Information for relevant authorities and organisations

Santos

Varanus Island Hub Operations Environment Plan (State)

Activity Overview

Santos operates the Varanus Island (VI) Hub oil and gas facilities on the North West Shelf, Western Australia (WA). VI forms the central gathering and processing hub for Santos' oil and gas production facilities in the area.

VI Hub infrastructure is in both Commonwealth waters, and WA State lands and waters with operational activities undertaken in each area managed under separate Government-approved Environment Plans (EPs). These EPs are required by law to be revised every five years. This fact sheet provides information associated with five year revision of the VI Hub Operations EP (State EP).

Operational activities managed under the State EP include:

- Routine oil and gas production on VI including condensate and gas export operations;
- Marine vessel based activities;
- Rig-less well intervention/ workover and infrastructure maintenance and remediation activities;
- Implementation of environmental monitoring including gas seepage on VI, Airlie Island (AI) and surrounding waters; and
- Care and maintenance, and investigative works within the VI Hub and on AI in preparation for decommissioning of retired assets.

The location of the VI Hub Infrastructure on State lands and waters is shown in **Figure 1**, including:

- Infrastructure on VI and AI;
- Associated offshore wells, platforms/monopods and subsea tie-backs;
- Subsea pipelines, flowlines and umbilicals (within State waters) between VI and the offshore facilities;
- Pipelines from VI to the mainland for connection in the WA domestic gas network at Compressor Station 1 (CS1) of the Dampier to Bunbury Natural Gas Pipeline;
- Condensate export pipeline from VI to the VI marine load-out terminal (VIMT); and
- Suspended pipelines and umbilicals associated with future VI and AI decommissioning.

More detail on the overall VI Hub infrastructure is shown in **Figure 2**.

Consultation and Feedback

Providing feedback

This fact sheet has been prepared to support consultation for the five year revision of the VI Hub Operations EP (State EP).

The consultation period for this State EP will close on **17 July 2025**. More details on consultation and providing feedback can be found on the back page of this fact sheet.

Government Requirements

Under WA government regulations, Santos is required to consult with relevant authorities and other relevant interested persons and organisations considering the activity type, location, environmental impacts and risks (planned activities and unplanned events) and relevant stakeholder interests or concerns.

Feedback received during consultation will be considered in the development of the revised State EP, which will be submitted to the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) for assessment. All petroleum activities in WA land and waters must have a State EP accepted by DEMIRS before any activities can take place.

