Amendment Report

Application for Licence Amendment

Division 3, Part V *Environmental Protection Act 1986*

Licence Number	L6284/1992/10
Licence Holder	Santos WA Energy Limited
ACN	009 301 964
File Number	DER2013/000949-3
Premises	Varanus Island and East Spar Facilities CALM Act Leases 1902/100 and 2604/100 Part Reserve 33902 (Part Lot 500 on Plan 240033) VARANUS ISLAND WA 6872
Date of Report	14 January 2020
Status of Report	Final

Table of Contents

1. Definitions of terms and acronyms

In this Amendment Report, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
ACN	Australian Company Number
Amended Licence	the amended Licence issued under Part V, Division 3 of the EP Act following the finalisation of this Review.
CALM Act	*Conservation and Land Management Act 1984* (WA)
Category/ Categories	Categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CPI	Corrugated Plate Interceptor
CS Act	*Contaminated Sites Act 2003* (WA)
DBCA	Department of Biodiversity Conservation and Attractions
Decision Report	refers to this document.
Delegated Officer	an officer under section 20 of the EP Act
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DMIRS	Department of Mines, Industry Regulation and Safety
DWER	Department of Water and Environmental Regulation
ESJV	East Spar Joint Venture
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999 (Cwth)*
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
Existing Licence	The Licence issued under Part V, Division 3 of the EP Act and in force prior to the commencement of, and during this Review
GLCs	Ground Level Concentrations
HJV	Harriet Joint Venture
Licence Holder	Santos WA Energy Limited
LTS	Low Temperature Separation
PFAS	perfluoroalkyl and polyfluoroalkyl substances
PFW	Produced Formation Water
Prescribed Premises	has the same meaning given to that term under the EP Act
Premises	refers to the premises to which this Amendment Report applies, as specified at the front of this Amendment Report
Risk Event	As described in *Guidance Statement: Risk Assessment*
Specified ecosystems	As described in *Guidance Statement: Environmental Siting*
VI	Varanus Island
WC Act	*Wildlife Conservation Act 1950 (WA)*

2. Purpose and scope of assessment

This Amendment Report is for the amendment of Licence (L6284/1992/10) for the operations associated with Varanus Island and East Spar Facilities (the Premises), operated by Santos WA Energy Limited (the Licence Holder).

The Licence Holder applied for an amendment to the licence to allow soil vapour extraction (SVE) to take place as part of the remediation works to address on site contamination issues.

This Amendment Report documents the Delegated Officer's risk assessment of emissions and discharges from the Premises consistent with *Guidance Statement: Risk Assessment* and *Guideline: Decision Making.*

3. Background

3.1 Premises information

Varanus Island (VI) is located approximately 58km off the coast of North West Australia around 117km west of Dampier and 12km east of Barrow Island. VI is part of the Lowendal group of islands which are vested as Nature Reserves and managed by the Department of Biodiversity Conservation and Attractions (DBCA). Since 1986 a portion of VI has been leased for the operation of petroleum receiving, processing, storage, loading and export facilities.

The Prescribed Premises situated on VI forms the central gathering and processing hub for the Licence Holder's offshore oil and gas production facilities in the area. The Licence Holder operates the oil and gas production infrastructure on VI on behalf of its joint venture participants. Produced hydrocarbons are processed through two processing plants on the Premises, the East Spar Joint Venture (ESJV) and the Harriet Joint Venture (HJV), and then delivered as:

- Sales quality gas to the mainland via two subsea pipelines that tie in to the Dampier to Bunbury Natural Gas Pipeline via Compressor Station One (CS1) as shown in Figure 2; and
- Tanker specification crude and condensate, which is stored in three floating roof Bulk Storage Tanks on the Premises before being exported to tankers via a 4.2km offshore pipeline, also shown in Figure 2.

The combined ESJV and HJV lease and licence area encompasses the central portion of VI as shown in Figure 1. It occupies an area of approximately 30ha or 35% of the land area of VI.

3.2 Operational aspects

VI is surrounded by a network of fixed offshore production platforms which feed gas, oil and condensates into the island's facilities for processing, storage and delivery or export. The Premises processes gas, oil and condensate from production wells located in both State and Commonwealth waters. Current production levels are around 5,000 barrels of oil and condensate per day (approximate equivalent to 612 tonnes (t) per day), and up to 390 terajoules of gas per day (around 7,839 t/day). Oil and condensate is stored on the Premises and transferred to tankers for direct export, while natural gas is transported via the Sales Gas Pipeline into the Dampier to Bunbury Natural Gas Pipeline and the Goldfields Gas Transmission pipeline.

