered and endangered species/communities Listed threatened species and ecological communities Listed migratory species 	<ul style="list-style-type: none"> Aquatic uptake Direct contact 	Flushing of umbilicals during facility preparation activities in Commonwealth marine waters aims to displace and remove any bulk quantities of fluids inside the umbilicals where practicable. Residual fluids remaining inside the umbilicals are likely to be discharged in Commonwealth waters during cutting and lifting operations at each facility. Contaminants of concern can only be released and transported to the environment if there is accidental structural failure.	No—There are no plausible release mechanisms for residual hydraulic fluids (if present) into coastal marine waters except in the event of accidental structural failure.

Source (Medium)	Potential Contaminants of Concern	Release Mechanisms	Transport Pathways	Potential Receptors	Exposure Mechanisms	Causal-pathway	Realistic Complete Pathway?
Organic waste attached to jacket structures	<ul style="list-style-type: none"> Organic waste (marine growth) containing nutrients (e.g., nitrogen) 	<ul style="list-style-type: none"> Detachment and decay 	<ul style="list-style-type: none"> Deck wash from wave action to marine waters Falling from infrastructure direct to marine waters 	<p>Primary receptor/s:</p> <ul style="list-style-type: none"> Adjacent marine waters <p>Secondary receptor/s:</p> <ul style="list-style-type: none"> Aquatic biota and fisheries Wetlands of international significance Listed threatened species and ecological communities Listed migratory species 	<ul style="list-style-type: none"> Aquatic uptake 	<p>Minor releases of organic matter are possible during transport in coastal waters and during offloading activities at the Onshore Reception Centre; large volumes of organic matter (if they detach) are anticipated to detach in Commonwealth waters prior to State waters transit. The remaining organic waste is considered likely to be desiccated hence not expected to detach readily. Longitudinal placement of jackets on vessels means minimal overhang of structures. Organic waste that falls from the structures outside the vessel perimeter is considered likely to be proportionate to naturally occurring processes.</p>	<p>No—While there are plausible release mechanisms for marine waste containing nutrients to enter marine coastal waters, such release is limited to areas beneath jackets that have some overhang of the vessels. As such, the release of marine growth into coastal marine waters is considered likely to be proportionate to naturally occurring processes, with marine growth therefore not acting as a source of contamination in this context. Marine growth that collects on the deck of the vessel from the jacket will be collected, where safe to do so, and taken onshore for composting or disposal in accordance with EPA Victoria regulations. Residual marine growth that cannot be collected will be washed off the deck to ensure a safe and hygienic working environment for vessel crew.</p>

Attachment D

Conceptual models for the Onshore Reception Centre

Table D1. Conceptual model of source–pathway–receptor of potential contaminants of concern associated with topsides and the means by which receptors connected to Stage 2 works within the Onshore Reception Centre might be exposed to them