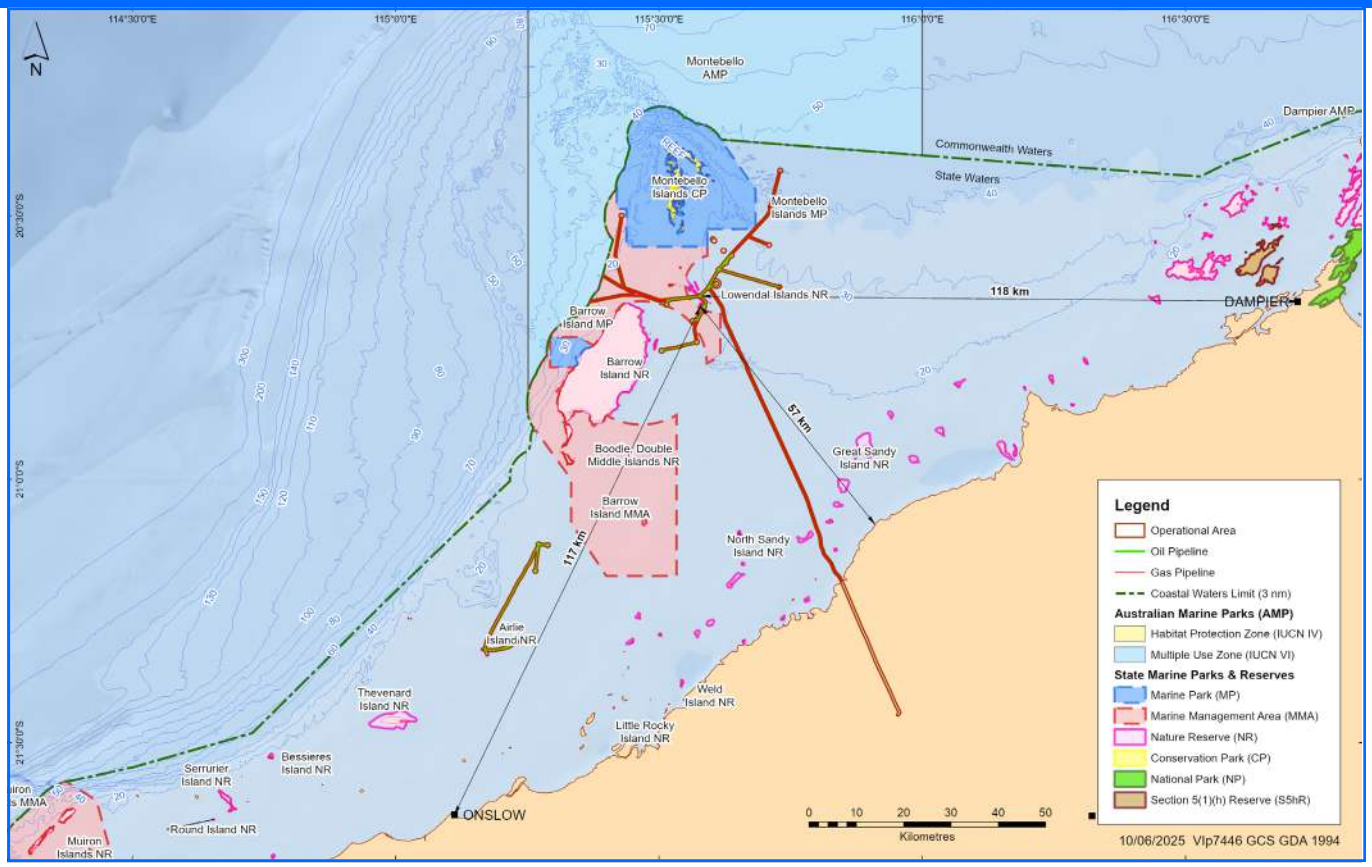

Figure 1. *Varanus Island Hub (State lands and waters) activity location.*

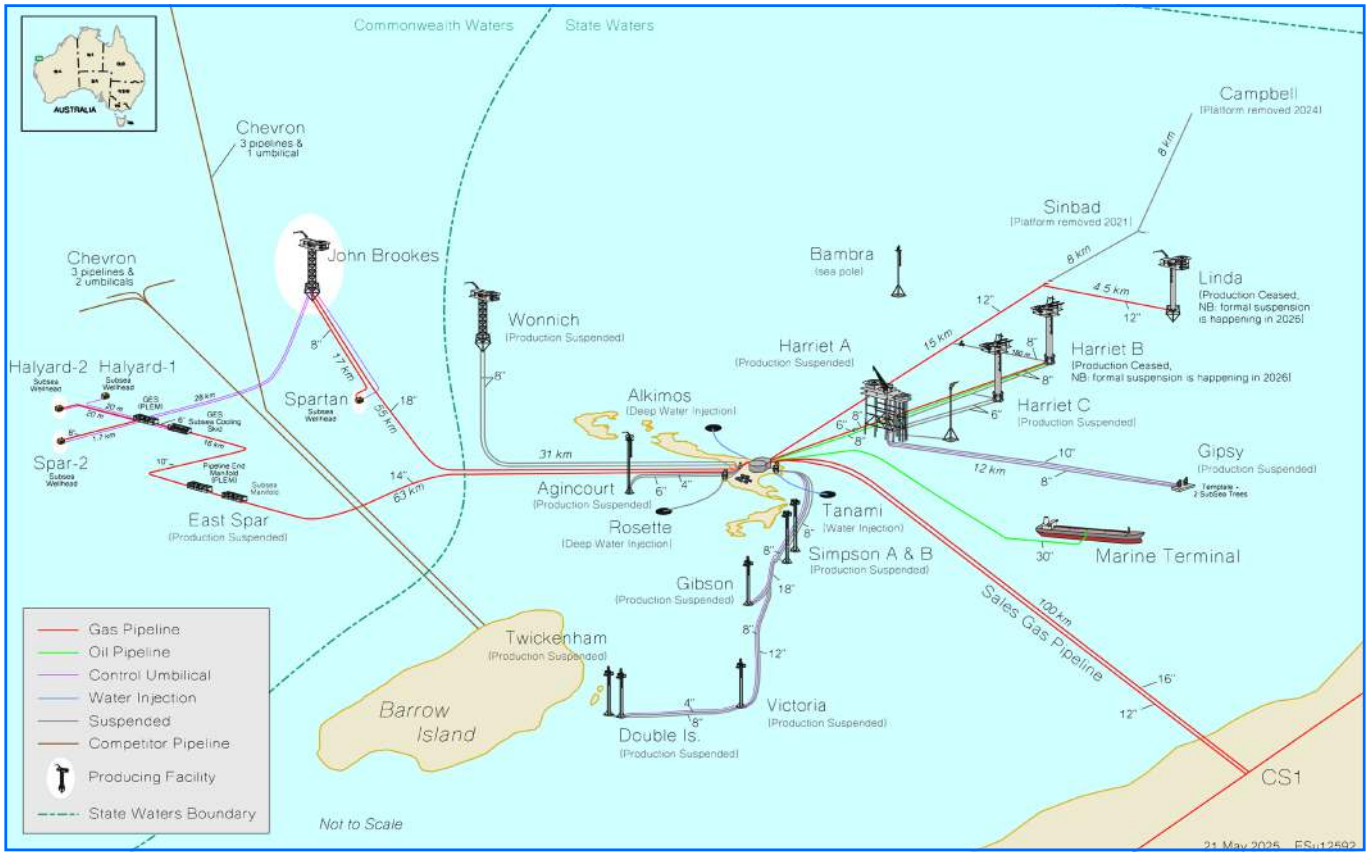

Figure 2. *VI Hub Offshore Facilities.*

Table 1. Activity Description

Activity details	
Timing	Operations at the VI Hub facilities on VI are ongoing with condensate and gas production (from VI Hub platforms and wells in Commonwealth waters) and condensate and gas export ongoing. Production from all VI Hub platforms and wells in State Waters has ceased with most of the platforms and associated marine infrastructure in state waters being operationally suspended and under a care and maintenance regime in preparation for future decommissioning.
Duration	The State EP will be valid for five years from Regulator acceptance and will replace the current in force VI Hub Operations (State) EP (Rev.13).
Water depth	Shoreline to approximately 40 m depth at the deepest point, at the location of the decommissioned Sinbad wellhead platform.
Planned Activities	**Operations and maintenance activities** • Routine production for the export of condensate via offtake tankers from the VIMT and export of gas to the WA mainland via the VI sales gas pipelines. • Routine inspection, monitoring, maintenance, and repair (IMMR) of the platforms and associated subsea infrastructure. • Platform well intervention, workovers and well control activities • Non-routine and unplanned activities, and incidents associated with the above. • Environmental Monitoring and Management. **Cessation of production and closure planning activities** • Cessation of production includes shutting in wells in preparation for suspension of operations. • Suspension of operations includes hydrocarbon freeing of production equipment and export pipelines and leaving assets in a safely suspended state in preparation for future decommissioning/ removal. • Care and maintenance of suspended facilities to support decommissioning/ removal activities. • Investigative works to inform decommissioning execution plans. • Gas seepage monitoring and assessment.
Vessels	• Supply barges (every two weeks and as needed). • Field Support Vessel (FSV) in the field at all times. • Jack-up barges (as required). • Crew transfer vessels. • Offtake tankers, approximately once every quarter. • Various vessels to support marine activities – e.g. diving, ROV operations, maintenance/repair, inspections, environmental monitoring, sediment removal.
Aircraft	Helicopters are used for crew changes, critical equipment supply and emergency response. There are personnel on rotation every two weeks with additional flights occurring as needed. An alternative means of VI workforce commuting to VI/ mainland via a plane transfer to/ from Barrow Island and then a high speed crew transfer vessel to VI is currently under assessment with input from internal and external stakeholders.

Description of the natural environment	**Terrestrial (land based) environments** on VI and AI comprise mostly disturbed vegetation and hummocked grasslands. The VI and AI shoreline offers sandy beaches used by nesting marine turtles. A small mangrove forest is located on the west coast of VI. The mainland portion of the Operational Area (OA), along the sales gas pipeline right of way, is dominated by sand dunes and grass savannas. The mainland shoreline crossing consists of saline mudflats and mangrove habitats. **Marine environments** for the seafloor along the gas pipelines running between VI and the mainland are calcareous sandy sediments with scattered sponges, algae, sea whips, soft corals and occasionally hard corals. This habitat reflects that which is widely distributed throughout the region. Other benthic (level above seabed) habitats within the OA include coral reefs, seagrass and macroalgae which are all associated with hard substrate around the Montebello and Lowendal Islands as well as the mainland. The majority of seabed habitat associated with the facilities within the OA is devoid of hard corals and coral outcrops are sparse. The exceptions to this are VI, AI, Twinkenham and Victoria facilities. Simpson A & B and Gibson facilities are situated adjacent to hard coral habitats.
Operational Areas	The petroleum activity Operational Areas (OA) remain as per current operations: • 250 m either side of pipelines. • 500 m radius around platforms and subsea infrastructure and wells. • 1000 m radius Restricted Zone at the VIMT.
Exclusion zones	• A 500 m radius Restricted Zone is defined around VI and AI. • A 500 m Petroleum Safety Zone (PSZ) is defined around the offshore platforms and marked on Australian Hydrographic Office (AHO) nautical charts.
Petroleum production licences	**Offshore Production Permits** are TL/1, TL/2, TL/5, TL/6, TL/8, TL/9 and TL/10. **Pipeline Licences** are PL12, PL14, PL17, PL29, PL30, PL42, TPL/1, TPL/2, TPL/3, TPL/4, TPL/5, TPL/7, TPL/8, TPL/12, TPL/13, TPL/14 and TPL/17.