The gas condensate produced from the Premises is a refinery feedstock that supplies light liquid hydrocarbons for the transport industry within Western Australia (WA). All of the produced gas from VI (and other facilities operated by the Licence Holder) supplies the domestic gas market in WA, including the resources sector and associated industries.

All offshore facilities and the sales gas pipelines associated with the Premises are shown in Figure 2. It should be noted that the offshore facilities do not form part of the Prescribed Premises and will not be considered further in this assessment report.

3.3 Contaminated sites

The site has been assessed as '*contaminated - remediation required'* under the *Contaminated Sites Act 2003* (CS Act), based on contamination assessments undertaken between 1995 and 2018. A number of site investigations have been conducted, of which the most recent was completed in February 2018.

Petroleum hydrocarbons (such as from oil and/or petroleum refining products) and perfluoroalkyl and polyfluoroalkyl substances (PFAS) (such as from firefighting foams) are present in soil and groundwater beneath the premises and extend to areas of ecological significance.

Two light non-aqueous phase liquid (LNAPL) petroleum hydrocarbon (such as from oil and/or petroleum refining products) plumes are present on Varanus Island. The older LNAPL plume is the result of historical waste disposal practices involving reinjection of PFW, containing residual hydrocarbons, into shallow wells located on the western boundary of lease 1902.

The second LNAPL plume is the result of an underground gas condensate leak within the East Spar Joint Venture processing plant which was first identified in January 2014. Site investigations in the vicinity of the condensate leak have identified petroleum hydrocarbons in groundwater at concentrations exceeding the relevant assessment levels applicable to drinking water and marine ecosystems, as published in Contaminated Sites Guideline *'Assessment and management of contaminated sites'*, (DER 2014) and the Health Screening Levels (HSLs) for vapour intrusion in the *'National Environment Protection (Assessment of Site Contamination) Measure'* (ASC NEPM 1999) for commercial/industrial land use.

The second LNAPL groundwater plume extends beneath Pipeline Beach. Ongoing groundwater, pore water and soil vapour investigations have been undertaken to assess potential impacts from petroleum hydrocarbons to sensitive ecological receptors (including marine turtles) at Pipeline Beach.

This site is considered to be high priority for actions to address risks to human health, the environment and environmental values. Further investigation is required to assess the risks to human health and ecological receptors (such as marine turtle nesting areas, wedge-tailed shearwater rookeries and mangrove protection areas) from contamination present at the site.

Remediation is required to mitigate unacceptable risks from petroleum hydrocarbons to the environment and human health. Active remediation of soil and groundwater on-site and within the conservation reserve has commenced and works are still in progress.

There is a risk that LNAPL Hydrocarbon plumes originating from the underground condensate delivery line identified in late 2013 are migrating towards sensitive receptors on Pipeline Beach, to the north of the VI Gas Plant. This risk has prompted research into SVE as a remediation strategy.

