



**Appeals Convenor**  
**Environmental Protection Act 1986**

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**REPORT TO THE  
MINISTER FOR ENVIRONMENT**

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**APPEAL IN OBJECTION TO THE CONDITIONS APPLIED TO A WORKS  
APPROVAL**

**W6298/2019/1: VARANUS ISLAND COMPRESSION AND POWER  
OPTIMISATION PROJECT INFRASTRUCTURE  
VARANUS ISLAND HUB**

**APPLICANT: SANTOS WA ENERGY LIMITED**

Appeal Number 008 of 2020

**December 2020**

## Appeal Summary

This is a report on an appeal against the conditions of the works approval issued by the Department of Water and Environmental Regulation (DWER) to Santos WA Energy Limited (Santos) for the Varanus Island Compression and Power Optimisation Project (VICPOP). The premises is located on *Conservation and Land Management Act 1984* Leases 1902/100 and 2604/100 and Part Reserve 33902 (Part Lot 500 on Plan 240033), Varanus Island.

The works approval authorises the construction and installation, pre-commissioning and commissioning of additional natural gas compression equipment, power generation infrastructure and ancillary facilities. The boundary and infrastructure are consistent with works approval W5518/2013/1 granted to Apache Energy in 2013 for the Varanus Island Compression Project (VICP). Only preparatory works were undertaken for the VICP prior to the expiry of the works approval in 2016.

In summary the appellant sought for conditions of the works approval to be strengthened in relation to monitoring and reporting of air emissions, in particular for greenhouse gas emissions (GHGe). In relation to GHGe:

- DWER advised that the environmental impact assessment process administered under Part IV of the *Environmental Protection Act 1986* (the Act) is the primary legislative instrument for managing GHGe from major proposals in WA.
- Apache Energy Limited (the former proponent) referred the Varanus Island Compression Project, essentially the same project as the VICPOP proposal, to the Environmental Protection Authority (EPA) in 2013. At the time of the referral of the proposal in 2013, the expected GHGe were stated to be below 100,000 tonnes per annum (tpa).
- The EPA determined that that proposal did not warrant formal assessment.
- The proponent advised that operational GHGe from the proposal are expected to increase above 100,000 tpa by the end of 2022.
- Under EPA's *Environmental Guideline Factor: Greenhouse Gas Emissions*, proposals will generally be assessed where they exceed 100,000 tonnes of carbon dioxide equivalent (CO<sub>2</sub>-e) emissions per annum.

In relation to the adequacy of conditions for monitoring and reporting of other emissions to air, having regard for DWER's risk assessment of potential emissions and noting the intent of the monitoring is to confirm that the authorised infrastructure is operating according to the manufacturer's specifications and within the emission profile described in the modelling, it is considered that the conditions applied with respect to monitoring are appropriate and justified.

## Recommendation

The Appeals Convenor recommended that the appeal be dismissed.

Noting the new information provided by the proponent about the volume of GHGe from the premises during operations, it is recommended that the Minister requests the EPA and DWER review this information, to determine what measures (if any) are applicable to manage those emissions under Parts IV and V of the EP Act.

## INTRODUCTION

This is a report on an appeal by Mr James Mumme (the appellant) against the conditions of the works approval issued by the Department of Water and Environmental Regulation (DWER) to Santos WA Energy Limited (Santos).

The works approval authorises the construction of the Varanus Island Compression and Power Optimisation Project (VICPOP) infrastructure at Varanus Island Hub. The Varanus Island Hub operations fall within Prescribed Premises Categories 10 and 34, as follows:

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|-------------|---|
| 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 stabilised crude oil, purified natural gas or liquefied hydrocarbon gases. |
| Category 34 | Oil or gas refining, premises on which crude oil, condensate or gas is refined or processed.  |