Onshore facilities

VI processing facilities include:

- The Harriet Joint Venture (HJV) processing plant, with HJV Trains 1 and 2 already in suspended operations, and HJV train 3 undergoing cessation of production due to cessation of production from the last two operational HJV offshore facilities, i.e. the Linda and Harriet Bravo platforms;
- The East Spar Joint Venture (ESJV) processing plant, which processes well fluids received from the John Brookes and Halyard/Spar fields in Cth waters to produce sales gas, stabilised condensate and associated water;
- The VI compression project (VICP) facilities, which include two parallel trains compressing the gas received from the East Spar Gas Plant (ESGP) Slugcatcher whereby the compressed gas is sent to the carbon dioxide (CO_2) removal plant at the inlet of the ESJV Gas Processing Trains 1 and 2;
- Acid gas removal, which cleans the compressed gas from acid gas components such as CO_2 and hydrogen sulphide (H_2S), which are then vented to the atmosphere; and
- Final treatment (dehydration, mercury (Hg), and residual hydrocarbon liquids removal) to achieve sales gas quality and allow sales gas compression and export via the VI sales gas pipelines to the mainland. This is the part of the normal cessation of production activities and currently under assessment.

The HJV and ESGP processing facilities are supported by common facilities, for example, crude oil/condensate storage tanks, power generation using site produced fuel gas, power distribution, chemical injection, produced formation water treatment and injection, and others.

VI onshore facilities also include the control centre and systems to remotely control and monitor the normally unmanned offshore facilities. The accommodation, administration and operating centre for the various production facilities are also located on VI.

Offshore facilities

The VI Hub comprises a network of production platforms and other subsea structures such as wells, flowlines and pipelines, and other production related infrastructure (refer to **Figure 2** presented above).

Platforms and other structures
The VI Hub State Waters facilities include 14 platforms, one flare structure and one seabed template. Two platforms are under cessation of production, 10 are in suspended operations awaiting future decommissioning and two platform structures, the Sinbad platform in TL/5 and the Campbell platform in TL/1, have already been decommissioned, in 2021 and 2024 respectively. There are 13 known gas seepages which are subject to a gas monitoring program.

Wells
The VI Hub wells associated with the offshore production facilities in State Waters are currently in any of the following states shut-in (inactive), suspended, temporarily abandoned and plugged and abandoned. There are no active hydrocarbon producing wells associated with the offshore VI Hub infrastructure in state waters.

In addition, two deviated deep disposal wells, drilled from VI, are currently used for produced formation water (PFW) injection into the Flag Sandstone formation, some 1,830 m – 1,870 m below the seabed.

Flowlines and pipelines
VI production is sustained by gas import from production facilities in Commonwealth waters via the 14" (356mm) production pipeline from the Halyard / East Spar field and the 18" production pipeline from the John Brookes platform.

The HJV pipelines associated with the 14 platforms and subsea template will be in a suspended state before year end 2025. All former production pipelines filled with either treated seawater or VI borewater, and former gas lift pipelines filled with dry gas at just above ambient seabed pressures. Pipelines are isolated at both ends and are still subject to inspections and maintenance to assure their integrity.

AI pipelines are also suspended and flushed with treated seawater or flooded with seawater after flushing.