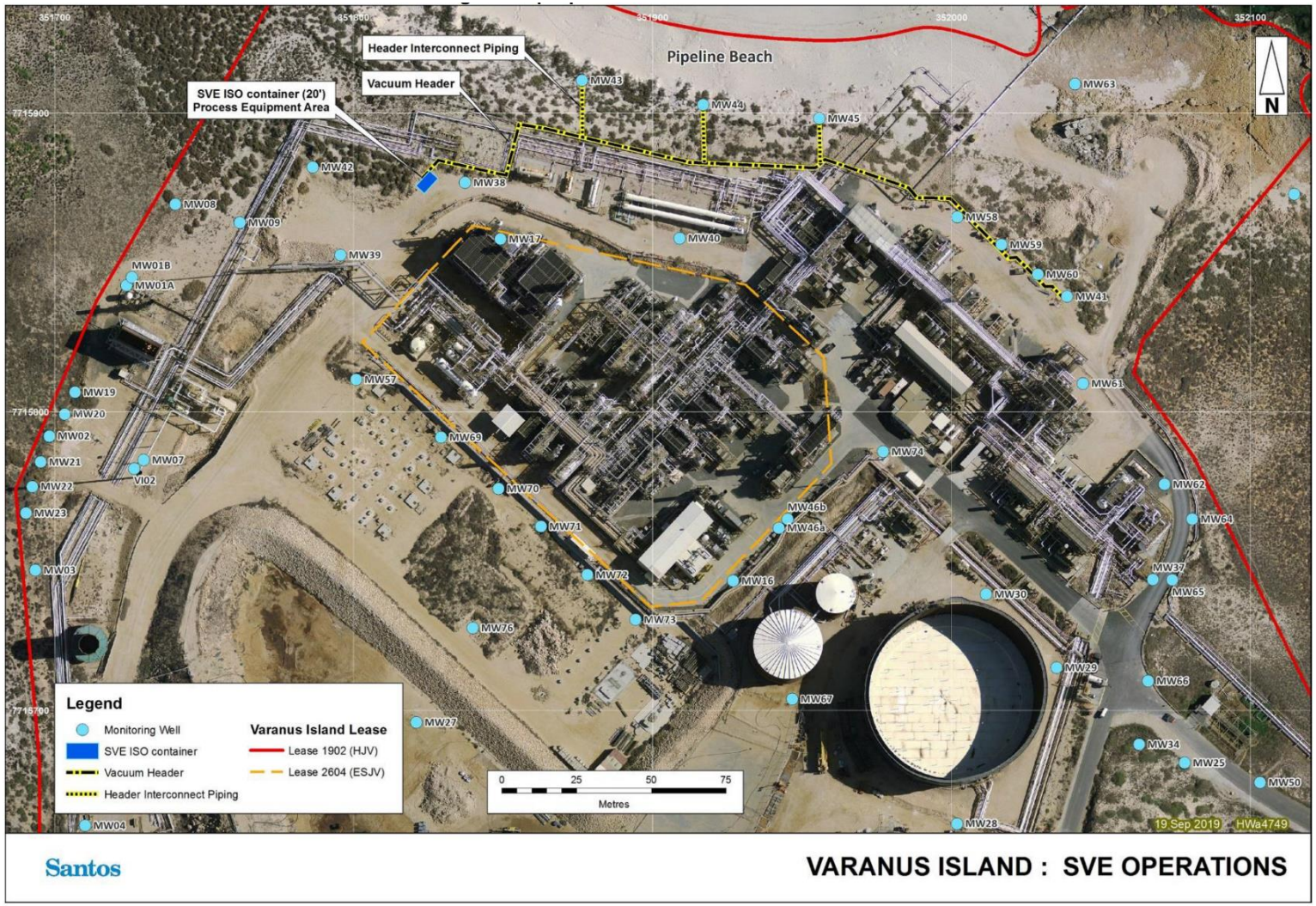

Figure 1: Soil Vapour Extraction layout

Figure 2 lists the prescribed premises categories that are approved under Existing Licence L6284/1992/10.

Table 2: Prescribed Premises Categories in the Existing Licence

Classification of Premises	Description	*Approved Premises production or design capacity or throughput*
Category 10	Oil or gas production from wells: premises, whether on land or offshore, on which crude oil, natural gas or condensate is extracted from below the surface of the land or the seabed, as the case requires, and is treated or separated to produce stabilized crude oil, purified natural gas or liquefied hydrocarbon gases.	7 050 000 tonnes per annual period
Category 34	Oil or gas refining: premises on which crude oil, condensate or gas is refined or processed	
Category 85	Sewage facility: premises — (a) on which sewage is treated (excluding septic tanks); or (b) from which treated sewage is discharged onto land or into waters.	28 cubic metres per day

4. SVE Licence amendment details

4.1 Application details

The Licence Holder submitted an application to amend Licence L6284/1992/10 on 23 October 2019 to allow for the operation of the SVE unit. The purpose of the SVE unit is to use a vacuum to induce airflow through the media to be treated (contaminated soils) with the intent of stripping volatile contaminants into the air stream.

The application states that the SVE system targets vapour, with some liquid (condensed hydrocarbons and entrained water). The vapour stream is expected to comprise methane, short-chain petroleum hydrocarbons fractions (predominantly hexane and cyclo-hexane) and benzene, toluene, ethylbenzene, xylenes (BTEX) and low-level hydrogen sulphide. Other constituents may include volatile organic compounds (VOC) and semi-volatile organic compounds (SVOC) such as naphthalene, fluorene, phenanthrene, isopropylbenzene, 1.3.5-trimethylbenzene, 1.2.4-trimethylbenzene, vinyl acetate, Npropylbenzene, 2,4-dimethylphenol, 2- methylnaphthalene, 2-methylphenol and 3-&4-methylphenol.

An SVE trial was conducted commencing on 25th June 2019. The trial has shown SVE can remove hydrocarbon mass at a rate that is significantly greater than the existing remediation strategy (skimming) and with minor water generation. The Licence amendment is to allow longer term use of the SVE and authorises emissions associated with the process.