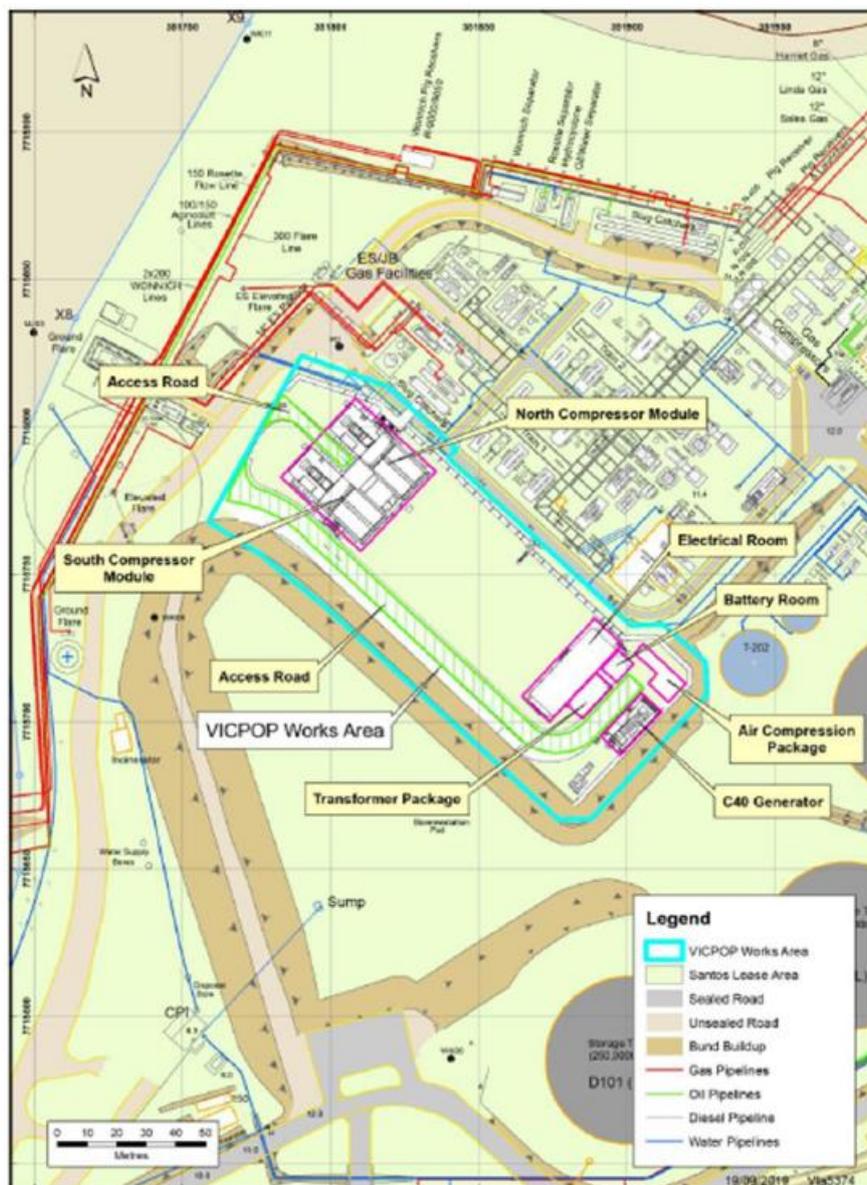
The premises is located on *Conservation and Land Management Act 1984* Leases 1902/100 and 2604/100 and Part Reserve 33902 (Part Lot 500 on Plan 240033), Varanus Island and the layout of the proposed infrastructure are shown in Figures 1 and 2 below.

**Figure 1 – Varanus Island Location Map**



(Source: Santos Response to Appeal 008/20 JB-10-RF-20020 page 7)

Figure 2 – Layout of proposed VICPOP infrastructure



(Source: DWER Decision Report W6198/2019/1 page 8)

## Background

Santos operates the Varanus oil and gas facilities on the North West Shelf of Western Australia. Recently, the natural pressure within the John Brookes gas formation has declined, and if it continues to decline, there will be insufficient natural pressure to maintain production flow rates. The VICPOP infrastructure will overcome the declining pressure and extend the operational life of the gas field.