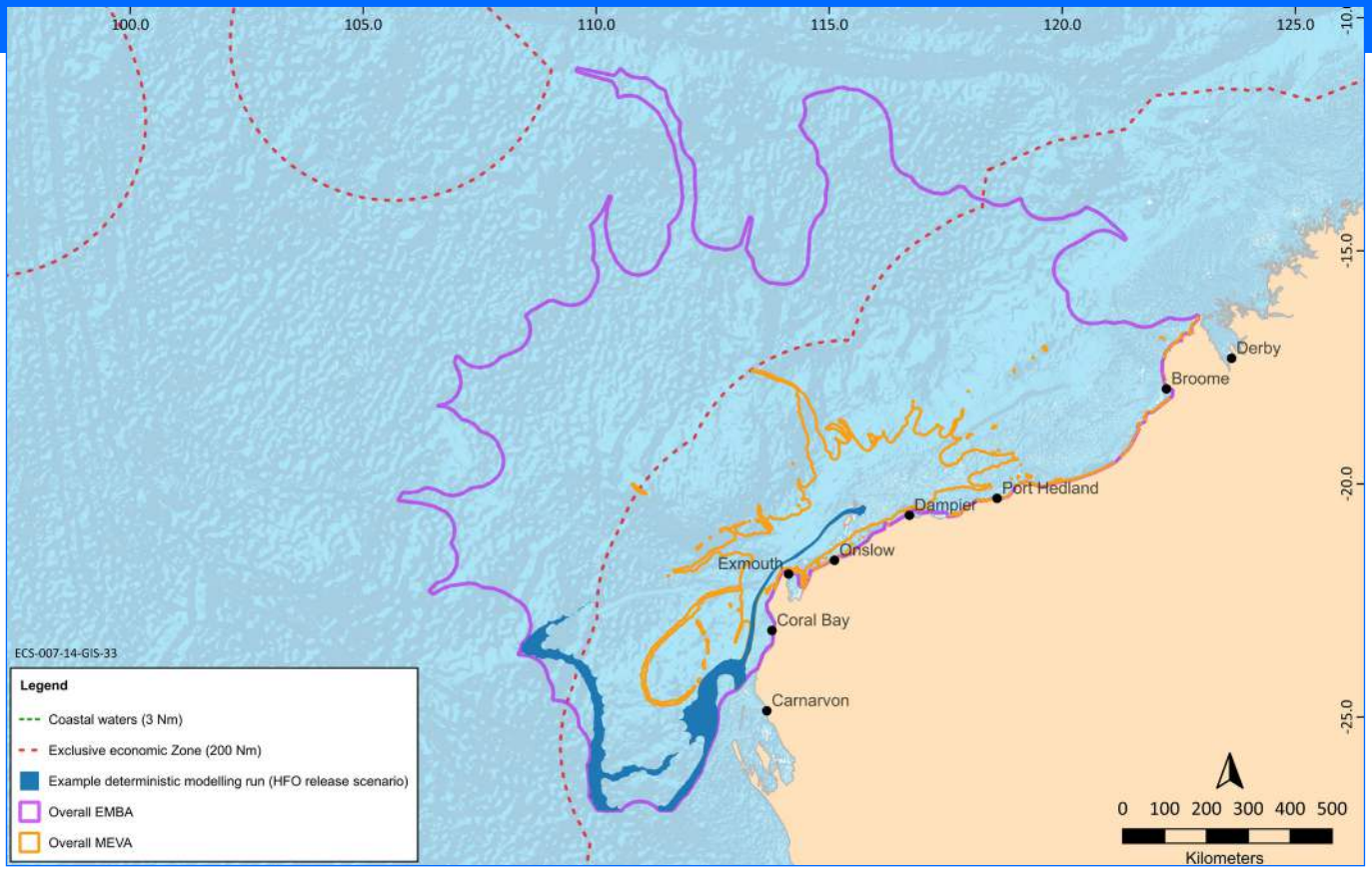

Figure 3. *Overall EMBA and an example of a deterministic run.*

Defining the environment that may be affected

Santos has undertaken an assessment to define environmental and socio-economic values and sensitivities that may be affected by proposed activities. To do this, Santos has considered the areas where activity impacts and risks may occur.

Activity impacts typically may occur within Operational Areas, the locations of which is provided in **Figure 1**.

The widest geographic extent of activity risk is defined by potential ecological and socio-economic impacts resulting from the identified credible worst case spill events scenarios.

For this State EP, the following scenarios were considered as being credible worst case spill events:

- Vessel collision resulting in hydrocarbon release from:
  - o A support vessel (marine diesel oil);
  - o An offtake tanker (heavy fuel oil and crude oil);
- Loss of well containment from subjected to well intervention/ work over; and wells; and
- Subsea pipeline rupture.

As part of spill response planning, Santos considered exposure values for the four oil phases of a spill, these being shoreline accumulation, floating oil, and dissolved and entrained oil in the water column.

These thresholds, combined with advanced and sophisticated computer modelling, enable Santos to present the areas that could be affected in the unlikely event of a spill.

The computer modelling overlays a great number (usually hundreds) of individual computer simulations, accounting for the range of metocean conditions experienced for the modelled events at their locations, to combine these hypothetical oil spill events into a single map.

Each simulation run starts from the same location for each scenario with each run subject to a different set of wind, weather and ocean current conditions derived from historical data.

This modelling helps Santos to develop suitable response strategies considering a range spill scenarios. These strategies are described in the Oil Spill Contingency Plan for this State EP, which will be reviewed and assessed by the Regulator as part of the environmental approval process.

While the EMBA outlines the maximum potential reach of all modelled spill scenarios, a deterministic model, which uses a single simulation from the stochastic modelling (e.g., the 640m^3 HFO surface release scenario), more realistically represents a single spill event's much smaller spatial footprint, as shown in **Figure 3**.

Santos has undertaken a review of publicly available information to identify environmental, social, economic and cultural values and sensitivities that may be affected by activity impacts and risks. The outcomes of this review are summarised in **Tables 2-5**. The VI Hub Operations EP includes multiple Operational Areas, which have been considered as a single Operational Area (OA) for the purpose of this review. Distances referenced in the tables below reflect the distance to the value or sensitivity from the nearest boundary of the OA.

Table 2. Environmental values and sensitivities

Value / Sensitivity	Description	Spatial overlap with OA	Spatial overlap with EMBA	Public Information Review
Biologically Important Areas	Biologically important areas (BIAs) are spatially defined areas where aggregations of individuals of a species are known to display biologically important behaviour such as reproduction, foraging, resting or migration.	Yes	Yes	The OA and EMBA includes BIAs for protected species that include seabirds, whales and marine turtles. The EMBA also includes BIAs for sharks and dolphins.
Key Ecological Features	Key Ecological Features (KEFs) are elements of the Commonwealth marine environment that are considered to be of regional importance for either a region's biodiversity or its ecosystem function and integrity.	No	Yes	No KEFs intercept the OA. The closest KEFs to the OA are the Ancient Coastline at 125 m Depth Contour KEF and Glomar Shoals KEF, which are located within the EMBA and approximately 50 km and 60 km northwest respectively.

Table 2. Environmental values and sensitivities ... continued

Value / Sensitivity	Description	Spatial overlap with OA	Spatial overlap with EMBA	Public Information Review
Listed and Protected Marine Fauna	The Australian Government uses the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) to protect and manage threatened and migratory marine species.	Yes	Yes	The marine environment of the OA and EMBA is traversed by a range of listed and protected marine species that include birds, mammals, fishes, reptiles and sharks. The marine environment of the OA and EMBA is traversed by a range of listed and protected marine species that include birds, mammals, fishes, reptiles and sharks. Within the OA there are 33 listed threatened species that are known to occur within the marine environment. Of these, 25 are also listed migratory species. An additional 27 listed migratory species, that are not listed as threatened species, are known to occur within the OA. Within the marine environment of the EMBA there are 56 listed threatened species, of which, 40 are also listed migratory species. An additional 54 listed migratory species, that are not listed threatened species, are known to occur within the EMBA.
Listed and Protected Terrestrial (land based) / Subterranean Species	The Australian Government uses the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) to protect and manage threatened and migratory terrestrial species	Yes	Yes	There are six listed threatened species and three listed migratory species that are known to occur within terrestrial or subterranean areas of the OA. In addition to those within the OA, there are a further 27 listed threatened species and two listed migratory species that occur within the EMBA. Of the 27 threatened species, four are considered to have the potential to be impacted by unplanned events. The remaining 23 threatened species as well as the two migratory species have no interaction with the marine environment and are not considered to be at risk.

Table 2. Environmental values and sensitivities ... continued

Value / Sensitivity	Description	Spatial overlap with OA	Spatial overlap with EMBA	Public Information Review
Protected Areas	World Heritage Areas (WHA)	No	Yes	No WHAs intercept the OA. The closest WHA to the OA is the Ningaloo Coast WHA which is located approximately 88 km southwest of the OA and lies within the EMBA.
	Australian Marine Parks (AMP)	No	Yes	No AMPs intercept the OA, with the OA sharing a boundary with the Montebello AMP which is within Commonwealth waters only. Twelve additional AMPs lie within the EMBA.
	Western Australian Marine Parks and Marine Management Areas	Yes	Yes	The Montebello and Barrow Island Marine Parks / Management Areas intersect the OA. There are a further six Western Australian Marine Parks located within the EMBA.
	Wetlands of International or National Importance	No	Yes	There are no Wetlands of International or National importance located within the OA. There are two Internationally and nine Nationally Important Wetlands located within the EMBA. The closest Wetland of International Importance to the OA is Eighty Mile Beach which lies 450 km east of the OA.