All gas emissions extracted from the SVE operations are vented to the atmosphere at approximately 6.5 m above ground level.

The Licence Holder has advised that any liquid waste recovered from the SVE will be collected in an intermediate bulk container (IBC) and processed through the Corrugated Plate Interceptor. The treated water will then be discharged via deep disposal wells as per the disposal of produced formation water (PFW) and treated stormwater. The disposal of PFW is regulated by

Department of Mines, Industry Regulation and Safety and was assessed in the decision report for the review and amendment to licence L6284/1992/10 issued 13 March 2019.

Oil collected in the CIP is transferred to the HJV Liquids Handling Facility Separators.

The Licence Holder has advised that during the trial discussed below in section 6.2 that no liquid was recovered.

Table 3 lists the documents submitted during the assessment process.

Table 3: Documents and information submitted during the assessment process

Document/information description	Date received
Application to amend licence L6284/1992/10 –	Received by DWER 23 October 2019
DWER Request for further information: email response from Santos	Received by DWER 14 November 2019
Email from Santos with SVE trial monitoring results	Received by DWER 22 November 2019
Email from Santos with information on liquid waste disposal information	Received by DWER 26 November 2019

4.2 Infrastructure

The SVE system comprises:

- groundwater wells;
- vapour/liquid separator (VLS), which protects downstream equipment from potential liquid and condensate;
- transfer pump to transport liquid separated from the air stream in the VLS to a storage vessel (intermediate bulk container (IBC)); and
- A vacuum pump which provides the motive force for the extraction system.

The SVE layout is shown in Figure 1. Individual branch lines connect groundwater monitoring wells to a main header. This equipment is existing and therefore no construction period for additional equipment is required.

The Licence Holder requests the flexibility to conduct SVE on any groundwater monitoring well covered under the existing Licence L6284/1992/10. This would involve the relocation of the header and branch lines, or addition of extra piping to allow for extraction from other groundwater monitoring wells as required.

4.3 Exclusions from assessment

The assessment undertaken in this Amendment Report only includes the operation the SVE related infrastructure. The potential impacts to workers within the site does not form part of this assessment as these impacts are regulated by the *Occupational Safety and Health Act 1984* and *Occupational Safety and Health Regulations 1996*.

5. Legislative context

Table 4 summarises approvals relevant to the premises.

Table 4: Relevant approvals and tenure

Legislation	Number	Subsidiary	Approval
Petroleum and Geothermal Energy Resources Act 1967	Petroleum Lease	Department of Mines, Industry Regulations and Safety (DMIRS)	Titles for petroleum exploration and production in WA (onshore or internal waters) issued under this Act. Varanus Island Hub Operations Environment Plan (Rev. 6) dated 5/9/2014
Petroleum and Geothermal Energy Resources (Environment) Regulations 2012 (WA) (PGERE Regulations)	NA	DMIRS	Disposal of PFW via deep disposal wells is regulated by DMIRS
Environment Protection and Biodiversity Conservation Act 1999 (Cth)	EPBC 2013/6900	Apache Energy Ltd (previous Occupier of Prescribed Premises)	Apache Energy Ltd referred the earthworks associated with the construction of kitchen and mess hall facilities, a cyclone refuge, the Varanus Island Compression Plant, a bund wall realignment, the west laydown area and an access road realignment on Varanus island to determine the status of these works as a 'controlled action'. Determined to be 'not a controlled action if undertaken in a particular manner'.
	EPBC 2013/6952		Apache Energy Ltd. referred the construction and operation of the kitchen and mess facilities, cyclone refuge building, Varanus Island Compression Plant and accommodation camp on Varanus Island to determine the status of these works as a 'controlled action'. Determined to be 'not a controlled action if undertaken in a particular manner'.
Dangerous Goods Safety Act 2004	Dangerous Goods Licence Exemption applicable	Apache Energy Ltd	Exemption granted in 1993 - letter reference 275/9051H
Part IV of the EP Act (WA)	Ministerial Statement Number 134	Hadson Australia Development Pty Ltd	Construction of pipeline connecting Harriet Gas Field to Dampier-Wagerup Pipeline (Sales Gas Pipeline)
	Ministerial Statement Number 395	Western Mining Corporation Limited	East Spar Offshore Gas Field Development
	Ministerial Statement Number 457	Apache Northwest Pty Ltd	Wonnich Gas Development: monopod and pipeline to VI
	Ministerial Statement Number 573		Simpson Oil field development: Construction and operation of two offshore oil and gas mini platforms and undersea pipeline bundle connecting Tanami-4, Tanami-5, Simpson-1 and Simpson-3H wells to the existing facilities on VI

Legislation	Number	Subsidiary	Approval
Part V of the EP Act (WA)	Licence L6284/1992/10	Santos WA Energy Limited	Licence for the following Prescribed Premises categories: • Category 10: Oil or gas production wells; • Category 34: Oil or gas refining; and • Category 85: Sewage facility
	Vegetation Clearing Permit CPS 7551/1	Quadrant Northwest Pty Ltd	Approves clearing for the purpose of petroleum production and associated activities on Production Licence TL/6. Clearing permit duration is from 1 July 2017 to 31 July 2027.