The VICPOP comprises the construction and installation, pre-commissioning and commissioning of additional compression equipment, power generation infrastructure and ancillary facilities. The proposed infrastructure is to include:

- two Solar Mars 100 gas turbine driven compressors (10.5 megawatt)
- one Solar Centaur 40 gas turbine driven electrical power generator (3.5 megawatt at 11 kilovolts (kv))

- supporting building and infrastructure.

The pre-commissioning activities will overlap with the later stages of the construction of the VICPOP infrastructure. Pre-commissioning will include instrument and valve testing and utility start-ups. Once construction, module installation and pre-commissioning activities have been completed, the VICPOP will be commissioned to confirm proper function of the components and identify any problems or leaks prior to gas production. The commissioning phase is expected to take approximately 90 days.

### History of works approval

In December 2013, DWER issued works approval W5518/2013/1 to Apache Energy for the Varanus Island Compression Project (VICP). Apache Energy Limited operated Varanus Island Hub at that time on behalf of its joint venture partner.

The VICP boundary and infrastructure is consistent with the VICPOP proposed by Santos. The following works were completed under works approval W5518/2013/1, prior to deferral of the project in June 2014:

- preparatory work including the removal of redundant facilities, site preparation, levelling and creation of laydown areas
- realignment of the existing bund wall and bund liner modification works
- infill, compaction, retaining wall installation and stormwater drainage works
- installation of compressor module, power generation, electrical and battery room foundations and transport of the modules and power generator to a preservation facility in Henderson, WA.

Works approval W5518/2013/1 expired on 22 December 2016 and no further works were undertaken.

On 19 September 2019, Santos submitted an application for a works approval for the VICPOP. For the purposes of the assessment, DWER, noting that the two projects are consistent, relied on air emissions modelling data provided by Apache Energy Limited in support of the 2013 VICP works approval application.

After undertaking a risk assessment of the proposed works, DWER issued a works approval, subject to certain conditions on 14 February 2020. It was against these conditions that the appeal was lodged.

### **OVERVIEW OF APPEAL PROCESS**

In accordance with the *Environmental Protection Act 1986* (EP Act), two reports relating to the matters raised on appeal are required for the Minister for Environment to determine the outcome of an appeal:

- a report from the Appeals Convenor, as required by section 109(3) of the EP Act
- a report from the decision-making authority of the decision under appeal, as required by section 106(1).

This document is the Appeals Convenor's report to the Minister.

In order to properly advise the Minister, the Appeals Convenor conducted an investigation into the matters raised on appeal. The investigation included:

- review of the matters raised in the appeal submitted by the appellant
- review of the response to the appeal provided by Santos
- review of the report from DWER provided under section 106 of the EP Act
- a video conference with the appellant on 5 May 2020
- review of other information, policy and guidance as considered necessary.

The environmental appeals process is a merits-based process. Appeal rights in relation to a works approval are normally against the specifications of a works approval and whether the conditions of the works approval are adequate or appropriate to control the environmental impacts of the design and construction of the plant. Issues of whether the plant operates so as to manage or abate pollution and to ensure that it operates in an environmentally acceptable manner are normally considerations of the licensing process rather than a works approval. Consistency with previous Ministerial appeal determinations is also relevant, subject to new information or evidence being presented that was not previously considered.

### **OUTCOMES SOUGHT BY APPELLANT**

By the appeal, the appellant is seeking for the conditions to be strengthened to include:

- monitoring and reporting of greenhouse gas (GHG) emissions from the construction, transport and installation of infrastructure
- longer duration and frequency of monitoring, unexpected monitoring checks and include other greenhouse gases besides NO<sub>x</sub> gasses during commissioning, including fugitive emissions.