Source (Medium)	Potential Contaminants of Concern	Release Mechanisms	Transport Pathways	Potential Receptors	Exposure Mechanisms	Causal-pathway	Realistic Complete Pathway?
Residual PCB resin (potentially contained in capacitors in old light fittings) and potential mercury in old lighting tubes	<ul style="list-style-type: none"> • PCBs resin • Potential mercury 	<ul style="list-style-type: none"> • Accidental structural failure 	<ul style="list-style-type: none"> • Drips to surfaces • Infiltration within permeable soils • Surface water runoff into stormwater 	<p>Primary receptor/s:</p> <ul style="list-style-type: none"> • Stormwater • Soil <p>Secondary receptor/s:</p> <ul style="list-style-type: none"> • Groundwater • Adjacent marine waters • Sediments and seagrass beds • Aquatic biota and fisheries • Wetlands of international significance • Listed threatened species and ecological communities • Listed migratory species 	<ul style="list-style-type: none"> • Direct contact • Aquatic uptake • Bioaccumulation and biomagnification 	Release of potential residual PCB resin or mercury within the Onshore Reception Centre can only occur in the event of accidental structural failure during temporary storage and laydown. Only in the event of such accidental structural failure could residual PCBs or mercury be released and transported to receptors.	No—There are no plausible release mechanism for residual PCBs and mercury from light fittings into the environment associated with the Onshore Reception Centre except in the event of accidental structural failure. There are no confirmed sources of PCBs or mercury within topsides.
Residual chemicals in pipes, process vessels, and equipment	<ul style="list-style-type: none"> • Residual petroleum hydrocarbons • Corrosion inhibitor • Demulsifiers • Biocides • Trace NORM scale • Iron sulfide scales • Trace mercury scale 	<ul style="list-style-type: none"> • Accidental structural failure 	<ul style="list-style-type: none"> • Infiltration within permeable soils • Drips to surfaces • Surface water runoff into stormwater 	<p>Primary receptor/s:</p> <ul style="list-style-type: none"> • Stormwater • Soil <p>Secondary receptor/s:</p> <ul style="list-style-type: none"> • Groundwater • Adjacent marine waters • Sediments and seagrass beds • Aquatic biota and fisheries • Wetlands of international significance • Listed threatened species and ecological communities • Listed migratory species 	<ul style="list-style-type: none"> • Aquatic uptake • Direct contact • Bioaccumulation and biomagnification 	Topside equipment will be drained and isolated, reducing residual liquid contaminants to trace amounts. Residual petroleum hydrocarbon, corrosion inhibitor, demulsifier, biocides, or potential trace iron sulfide scale, NORM, or mercury scale could only be released to environmental receptors associated with the Onshore Reception Centre if there is accidental structural failure. Only in the event of accidental failure could these potential contaminants of concern be released and transported to receptors associated with the Onshore Reception Centre.	No—There are no plausible release mechanisms for residual petroleum hydrocarbons, corrosion inhibitor, demulsifier, biocides, trace NORM, or mercury scale contained in pipes, process vessels or equipment into the environment associated with the Onshore Reception Centre except in the event of accidental structural failure.
Residual chemicals in chemical tanks, dosing equipment and lines	<ul style="list-style-type: none"> • Corrosion inhibitors • Biocides • Lube oil • Hydraulic fluids • Methanol • Glycol 	<ul style="list-style-type: none"> • Accidental structural failure 	<ul style="list-style-type: none"> • Drips to surfaces • Infiltration within permeable soils • Surface water runoff into stormwater 	<p>Primary receptor/s:</p> <ul style="list-style-type: none"> • Stormwater • Soil <p>Secondary receptor/s:</p> <ul style="list-style-type: none"> • Groundwater • Adjacent marine waters • Sediments and seagrass beds • Aquatic and terrestrial biota/fisheries • Wetlands of international significance • Listed threatened species and ecological communities • Listed migratory species 	<ul style="list-style-type: none"> • Aquatic uptake • Direct contact 	Tanks, dosing equipment and lines are emptied as far as reasonably practicable and isolated during de-inventory works in Commonwealth waters. Residual corrosion inhibitors, biocides, lube oil, hydraulic fluids, methanol, or glycol could only be released to environmental receptors associated with the Onshore Reception Centre if there is an accidental structural failure. Only in the event of accidental structural failure could these potential contaminants of concern be released and transported to receptors associated with the Onshore Reception Centre.	No—There are no plausible release mechanisms for residual biocides, lube oil, hydraulic fluids, methanol or glycol contained in chemical tanks, dosing equipment and lines into the environment associated with the Onshore Reception Centre except in the event of accidental structural failure.
ACMs (vinyl floors, cement, gaskets, insulation board)	<ul style="list-style-type: none"> • Chrysotile asbestos • Minor amosite 	<ul style="list-style-type: none"> • Accidental structural failure 	<ul style="list-style-type: none"> • Airborne dust/particle transport 	<ul style="list-style-type: none"> • N/A—humans outside scope 	<ul style="list-style-type: none"> • Inhalation 	If there is an accidental structural failure and ACM fibres are released, they could become airborne within the Onshore Reception Centre, presenting a human health hazard. ACM fibres are considered to not be a hazard to receptors identified in this report.	No—There are no relevant receptors of ACM fibres within the environment associated with the Onshore Reception Centre. There is no realistic complete pathway that could result in impacts to receptors from ACM contained in the topsides.

Table D2. Conceptual model of source–pathway–receptor of potential contaminants of concern associated with jackets and the means by which receptors connected to Stage 2 works within the Onshore Reception Centre might be exposed to them