5.1 Part V of the EP Act

5.1.1 Applicable regulations, standards and guidelines

The overarching legislative framework of this assessment is the EP Act and EP Regulations.

The guidance statements which inform this assessment are:

- *Guidance Statement: Regulatory Principles (July 2015)*
- *Guidance Statement: Setting Conditions (October 2015)*
- *Guidance Statement: Land Use Planning (February 2017)*
- *Guideline: Decision Making (June 2019)*
- *Guidance Statement: Risk Assessments (February 2017)*

6. Modelling and monitoring data

6.1 Modelling of air emissions

Air modelling of air emissions conducted for the trial of SVE (Ektimo 2019) modelled maximum predicted concentrations for hydrogen sulfide (H_2S), methane (CH_4) and benzene. The criteria for assessment used is shown in Table 5. Table 6 shows the peak predicted concentrations at on site receptors as a percentage of the assessment criteria.

Table 5: Assessment criteria used for air modelling (Source Ektimo 2019)

Pollutant	Assessment Criteria			
	ppm	mg/m3	Averaging Time (hours)	Policy
H2S	10	14.7	0.25	STEL
	15	22.0	8	TWA
	800	1175	0.25	LC50
	2	2.80	1	DGLC (toxicity)
	0.00010	0.00014	0.05	VIC EPA DGLC (amenity-odour)
CH4	50000	32720	0.05	LEL ignition risk
	30000	19632	0.05	gas plant shutdown
	10000	6544	0.05	20% of LEL (local alarm)
Benzene	0.25	0.779	8	Site Action Level (based on 8hr)
	1	3.12	8	TWA
	5	15.6	0.25	US STEL
	0.009	0.029	1	DGLC (toxicity)
n-Hexane	20	72	8	TWA
Cyclohexane	100	350	8	TWA
Toluene	50	191	8	TWA
Ethylbenzene	100	434	8	TWA
o, m & p-Xylene	80	350	8	TWA

Table 6: Peak predicted concentrations at discrete receptors (source Ektimo 2019)

Pollutant	Concentration (in-stack)		Mass rate	Criteria				All Discrete Receptors and on Amine Gantry		All Discrete Receptors at Ground Level	
	ppm	mg/m3	g/sec	ppm	mg/m3	Avg time (hours)	Policy	Peak Predicted (mg/m3)	Proportion of Criteria (%)	Peak Predicted (mg/m3)	Proportion of Criteria (%)
H2S @ 200ppm	200	294	0.029	10	14.7	0.25	STEL	0.227	2%	0.059	0.40%
				15	22.0	8	TWA	0.029	0%	0.012	0.05%
				800	1175	0.25	LC50	0.227	0%	0.059	0.00%
				2	2.80	1	DGLC (toxicity)	0.172	6%	0.044	1.6%
H2S @ 100ppm	100	147	0.014	10	14.7	0.25	STEL	0.113	1%	0.029	0.20%
				15	22.0	8	TWA	0.014	0%	0.006	0.03%
				800	1175	0.25	LC50	0.113	0%	0.029	0.00%
				2	2.80	1	DGLC (toxicity)	0.086	3%	0.022	0.79%
H2S @ 50ppm	50	73	0.007	10	14.7	0.25	STEL	0.057	0%	0.015	0.10%
				15	22.0	8	TWA	0.007	0%	0.003	0.01%
				800	1175	0.25	LC50	0.057	0%	0.015	0.00%
				2	2.80	1	DGLC (toxicity)	0.043	2%	0.011	0.40%
CH4 @ 20%	200000	130879	13	50000	32720	0.05	LEL Ignition risk	139	0%	36	0.11%
				30000	19632	0.05	Gas Plant Stutdown	139	1%	36	0.18%
				10000	6544	0.05	20% of LEL (local alarm)	139	2%	36	0.55%
Benzene @ 3500mg/m3	1095	3500	0.34	0.25	0.779	8	Site Action Level	0.34	44%	0.14	18%
				1	3.12	8	TWA	0.34	11%	0.14	4.6%
				5	15.6	0.25	US STEL	2.70	17%	0.70	4.5%
Benzene @ 1000mg/m3	313	1000	0.10	0.25	0.779	8	Site Action Level	0.10	13%	0.041	5.2%
				1	3.12	8	TWA	0.10	3%	0.041	1.3%
				5	15.6	0.25	US STEL	0.77	5%	0.199	1.3%