Table 3. Social values and sensitivities

Value / Sensitivity	Description	Spatial overlap with OA	Spatial overlap with EMBA	Public Information Review
Communities	Local Government Area (LGA)	Yes	Yes	The City of Karratha and Shire of Ashburton LGAs both intercept the OA. The mainland portion of the OA falls entirely within the City of Karratha LGA while the offshore terrestrial areas (VI and AI) lie within the Shire of Ashburton LGA. The marine portion of the OA is divided over both LGAs.
Indigenous, subsistence or customary fishing	Indigenous, subsistence or customary fishing areas	Yes	Yes	Traditional Indigenous fishing in WA waters predominately occurs within inshore tidal waters and is not expected within the majority of the OA. Traditional Indigenous fishing in WA waters may occur in proximity to the shoreline within the mainland portion of the pipeline OA and within the EMBA.
Recreational fishing	Recreational fishing areas	Yes	Yes	Recreational fishing may occur within the OA and is known to occur within the EMBA.
Commercial fishing	Commercial fishing (Cth)	Yes	Yes	Five Commonwealth managed fisheries intersect the EMBA of which three intersect the OA, these being the Southern Bluefin Tuna Fishery, the Western Skipjack Tuna Fishery and the Western Tuna and Billfish Fishery. However, none have had any recent activity within the OA (as per most recent available data from 2018-2023 seasons).

Table 3. Social values and sensitivities ... continued

Value / Sensitivity	Description	Spatial overlap with OA	Spatial overlap with EMBA	Public Information Review
Commercial fishing	Commercial fishing (State)	Yes	Yes	A number of State managed fisheries intersect the OA and the EMBA of which the following have had recent effort within the OA: • Hermit Crab Fishery • Mackerel Managed Fishery • Marine Aquarium Fish Managed Fishery • Nickol Bay Prawn Managed Fishery • Onslow Prawn Managed Fishery • Specimen Shell Managed Fishery • Western Australian Sea Cucumber Fishery
Defence	Designated defence activity areas	Yes	Yes	The OA intersects the NWXA Defence restricted training area. This area is a declared military flying training area associated with Learmonth RAAF base. The EMBA also intersects defence training and practice areas associated with the Learmonth RAAF Base.
Energy Industry	Offshore carbon capture and storage activities	No	Yes	The OA does not intersect any Greenhouse Gas (GHG) assessment permits for offshore carbon capture and storage activities. Five GHG assessment permits are present within the EMBA.
	Oil and gas activities	Yes	Yes	93 wells intersect the OA, of which 5 are located onshore and 88 are offshore. These are distributed across 11 operators, including Santos. Numerous oil and gas activities occur within the EMBA across both Commonwealth and State waters. Some oil and gas infrastructure included above is likely to be inactive.

Table 3. Social values and sensitivities ... continued

Value / Sensitivity	Description	Spatial overlap with OA	Spatial overlap with EMBA	Public Information Review
Energy Industry	Offshore renewables activities	No	No	Neither the OA nor the EMBA intersect any Offshore Energy Infrastructure (OIE) licences for proposed offshore renewables activities. The nearest OEI licence is located off the coast of Bunbury (>1200km south of the OA).
Shipping	AMSA shipping fairways and recorded vessel movements and shipping routes	Yes	Yes	The OA does intersect an AMSA shipping fairway to the south, between Varanus Island and the mainland. Shipping fairways also occur throughout the EMBA. Vessel traffic may be encountered throughout the OA as commercial vessels transit through the region
	Port areas	Yes	Yes	The Varanus Island Port Authority is located within the OA and services the Activity. The EMBA intersects the port authority boundaries of five ports, these being Port of Dampier, Port of Balla Balla, Broome Port, Ashburton Port and Port of Port Hedland.
Telecommunications infrastructure	Subsea telecommunications cables	No	Yes	The OA does not intersect any subsea telecommunications cables. The Darwin-Jakarta-Singapore Cable connects facilities onshore at Port Hedland, Darwin, Christmas Island, Indonesia and Singapore and runs through the EMBA on a roughly east west orientation. The cable is approximately 100 km north of the OA at its closest point of approach. T he Australia-Singapore Cable also intersects the EMBA, running on a roughly north south orientation. The closest point of approach of this cable to the OA is approximately 500 km to the west.

Table 3. Social values and sensitivities ... continued

Value / Sensitivity	Description	Spatial overlap with OA	Spatial overlap with EMBA	Public Information Review
Tourism	Marine and coastal tourism	No	Yes	No known tourism activities occur in the OA. The Montebello Islands have frequent tourism activities and are located in close proximity to the OA boundaries. The closest points of the OA lie approximately 6 km south, 9km west, and 12 km east of the Montebello Island group. Tourism activities are known to occur throughout the wider EMBA.

Table 4. Cultural values and sensitivities

Value / Sensitivity	Description	Spatial overlap with OA	Spatial overlap with EMBA	Public Information Review
Aboriginal Heritage	Registered Aboriginal Heritage sites protected under the: • *Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth)*	No	Yes	There are no registered sites within the OA. The Dampier Archipelago including the Burrup Peninsula is listed on the National Heritage List under the Indigenous class and lies 76km east of the nearest boundary of the OA.
	Registered Aboriginal Heritage sites protected under the: • *Aboriginal Heritage Act 1972 (WA)*	No	Yes	There are no registered sites within the OA. 418 Aboriginal Heritage sites are present throughout the EMBA (ACHIS, 2025).
Cultural Heritage	Registered cultural sites under the: • *Underwater Cultural Heritage Act 2018 (Cth)* • *Maritime Archaeology Act 1973 (WA)*	Yes	Yes	There are approximately 179 historic (>75 years old) ship and aircraft wrecks located within the EMBA (some records are potentially duplicated). Additionally, there is one shipwreck located within the OA, Macey's Wreck, which does not have a wreck date recorded and could be >75 years old. A further 12 shipwrecks within the EMBA do not have their wreck dates recorded and could be >75 years old.

Table 5 summarises the potential environmental impacts and risks. and associated management measures for the proposed Activity. These aspects will be risk-assessed within the EP on a case-by-case basis.