### **GROUND OF APPEAL**

The appeal is considered to relate to the following two issues:

1. Greenhouse gas emissions
2. Adequacy of monitoring

#### **GROUND 1: GREENHOUSE GAS EMISSIONS**

The appellant raised the following concerns about the adequacy of the conditions of the works approval as they relate to GHGe:

- condition 3 does not require compliance or accounting for environmental impacts of GHGe
- condition 5 (d) requires only monitoring of nitrogen dioxide (NO<sub>x</sub>), but does not include monitoring for any other GHGe
- condition 8 requires point source monitoring of NO<sub>x</sub> during commissioning. NO<sub>x</sub> should not be used as an indicator for GHGe, unless supported by evidence
- the omission of requirements for monitoring and accounting of fugitive GHGe from unburnt natural gas during construction, commissioning, and maintenance.

The appellant also submitted that GHGe should be monitored in the same units and quantified in terms of CO<sub>2</sub> equivalent (CO<sub>2</sub>-e), and that an 'account' for CO<sub>2</sub> and other GHGe produced from the embodied energy in the construction and transport elements and processes for their installation, should be undertaken.

## Consideration

In response to the appeal, while DWER acknowledged the risks of GHG emissions broadly it stated that the environmental impact assessment process 'administered under Part IV (and not Part V) of the EP Act is the primary legislative instrument for managing GHG emissions from major proposals in WA'.<sup>1</sup> DWER also advised that:

... GHG emissions do not fall within the scope of Part V of the EP Act [as] GHG emissions discharged into the environment are considered unlikely to constitute pollution or material or serious environmental harm as defined in the EP Act, if all that could be established is that the Works Approval holder's activities have added incrementally to the cumulative global problem of GHG emissions.<sup>2</sup>

It is understood from this that DWER is of the view that GHG emissions are unlikely to meet the necessary prerequisite for the application of conditions to a works approval under section 62(1) of the EP Act. This position is consistent with advice received from DWER and its predecessors on multiple of appeals over many years.

Notwithstanding the above, DWER advised that there are a number of initiatives being progressed to address climate change in WA:

[T]he State Government's *Greenhouse Gas Emissions Policy for Major Projects* ... guides Government decision-making for proposals with significant potential for GHG emissions and endorses the assessment and management of GHG emissions under Part IV of the EP Act. The Policy supports the development of GHG Management Plans for proposals with emissions over 100,000 tonnes of CO<sub>2</sub>-e [each year], including strategies to avoid, reduce, mitigate and offset the proposal's GHG emissions, set interim GHG emission targets and report publicly against those targets.

The *Environmental Guideline Factor: Greenhouse Gas Emissions (2020)* sets out the information required for an Environmental Impact Assessment (EIA) where GHG emissions have been identified as a key environmental factor requiring assessment under Part IV of the EP Act. Information required may include characterisation of GHG emission sources and estimation of expected Scope 1 (direct), Scope 2 (energy indirect) and Scope 3 (consequence of activities) greenhouse gas emissions in accordance with the *National Greenhouse and Energy Reporting Act 2007*.<sup>3</sup>

In the case of VICPOP, the Decision Report identifies that the works approval (W6298/2019/1) is to implement works that were subject to a separate works approval W5518/2013/1. Those works were also referred by Apache Energy Limited to the EPA under section 38 of the EP Act in 2013.

While this preceded the publication of the above policies, the referral form at that time required a proponent to advise whether the proposal is 'likely to result in substantial greenhouse gas emissions (greater than 100,000 tonnes per annum of carbon dioxide equivalent emissions)'. In response to that question, Apache answered 'no'.<sup>4</sup> In supporting information accompanying the referral form, Apache more specifically advised:

It is not expected that the Project will have a significant contribution of greenhouse gas emissions to the VI [Varanus Island] facilities.<sup>5</sup>

The EPA decided not to assess the proposal and published its decision with public advice on 13 March 2013. No comments or concerns were raised in relation to greenhouse gas emissions and the decision was not the subject of appeal.

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<sup>1</sup> DWER, Response to appeal 008/20, 22 April 2020, page 2.

<sup>2</sup> DWER, Response to appeal 008/20, 22 April 2020, page 3.

<sup>3</sup> DWER, Response to appeal 008/20, 22 April 2020, page 3.

<sup>4</sup> Apache Energy Limited, Proponent referral form, 21 December 2012, page 14.