6.2 Air emissions monitoring during trial operations

The Licence Holder advised that during the trial period, vent stack gas monitoring showed a maximum H_2S concentration of 180ppm in MW41 and MW45 with all other wells below 20ppm.

On site monitoring was also conducted 2 – 3 times a day around the Premises and near monitoring wells MW43 and MW45 with no exceedances of STEL or TWAs.

7. Location and siting

7.1 Siting context

VI is located in the North West Shelf of Western Australia approximately 117km west of Dampier and 12km east of Barrow Island. VI is 2.5km long, 600m wide at its widest point and reaches a height of 30m above sea level.

VI is a 'C' Class nature reserve (Reserve 33902) for the purpose of flora and fauna conservation. Areas of ecological significance, (including marine turtle nesting beaches, shearwater rookeries and mangrove protection areas) are present adjacent to the oil and gas processing facilities.

7.2 Residential and sensitive Premises

The distances to residential and sensitive receptors are detailed in Table 7.

Table 7: Receptors and distance from activity boundary

Sensitive Land Uses	Distance from Prescribed Activity
Worker Accommodation Village on Barrow Island Oil and Gas Facility (Industrial Premises)	12km west
Mardie Station homestead	70km southeast
Residential premises (Dampier)	117km east

7.3 Specified ecosystems

Specified ecosystems are areas of high conservation value and special significance that may be impacted as a result of activities at or Emissions and Discharges from the Premises. The distances to specified ecosystems are shown in Table 8. Table 8 also identifies the distances to other relevant ecosystem values which do not fit the definition of a specified ecosystem.

The table has also been modified to align with the *Guidance Statement: Environmental Siting.*

Table 8: Environmental values

Specified ecosystems	**Distance from the Premises**
DBCA Managed Lands and Waters	The Premises is located on Varanus Island which is part of the Lowendal Islands Nature Reserve gazetted for the conservation of flora and fauna.
Biological component	**Distance from the Premises**
Threatened/Priority Fauna	There are multiple reptile, bird and mammal species declared as Threatened/Priority Fauna under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwth) (EPBC Act) and *Wildlife Conservation Act 1950 (WA)* (WC Act) that are known to use the Lowendal Islands, including VI, as habitat and / or breeding areas. These fauna are listed as critically endangered, endangered and vulnerable, and include migratory birds protected under international agreements. VI beaches are an important nesting and breeding habitat for Hawksbill, Flatback and Green turtles which are all classified as vulnerable under the EPBC Act and the WC Act. Migratory birds known to nest on VI include Wedge-tailed Shearwaters, Bridled Terns, Crested Terns and Osprey. The Great Knot is listed on Schedule 1 (Fauna that is rare or is likely to become extinct) of the WC Act.
Other relevant ecosystem values	**Distance from the Premises**
Mangrove community (high value ecosystem providing habitat and shelter for birds, fish and other marine species and breeding sites for a number of fish and crustaceans).	A white mangrove (*Avicennia marina)* community occurs along the southern portion of a sandy beach on the west coast of VI.
Barrow Island Marine Management Area (high value ecosystem)	The boundary of the Marine Management Area is located to the north, west and south of VI. At its closest point, the Marine Management Area is around 1.6km west of the VI lease area boundary.

7.4 Meteorology

7.4.1 Regional climatic aspects

VI is located in the arid tropics, subject to high summer temperatures, seasonal cyclones and associated rainfall. Rainfall in the area is generally low with evaporation exceeding rainfall throughout the year. Intense rainfall may occur during the passage of summer tropical cyclones and thunderstorms. The summer season occurs from September to March and winter occurs from May to July. Winters are characterised by clear skies, fine weather, predominantly strong east to south-east winds and infrequent rain. Summer winds are more variable, with strong south-westerly winds dominating. Three to four cyclones per year are typical of the region, usually between December and March.