Table 5. Activity Impacts and Risk Management

Potential impacts from planned activities	
Acoustic (sound) disturbance to fauna	
Description of event Potential impacts from noise emissions may occur from the following sources: • VI operations within the leased area (e.g. gas plant operations, power generation, flaring, venting, crane operations, etc) • Support vessel and crude offloading activities (e.g., vessel engines, thrusters and other machinery). • Inspection, Maintenance, Monitoring and Repair (IMMR) and Cessation of operations, care and maintenance and investigative activities (e.g., use of ROV, Single-Beam and Multi-Beam Echo Sounders and Side Scan Sonar, autonomous underwater vehicle (AUV), diving operations, marine growth cleaning, pigging, modification and replacement of components. • Helicopter activities, including the use of noise-emitting devices to deter birds) [NB: these may be discontinued after October 2025) • Land-based vehicles • Use of small drones for monitoring and/ or oil spill response. • Marine growth removal (subsea).	**Compliance with the following key management measures** • Santos' procedure for interacting with marine fauna • Procedure for interacting with marine fauna incorporating the requirements of *Environment Protection of Biodiversity Conservation Act (EPBC) Regulations* (Part 8) for interacting with cetaceans. Rotating equipment enclosures • Prestart Requirements.

Table 5. Activity Impacts and Risk Management ... continued

Disturbance of Land and Native Vegetation	
Description of event Disturbance to terrestrial (land based) flora may occur from the following planned activities: • Installation and/or storage of equipment and materials; • Clearing and earthworks for repair and maintenance; • Establishment of temporary work/laydown areas; • Flaring; • Concrete batching operations; • Maintaining fire breaks, footpaths, roads, tracks and work, accommodation and leisure areas; • Environmental monitoring and management activities; • Weed management; • Access outside lease boundary for monitoring activities; • Remediation activities within the operational area including exposure of known contaminated materials.	**Compliance with the following key management measures** • Vegetation clearing permitting and management within lease with annual reporting to Department of Biodiversity Conservation and Attractions' Quarantine management • Vehicle movement (within designated roads) and speed restrictions • Access restrictions outside lease areas • Monitoring of mangroves and vegetation
Disturbance to Terrestrial (land based) Fauna	
Description of event Terrestrial (land based) flora and fauna interactions could occur due to: • Noise and vibration from operational activities • Artificial lights • Physical interactions with helicopters and vehicle movement; • Entrapment e.g. excavation works, bunds and sumps; • Flaring (during process upsets); • Potential personnel interaction with fauna; • Waste management e.g. entanglement/ingestion; • Quarantine breach; • Clearing (leading to potential loss of habitat); and • Terrestrial or subterranean remediation activities.	**Compliance with the following key management measures** • Protected Marine Fauna Interaction and Sighting Procedure. • Management of ground disturbance activities. • Traffic management • Nearshore activities scheduled around sensitive environmental periods. • Environmental monitoring • Shielded ground flares • VI Site Management Plan • Santos quarantine management plan • Lighting management for onshore facilities, activities and support vessels • Access restrictions outside lease areas. • Change management procedure.

Table 5. Activity Impacts and Risk Management ... continued

Light emissions	
Description of event Light emissions to the terrestrial (land based) and marine environments will occur as a result of: • Navigational safety lighting on the wellhead platforms (WHP) and marine vessels • Lighting of the VI gas plants and supporting infrastructure. • Temporary lighting for night-time operations (e.g. maintenance on the WHP or from support vessels. • Lights on land based vessels • Safety lighting on condensate tanks, etc	**Compliance with the following key management measures** • VI Lighting Management Plan (7715-650-REP-0430) • Manage the timing of non-routine activities to avoid peak turtle and Wedge-tailed Shearwater nesting season (1 October – 30 April) • Pre-mobilisation review and planning of lighting on vessels prior to IMMR activities commencing. • Annual Lighting Audit on Varanus Island • Marine vessel loading/unloading is carried out during daylight hours unless in an emergency • Future: crew transfer vessel operates in day-light hours only. • Progressively changing out white lights to turtle friendly lights throughout plant and accommodation • Monitoring of nesting protected fauna
GHG and Atmospheric Emissions	
Description of event GHG and atmospheric emissions (e.g. Nox, Sox, Particulate Matter) occur in the operational area and outside it from the following sources: • Power generation gas turbines and engines and gas compressors on VI and diesel engines such as in cranes and emergency power generation equipment. • Flaring and venting of hydrocarbons on VI and fugitive emissions from the gas plant and wells and fugitive emissions dominated by methane from gas seepage. • Fuel consumption in supply and infield support vessel operations. • Accidental release of ozone-depleting substances in closed-system rechargeable refrigeration systems. • Annual pollutant and GHG emissions estimation and reporting to the NPI Inventory and Safeguard Mechanism Programs. • Manage flaring on VI to meet Santos flaring annual target. • Gas seepage monitoring (rates trending, composition.	**Compliance with the following key management measures** • Inspection, Maintenance, Monitoring and Repair (IMMR) (plant and equipment) • Use of export quality gas as fuel gas on VI • Vessel's planned maintenance system. • Fuel oil quality meets The International Convention for the Prevention of Pollution from Ships MARPOL requirements. • International Air Pollution Prevention Certification (IAPP).

Table 5. Activity Impacts and Risk Management ... continued

Physical presence and interaction with other marine users	
Description of event Potential interactions with other users may occur as a result of: • Support vessels regularly transiting the area posing collision risk and inconvenience; and • Intermittent maintenance, inspection and repair requiring 24 hour a day operation.	**Compliance with the following key management measures** • Marine Vessel Guidelines (7900-250-GDE-0001) • Project execution plans for IMMR activities
Seabed and benthic (level above seabed) habitat disturbance	
Description of event Disturbance to the seabed and benthic habitats within the operational areas could potentially occur as a result of the following activities: • Vessel anchoring. • Position of jack up barge near offshore facilities. • Subsea maintenance and repair activities (e.g., diving, drone survey activities, ROV operations, cutting, welding, pigging, installation, replacement or modification of subsea equipment, freespan rectification and stabilisation etc.). • Cleaning of subsea infrastructure. • Sedimentation as infrastructure is placed or relocated on the seabed for operational requirements or IMMR activities. • Temporary subsea storage of equipment (e.g., ROV basket or clump weight). • Creation of artificial habitat because of the physical presence of infrastructure (and from currents altered by the presence of subsea infrastructure).	**Compliance with the following key management measures** • Marine Vessel Guidelines (7900-250-GDE-0001) • Planned subsea and offshore maintenance • Dropped object prevention procedures • Dropped object recovery • Anchoring and equipment deployment management