<sup>5</sup> Apache Energy Limited, Varanus Island Compression Project Section 38 Environmental Referral under the Environmental Protection Act 1986 EA-00-RI-217, December 2012, page 74.

During the appeal investigation, Santos advised that GHGe from the proposal would initially be below 100,000 tonnes CO<sub>2</sub>-e per annum, but increase to approximately 176,000 tonnes CO<sub>2</sub>-e per annum in 'late life', which is understood to be beyond the year 2025. As these are operational emissions, they are outside the scope of the consideration of the conditions of the works approval.

Noting the emissions from the proposal are now expected (at a future stage), to exceed the threshold for consideration by the EPA under its *Environmental Guideline Factor: Greenhouse Gas Emissions (2020)* (which is at odds with the referral of the VICP in 2013), how the operational GHGe are assessed and managed may require further examination. It is recommended, therefore, that the Minister requests the EPA and DWER to review the proposal in its historical context, and determine the extent to what, if any, consideration of GHGe from the operation of the premises is required.

## Conclusion

While the appellants submission that additional conditions should be applied to the works approval for the monitoring of CO<sub>2</sub> are noted, DWER has long held the view that GHG emissions are unlikely to meet the necessary prerequisite for the application of conditions to a works approval.

The purpose of the monitoring conditions applied to this works approval is to determine whether the authorised infrastructure is operating according to the manufacturer's specifications and within the emissions profile described in the modelling, which is discussed further at Ground 2.

In relation to the operational management of air emissions, for the reasons stated above, it is recommended the Minister requests the EPA and DWER to review new information about the volume of GHGe and to liaise with Santos on what measures (if any) are applicable to those emission under either Part IV or Part V of the EP Act.

## GROUND 2: ADEQUACY OF MONITORING

By this ground of appeal, the appellant submitted that the monitoring required to verify if commissioning meets acceptable emissions outcomes, is inadequate.

To address his concerns, the appellant sought for the works approval to be modified to include:

- more than one test event and for that test event to be longer than 30 minutes
- monitoring of all emissions from the stack (unless nitrogen oxides are suitable as a proxy) and fugitive emissions
- a specification of what gases are to be removed by the scrubbers

The appellant also suggested that the testing be undertaken 'unannounced', such that the results are not filtered to a time where the plant is operating in a certain way. He also questioned whether the reference to the 'environmental compliance report' in condition 3 was a misnomer – and considered it would better be described as a 'construction compliance report'.

## Consideration

Condition 4 of the works approval provides:

Upon the completion of the Works ..., the Works Approval Holder must undertake Environmental Commissioning of the infrastructure ... for a period not exceeding 3 months.

Condition 5 of the works approval requires the proponent to monitor and record emissions in accordance with Table 2 of the approval, which provides:

Discharge Point	Parameter	Reporting Unit	Frequency	Averaging Period	Method
A24, A25 and A26; As depicted in Schedule 1: 'Emission Points to the Air'	NO <sub>x</sub>	mg/m <sup>3</sup> g/min	Once off during the environmental commissioning period.	> 30 minutes	USEPA Method 7E

Thus, the works approval requires that the three point source emission points (two compressors and generator) are the subject of a one-off test event for no less than 30 minutes, with the only parameter being tested NO<sub>x</sub>. This is consistent with the Decision Report, which identified the two compressor turbine exhaust stacks and a gas turbine generator exhaust stack as being the key emission sources.<sup>6</sup>

In its assessment, DWER relied on air emissions modelling data provided by Apache Energy Limited in support of the VICP in 2013. Apache commissioned Pacific Environmental Limited to determine the degree and significance of the change in nitrogen dioxide (NO<sub>2</sub>) emissions at the Varanus Island Hub resulting from the VICPOP.