7.4.2 Rainfall and temperature

Rainfall at VI varies significantly from year-to-year and is dependent on rain-bearing low pressure systems, thunderstorms and tropical cyclone activity. The closest Bureau of Meteorology weather station to VI that has recorded statistics for wind, rainfall and temperature is located at Barrow Island (BWI) 12km west of VI. The historic annual average rainfall for BWI is 298.2mm, of which, around 48% occurs during summer months.

Summer months experience high temperatures ranging from 27 – 33.6°C, while winter temperatures are more moderate ranging from 23.7 – 31.2°C.

Figure 2 shows average annual rainfall and maximum temperatures for BWI, a suitable surrogate for weather statistics experienced at VI.

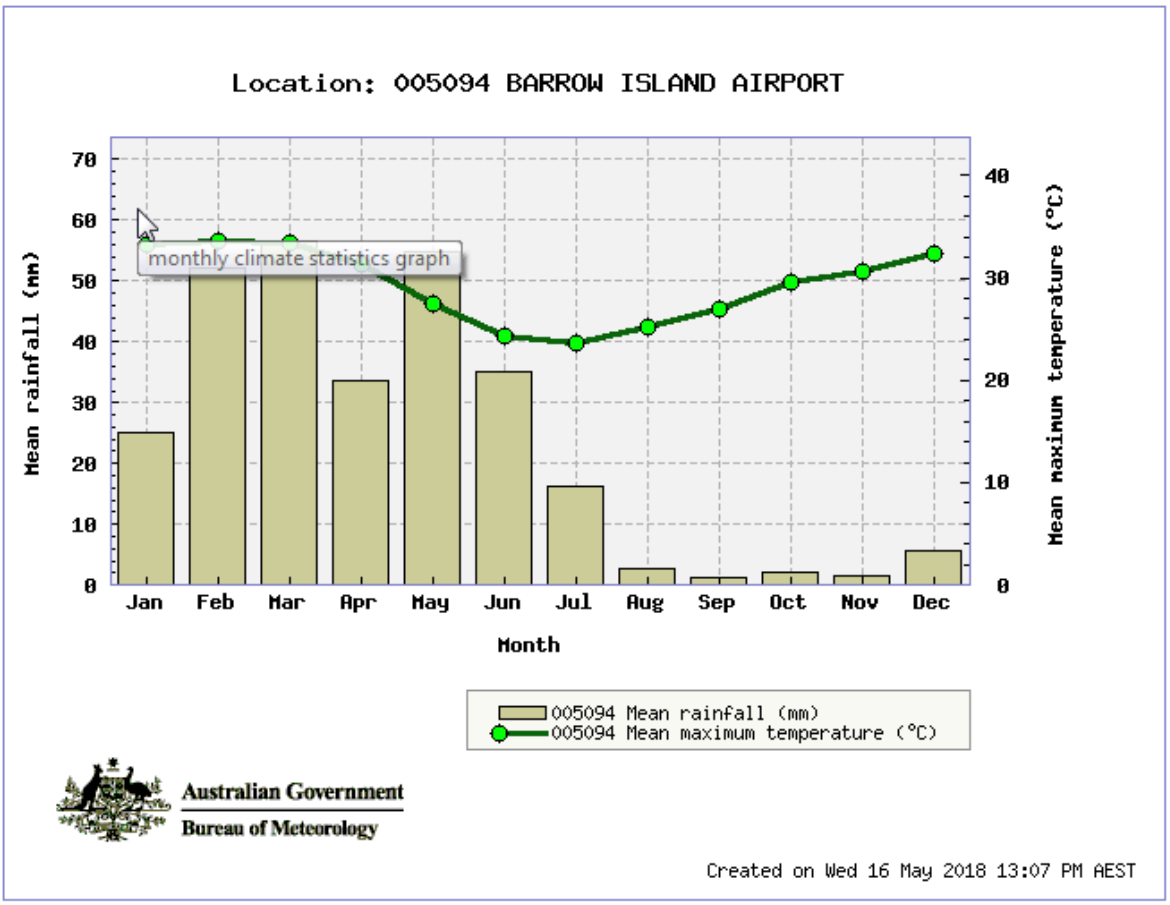

Figure 2: Climatic aspects for Barrow Island airport

8. Risk assessment

8.1 Determination of emission, pathway and receptor

In undertaking its risk assessment, DWER will identify all potential emissions pathways and potential receptors to establish whether there is a Risk Event which requires detailed risk assessment.

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission. Where there is no actual or likely pathway and/or no receptor, the emission will be screened out and will not be considered as a Risk Event. In addition, where an emission has an actual or likely pathway and a receptor which may be adversely impacted, but that emission is regulated through other mechanisms such as Part IV of the EP Act, that emission will not be risk assessed further and will be screened out through Table 9.