Table 5. Activity Impacts and Risk Management ... continued

Operational discharges	
Description of event	**Compliance with the following key management measures**
Onshore discharges associated with island infrastructure include: • treated sewage; and • brine Planned discharges from vessels (including the jack-up barge) to the marine environment include: • Deck drainage • Cooling water • Bilge water • Ballast water • Desalination brine Planned discharges from platforms and the jack-up barge to the marine environment include: • sewage; and • deck drainage/rain runoff Discharges from subsea infrastructure eg. wells, risers, pipelines and structures: • Discharges from cathodic protection systems on subsea pipelines. • Loss of treater seawater/ preservation fluid within pipelines. • Discharges from maintenance activities (e.g., releases of hydrocarbons/ hydraulic fluids during repair of infrastructure, leak testing, fabric maintenance). • Small amounts of paint and chemicals from cleaning, inspection and repair of infrastructure and pipeline. • Continuous small or intermittent gas seeps/gas bubbles from or around wellheads, conductors, platform legs or the adjacent seabed.	• VI Hub sewage and wastewater management • Vessel sewage treatment systems • Marine assurance procedure • Oily water treatment system • Waste (garbage) management plan • Deck cleaning product selection procedure • Chemical selection procedure • Pipeline/ flowline / umbilical flushing for maintenance, repair or suspension of operations • Planned subsea and offshore maintenance • Gas seepage monitoring (rates trending, composition)

Table 5. Activity Impacts and Risk Management ... continued

Potential impacts from unplanned activities	
Unplanned Introduction of invasive marine species (IMS)	
Description of risks Introduction of invasive marine species (IMS) may occur due to: • Biofouling on vessels and external/internal niches (such as sea chests, seawater systems). • Biofouling on equipment that is routinely submerged in water (such as mooring lines, ROVs). • Discharge or exchange of high-risk ballast water. • Cross-contamination between vessels.	**Compliance with the following key management measures** • Implementation of the management controls in the Santos Invasive Marine Species Management Plan (IMSMP). • Anti-foulant system • Ballast water management plan
Unplanned Introduction of Non-Indigenous Flora and Fauna	
Description of risks Introduction of non-indigenous flora and fauna may occur due to: • the transportation of goods, materials, equipment and personnel from a mainland or overseas location to the islands • Movement of vehicles and personnel may result in internal distribution of weeds to currently weed-free sites.	**Compliance with the following key management measures** • Quarantine management. • Environmental Monitoring Program • Implementation of the VI Cultural Heritage Management Plan
Unplanned interaction with marine fauna	
Description of risks There is the potential for vessels or equipment (e.g., ROV) involved in operational activities to interact with marine fauna, including potential strike or collisions potentially resulting in severe injury or mortality. Fauna strike may also occur from Fauna strike may also occur from helicopter or UAV strike, during take-off and landing	**Compliance with the following key management measures** • Constant bridge watch on support vessels. • Protected Marine Fauna Interaction and Sighting Procedure (EA-91-II-00003). • Constant bridge watch. • Marine fauna protection available on the vessel for use on ROV (e.g. thruster guards for ROVs).

Table 5. Activity Impacts and Risk Management ... continued

Unplanned release of solid objects to terrestrial (land based) and marine environments	
Description of risks Solid objects, such as those listed below, can be accidentally released to the terrestrial and marine environments, and potentially impact on sensitive receptors: • Non-hazardous solid waste, e.g., paper, plastics and packaging. • Hazardous solid waste, e.g., batteries, fluorescent tubes, medical waste, and aerosol cans. • Equipment and materials, e.g., hard hats, tools or infrastructure parts.	**Compliance with the following key management measures** • Waste Garbage Management Plan • Facilities Planned Maintenance System • Vessels Planned Maintenance System • Dropped Object Prevention Procedure • Radiation Management Plan – NORM (SO-91-IG-10017) • Dedicated lined chemical laydown areas (onshore) • Cyclone preparedness procedure • General site housekeeping procedures • Dropped Object Recovery • Implementation of the VI Cultural Heritage Management Plan • Varanus Island Emergency Response Plan • Incident response equipment
Unplanned hazardous liquid release to the marine environment (non-hydrocarbon)	
Description of risks Causes for accidental liquid releases (other than diesel and condensate spills) include: • Transferring, storing or using bulk products. • Mechanical failure of equipment (e.g. cranes, ROVs). • Hose or hose connection failure or leak. • Lifting – dropped objects damaging liquid vessels (containers). Loss of integrity or overpressure incident during maintenance, cessation of production and suspension of operations, well intervention and workover, etc.	**Compliance with the following key management measures** • Dropped object prevention procedure. • Hazardous Chemical Management Procedure. • General Chemical Management Procedure. • Refueling and chemical transfer procedure. • Spill Response Equipment on producing offshore platforms • Vessel spill response plans [Shipboard Oil Pollution Emergency Plan (SOPEP) / Shipboard Marine Pollution Emergency Plan (SMPEP)]. • ROV inspection and maintenance procedures. • Planned subsea and offshore maintenance • Inspection of platforms, subsea structures and hydrocarbon containing equipment including utility flowlines • Offshore platform equipment bunding and deck drainage systems, including treatment and disposal

Table 5. Activity Impacts and Risk Management ... continued

Unplanned hazardous liquid release to the terrestrial (land based) environment (non-hydrocarbon)	
Description of risks	**Compliance with the following key management measures**
Accidental spillage can occur during activities and events such as: • Chemical and other hazardous substances storage and handling; • Vehicle use and maintenance. • Use and maintenance of equipment (e.g. crane); • Maintenance or suspension of operations of process equipment and piping (e.g. draining, purging, cleaning, flushing, fabric maintenance); • Integrity issue or overpressure incident resulting in chemical spills from storage tanks, piping or process/ utility systems • Testing and use of fire-fighting foam/ water system • Produced water treatment and disposal • Sewage treatment and disposal; and • Reverse Osmosis water production and brine disposal.	• Facilities Planned Maintenance System (includes pipelines) • Dedicated chemical storage areas • Drainage management and water disposal systems and procedures • Plant closed and open drains systems; bunding, sumps • Dropped object prevention procedure. • Hazardous Chemical Management Procedure. • General Chemical Management Procedure. • Refueling and chemical transfer procedure. • Fire-fighting foam testing procedures • Operating procedures (produced water, sewage treatment and RO plant) • Environmental monitoring and remediation program • Varanus Island Emergency Response Plan • Incident response equipment

Table 5. Activity Impacts and Risk Management ... continued

Unplanned hydrocarbon release to terrestrial (land based) environment	
Description of risks	**Compliance with the following key management measures**
Sources of risk from a major hydrocarbon release may occur as a result of: • Crude storage tanks • Plant processing tanks • 2” diesel pipeline • Tanker 30” Oil load-out VI crude export line at the eastern shore crossing • East Spar 14” gas flowline# • John Brooks 18” pipeline# • Linda to VI 12” pipeline#. The worst-case credible spill onshore outside of secondary containment would be a loss from the VI crude export line.	• Facilities Planned Maintenance System (includes pipelines) • VI Process control system • Testing and maintenance of emergency shutdown systems and shutdown/ safety valves • Fire and gas detection system • Dropped object prevention procedures. • Varanus Island Emergency Response Plan detailing the requirements for preparedness and response to emergencies and crises to protect people and the environment. • DEMIRS accepted safety case • Plant closed and open drains systems; bunding, sumps • Spill kits and spill response equipment • Permit to Work System • Environmental monitoring and remediation programs