Source (Medium)	Potential Contaminants of Concern	Release Mechanisms	Transport Pathways	Potential Receptors	Exposure Mechanisms	Causal-pathway	Realistic Complete Pathway?
Residual petroleum hydrocarbons, corrosion inhibitors, and biocides (residues in internal walls) in open & closed drain skimmer piles	<ul style="list-style-type: none"> Residual petroleum hydrocarbons Corrosion inhibitors Biocides 	<ul style="list-style-type: none"> Accidental structural failure 	<ul style="list-style-type: none"> Drips to surfaces Infiltration within permeable soils 	<p>Primary receptor/s:</p> <ul style="list-style-type: none"> Soil <p>Secondary receptor/s:</p> <ul style="list-style-type: none"> Groundwater Adjacent marine waters Sediments and seagrass beds Aquatic and terrestrial biota/fisheries Wetlands of international significance Listed threatened species and ecological communities Listed migratory species 	<ul style="list-style-type: none"> Direct contact Aquatic uptake 	All open and closed drain skimmer piles are to be de-inventoried and cleaned in Commonwealth waters, as far as reasonably practicable. Residual petroleum hydrocarbons, corrosion inhibitor, and biocides (in residues within internal walls) in skimmer piles after de-inventory are possible. Residual contaminants that have the potential to occur are considered likely to be of low volume. Residual petroleum hydrocarbons, corrosion inhibitors, and biocides could only be released to environmental receptors if there is accidental structural failure and if control measures to contain any potential leakage fail.	No—Jackets will be set-down on bespoke-designed concrete foundations and grillage support structures. Drip containment will be installed on the foundations around selected jacket legs, which had been for bulk storage or skimmer pile service. Drip containment will have sufficient volume to contain any potential residual leakage from the skimmer piles or rainfall for the duration of temporary storage. The containment structures will be monitored for residual leaks, with action taken to rectify leaks and spills if they occur. The level of captured fluids within the drip containment will be monitored throughout the duration of storage, and if required, fluid will be drained and taken offsite to a licensed waste facility, in accordance with EPA Victoria regulations. There are no plausible release mechanisms for residual hydrocarbons, corrosion inhibitors, and biocides into the environment associated with the Onshore Reception Centre except in the event of accidental structural failure and if control measures to contain any potential leakage fail.
Potential trace NORM scale, residual petroleum hydrocarbon, corrosion inhibitors, and biocides in pipeline risers	<ul style="list-style-type: none"> Residual petroleum hydrocarbons Corrosion inhibitors Biocides Trace NORM scale 	<ul style="list-style-type: none"> Accidental structural failure 	<ul style="list-style-type: none"> Drips to surfaces Infiltration within permeable soils 	<p>Primary receptor/s:</p> <ul style="list-style-type: none"> Soil <p>Secondary receptor/s:</p> <ul style="list-style-type: none"> Groundwater Adjacent marine waters Sediments and seagrass beds Aquatic and terrestrial biota/fisheries Wetlands of international significance Listed threatened species and ecological communities Listed migratory species 	<ul style="list-style-type: none"> Direct contact Aquatic uptake 	Pipeline risers are to be cleaned as far as reasonably practicable in Commonwealth waters, prior to decommissioning. Pathways for contaminant transport to the environment associated with the Onshore Reception Centre only exist if there is accidental structural failure.	No—there are no plausible release mechanisms for residual petroleum hydrocarbons, corrosion inhibitors, biocides into the environment associated with the Onshore Reception Centre except in the event of accidental structural failure.

Source (Medium)	Potential Contaminants of Concern	Release Mechanisms	Transport Pathways	Potential Receptors	Exposure Mechanisms	Causal-pathway	Realistic Complete Pathway?
Potential residual hydraulic fluids in umbilicals	<ul style="list-style-type: none"> Residual hydraulic fluids 	<ul style="list-style-type: none"> Accidental structural failure 	<ul style="list-style-type: none"> Drips to surfaces Infiltration within permeable soils 	<p>Primary receptor/s:</p> <ul style="list-style-type: none"> Soil <p>Secondary receptor/s:</p> <ul style="list-style-type: none"> Groundwater Adjacent marine waters Sediments and seagrass beds Aquatic biota and fisheries Wetlands of international significance Listed threatened species and ecological communities Listed migratory species 	<ul style="list-style-type: none"> Aquatic uptake Direct contact 	<p>Flushing of umbilicals during facility preparation activities aims to displace and remove any bulk quantities of fluids inside the umbilicals where practicable. Residual fluids remaining inside the umbilicals are likely to be discharged during cutting and lifting operations at each facility in Commonwealth waters. Contaminants of concern can only be released and transported to the environment if there is accidental structural failure.</p>	<p>No—There are no plausible release mechanisms for residual hydraulic fluids (if present) into the environment associated with Onshore Reception Centre except in the event of accidental structural failure.</p>
Organic waste attached to jacket structures	<ul style="list-style-type: none"> Organic waste (marine growth) containing nutrients (e.g., nitrogen) 	<ul style="list-style-type: none"> Detachment and decay 	<ul style="list-style-type: none"> Infiltration within permeable soils 	<p>Primary receptor/s:</p> <ul style="list-style-type: none"> Soil <p>Secondary receptor/s:</p> <ul style="list-style-type: none"> Groundwater Adjacent marine waters Aquatic biota/fisheries Wetlands of international significance Listed threatened species and ecological communities Listed migratory species 	<ul style="list-style-type: none"> Aquatic uptake 	<p>Buildup of marine growth that falls from the jacket structure on to Onshore Reception Centre surfaces during load-in and temporary storage will be monitored, periodically collected, and taken offsite for composting or disposal in accordance with EPA Victoria regulations. Potential Impacts to receptors from nutrients could only occur, if nutrients from organic waste infiltrate permeable surfaces, and if nutrients are transported to the marine environment.</p>	<p>No— Buildup of marine growth that falls from the jacket structure on to Onshore Reception Centre surfaces during load-in and temporary storage will be monitored, periodically collected, and taken offsite for composting or disposal thereby removing the source of potential contaminants of concern.</p>