The identification of the sources, pathways and receptors to determine Risk Events are set out in Table 9.

Table 9. Identification of emissions, pathway and receptors during operation

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
Operation of SVE	Venting of extracted volatile substances from SVE operations	Methane, hexane, cyclo-hexane, BTEX, H_2S, VOCs SVOCs	No residences or other sensitive receptors in proximity Closest residence is12km west and 70km southeast	Air / wind dispersion	None	No	No receptors present Air emissions dispersion modelling (Ektimo 2019) conducted for key pollutants of concern associated with the SVE emissions indicates that, under normal operating conditions, predicted Ground Level Concentrations (GLC's) within the premises are expected to be significantly lower than the 8 hour time weighted average criteria and short term exposure limits. The Delegated Officer notes the predictions in the modelling assessment and the lack of public receptors on or adjacent to the Premises and does not consider impacts from air emissions to be a credible risk event.
	Disposal of recovered liquids from SVE operations to depleted oil reservoirs via deep wells.	Treated waste water mixed with PFW	Ocean flora and fauna	Water	Reduced ocean water quality impacting ocean fauna and flora	No	Limited water produced by the SVE is treated by Corrugated Plate Interceptor. Oils are recovered and transferred to the HJV Liquids Handling Facility Separators. Disposal to deep wells means there is no receptors. The disposal of PFW is regulated under the *Petroleum and Geothermal Energy Resources (Environment) Regulations 2012* (WA) (PGERE Regulations) and is therefore the infrastructure for deep well injections is managed by DMIRS as appropriate.

9. Applicant's comments

The Licence Holder was provided with the draft Amendment Report and draft amended Licence on 4 December 2019. A response was received on 10 January 2020 indicating no comments on the draft documents.

10. Decision

The Delegated Officer considers that the risks associated with the operation of the SVE infrastructure are low and has determined the Licence can be amended with controls proposed by the Licence Holder.

The Delegated Officer has amended the Licence to allow the SVE operations by:

- adding condition 2 to allow the SVE infrastructure to be brought to the Premises;
- conditioning operational requirements of the infrastructure in Table 2: Infrastructure and equipment controls table; and
- adding the emission point for the SVE stack to Table 4: Authorised discharge points.

The Delegated Officer has also made the following administrative changes to the licence:

- updated maps to show SVE operations and emission point;
- added SVE operations to Other Activities section in Table 12: Infrastructure and Equipment in Schedule 2 of the Licence;
- minor formatting changes and addition of definitions related to the SVE; and
- updates to condition numbering and referencing to reflect new condition 2.

11. Conclusion

This assessment of the risks of activities from the SVE activities on the Premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this Amendment Report (summarised in Appendix 1).

In accordance with section 59 of the EP Act, the Delegated Officer has granted amendments to Licence L6284/1992/10 subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

Carmen Standring
A/Manager, Process Industries

An officer delegated by the CEO under section 20 of the EP Act

Appendix 1: Key documents

	Document title	Availability
1.	Reviewed Licence L6284/1992/10 – Varanus Island and East Spar Facility issued 13 March 2019	Accessed at: www.dwer.wa.gov.au DWER Ref: A1771837
2.	Decision report for Licence review issued 13 March 2019	DWER Ref: A1771837
3.	Application to amend licence L6284/1992/10 – Received by DWER 23 October 2019	DWER Ref. A1834616
4.	RFI email from Santos received by DWER 14 November 2019	DWER Ref. A1841420
5.	Email from Santos with SVE trial monitoring results received by DWER 22 November 2019	DWER Ref. A1844125
6.	Email from Santos with information on liquid waste disposal information received by DWER 26 November 2019	DWER Ref: A1847451
7.	DER, July 2015. *Guidance Statement: Regulatory principles.* Department of Environment Regulation, Perth.	Accessed at: www.dwer.wa.gov.au
8.	DER, October 2015. *Guidance Statement: Setting conditions.* Department of Environment Regulation, Perth.	
9.	DER, November 2016. *Guidance Statement: Environmental Siting* Department of Environment Regulation, Perth.	
10.	DER, February 2017. *Guidance Statement: Risk Assessments*. Department of Environment Regulation, Perth.	
11.	DER, February 2017. *Guidance Statement: Decision Making*. Department of Environment Regulation, Perth.	
12.	National Environment Protection Council, July 1998. *National Environment Protection (Ambient Air Quality) Measure (1998)*	Accessed at: http://nepc.gov.au/nepms/ambient-air-quality