Table 5. Activity Impacts and Risk Management ... continued

Unplanned hydrocarbon release from vessel collision	
Description of risks The following vessel collision scenarios were considered credible: • 69 m^3 MDO release over 1 hour from support vessel diesel tank at Wonnich Platform (Modelling Scenario 1) • 640m^3 HFO release over 1 hour from offtake tanker at VI Marine Terminal (Modelling Scenario 2) • 5,330m^3 VI crude blend release over 1 hour from offtake tanker VI Marine Terminal (Modelling Scenario 3) Smaller spills of hydrocarbons from vessels are considered credible, such as during bunkering activities (Section 7.5.1.2) during diesel transfer to platforms (1 m3) and during vessel maintenance and repair (<500 L).	**Compliance with the following key management measures** • Dropped object prevention procedures. • WHP Petroleum Safety and Cautionary Zone • Navigational charting of marine infrastructure • Navigation lighting and aids • Seafarer Competency and Certification • Vessel spill response plan (SOPEP/SMPEP) • Support vessel positioning • Accepted Oil Spill Contingency Plan (OSCP) • Refuelling and Chemical Transfer Procedure • Implementation of the Port of Varanus Island Marine Operations Procedure • Tanker mooring and mooring subsea systems are inspected and maintained • Varanus Island Emergency Response Plan detailing the requirements for preparedness and response to emergencies and crises to protect people and the environment. • Marine Assurance Procedure • Implementation of the VI Cultural Heritage Management Plan

Table 5. Activity Impacts and Risk Management ... continued

Unplanned hydrocarbon release from platform wells	
Description of risks The following loss of well control (LOWC) scenarios were considered credible during well intervention activities: • 3,111 m^3 condensate release over 91 days from Linda Platform • 2,532 m^3 crude oil release over 91 days from Simpson A & B/Gibson & South Plato/Victoria Platforms • 4,413 m^3 crude oil release over 91 days from Harriet Bravo Platform • 8,970 m^3 condensate release over 91 days from Wonnich Platform • 12,746 m^3 crude oil release over 91 days from Agincourt Platform • 3,183 m^3 crude oil release over 91 days from Double Island Platform	**Compliance with the following key management measures** • Accepted WMP in place • Well services procedures and criteria • Planned subsea and offshore maintenance • Inspection of platform structures and hydrocarbon containing equipment • Dropped object prevention procedures. • WHP Petroleum Safety and Cautionary Zone • Navigational charting of marine infrastructure • Navigation lighting and aids • Accepted Oil Spill Contingency Plan (OSCP) • Varanus Island Emergency Response Plan detailing the requirements for preparedness and response to emergencies and crises to protect people and the environment. • Marine Assurance Procedure • Implementation of the VI Cultural Heritage Management Plan

Table 5. Activity Impacts and Risk Management ... continued

Unplanned subsea release from a pipeline	
Description of risks	**Compliance with the following key management measures**
The following subsea pipeline release scenarios are considered credible: • 232 m^3 condensate and gas release over 7 hours from the John Brooks 18" pipeline due to loss of integrity or damage. • 2,742 m^3 crude oil release over 15 minutes from the 30" tanker oil load-out line due to loss of integrity or damage. • 327 m^3 condensate and gas release from East Spar 14" pipeline, due to loss of integrity or damage (Modelling Scenario 4 & 5) Smaller hydrocarbon releases from pipelines are considered to credible, such as loss of trapped hydrocarbons in suspended pipeline rises, or during pipeline cutting activities of suspended pipelines. Such releasees would be small in nature and may include hydrocarbon/water mixtures.	Inspection and corrosion monitoring of pipeline (offshore and onshore) • Navigational charting of infrastructure. • Anchoring, mooring and equipment deployment management • Dropped object prevention procedures. • Inspection of platforms, subsea structures and hydrocarbon containing equipment including utility flowlines • Accepted Oil Spill Contingency Plan (OSCP) • Varanus Island Emergency Response Plan detailing the requirements for preparedness and response to emergencies and crises to protect people and the environment. • Testing and maintenance of emergency shutdown systems and shutdown/safety valves • DMPE Accepted Pipeline Safety Case • Assurance of operational readiness and fitness for service of tanker loading line • Terminal Handbook Tanker Loading Facility Varanus Island (7900-294-GDE-0027) • Annual Review of Hydrocarbon Loss of Containment Events • Marine assurance procedure • Use of FLIR Camera for detection and or verification of suspected crude oil spills at the VIMT at night • Use of optimised length VIMT flexible marine hose • ROV contractor competency assurance and training • Dropped object recovery • Implementation of the VI Cultural Heritage Management Plan

Consultation

Consultation provides Santos with an opportunity to receive feedback from authorities, persons and organisations whose interests may be affected by proposed petroleum activities. This feedback helps us to refine or change the management measures we are planning to address potential activity impacts and risks.

Santos' objective for proposed activities is to reduce environmental impacts and risks to a level that is as low as reasonably practicable (ALARP) and acceptable over the life of the activity.

Consultation also helps us to identify values and sensitivities where information is not publicly available, such as spiritual and cultural connection to land and sea country, as well as first-hand feedback on commercial and recreational fishing, tourism and local community activities and interests.

Providing feedback

You might be a relevant authority or other relevant interested persons or organisations if, for example, you have spiritual or cultural connections to land and sea country in accordance with Indigenous tradition that might be affected by our activity, if you otherwise carry out recreational or commercial fishing, tourism or other activities that might be affected by our proposed activity, or if you are part of a local community that might be affected by our proposed activity.

If you consider you may be a relevant person, please contact us as soon as possible if you require any further information or if you think you are not on our consultation list.

We are asking for relevant persons to provide feedback by **17 July 2025**.

The merits of feedback provided through the consultation process will be considered during EP development, with a summary of responses summarised and included in the EP submitted to DEMIRS for assessment. Please let us know if you would like your personal/organisational details or any part of your feedback to remain private and we will ensure this remains confidential to DEMIRS.

DEMIRS has developed a Guideline is to assist petroleum, geothermal and pipeline operators to develop EPs in accordance WA legislative requirements. The **Guideline** is also a useful resource for authorities or other relevant interested persons or organisations to understand the Department's expectations with respect to consultation in the preparation of an EP.

Contact

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