DWER's decision report noted that SO<sub>2</sub>, unburnt hydrocarbons, CO and PM<sub>10</sub> were not modelled due to their anticipated low levels within the turbine fuel gas. DWER also advised that benzene, toluene, ethylbenzene and xylene (BTEX) arising as fugitive emissions within VICP infrastructure were also not modelled as these emissions were considered to be negligible.<sup>7</sup>

Section 6 of the Decision Report noted that modelling results predict that both the one hour and annual averaging period measures of NO<sub>x</sub> emissions would increase by less than one per cent. Given the conservative assumptions used in the modelling, the risk of NO<sub>x</sub> emissions at the Varanus Island Hub exceeding the National Environment Protection (Ambient Air Quality) Measurement (NEMP) was considered by DWER to be low.

Emissions to air identified by DWER in its risk assessment of the application were NO<sub>x</sub> emissions<sup>8</sup>, and noting the emission controls applied to the infrastructure, was not considered to be a risk event that required a further detailed risk assessment.

In regard to the emission controls applied to the infrastructure, the primary emission control for the VICPOP is the Low NO<sub>x</sub> combustion technology (SoLoNO<sub>x</sub>). This technology reduces the conversion of atmospheric nitrogen to NO<sub>x</sub> by reducing the temperature of fuel combustion, since NO<sub>x</sub> formation is dependent on flame temperature.

The decision report listed measures, in addition to the SoLoNO<sub>x</sub> technology, used to control atmospheric emissions during operation of the turbine powered equipment, including:

- low sulphur fuel (<8 parts per million) used to fuel the turbines

<sup>6</sup> Santos (2019). Varanus Island Compression and Power Optimisation Project – Bridging Document to the Varanus Island Hub Operations Environment Plan. JB-10-BI-20003.

<sup>7</sup> DWER. Decision Report: Application for Works Approval W6198/2019/1. Varanus Island Hub. 14 February 2020, page 21.

<sup>8</sup> For completeness, light spill and noise and vibration were also identified by DWER as 'emissions to air', however are not considered as they are not the subject of this appeal.

- high utilisation rate of the VICPOP infrastructure (<95% annually) reduces increased emission outputs from non-steady state operating conditions
- the use of the compressor and generator equipment with high combustion temperatures, resulting in reduced emission of CO
- flue gas monitoring and analysis will be undertaken for the VICPOP infrastructure to ensure that it meets manufacturer's specifications.

In relation to the scrubber as raised by the appellant, Santos advised that:

scrubbers for air pollution are not typically utilised on the exhaust stacks of gas turbine driven machines as they provide little benefit in reducing pollution (specifically NO<sub>x</sub> emissions). Pollution control for gas turbine driven machines primarily focus on primary (at source) over secondary (end of pipe control measures)....

Santos further advised that the 'scrubber' referred to in Table 4 of the works approval is not for the purpose of air pollution control. For the VICPOP, the scrubber is provided on each compression module to remove liquid carry over from the slug catcher, ensuring that the outlet stream is free of hydrocarbon condensation and water.

In response to the appellant's concerns about the adequacy of monitoring, DWER advised that given the NO<sub>x</sub> emissions were considered acceptable, it was of the view that a once off frequency and an averaging period greater than 30 minutes was reasonable and adequate to confirm whether the authorised infrastructure is operating according to the manufacturer's specifications and within the emissions profile described in the modelling.

For its part, Santos advised that during the application process it sought to reduce the frequency originally proposed by DWER for monitoring, as it was of the view that design emission specifications can be validated by a single point source monitoring exercise. Santos further advised that should emission specifications not be met, additional monitoring requirements would be justified and this would be outlined in the Environmental Commissioning report required under condition 8(e), which states:

Where [point source emissions monitoring results] have not been met, measures proposed to meet the manufacturers' design specifications (including but not limited to additional monitoring of point source emissions to the air) an/or conditions of this Works Approval, together with timeframes for implementing the proposed measures.

In relation to the minimum duration of 30 minutes, Santos advised that due to the continuous nature of its operation and without short-term variation in loading, a minimum of 30 minutes is sufficient. Santos further advised that the infrastructure will be tested at peak loads to ensure it meets design specifications, which also underpin the air quality modelling used to assess compliance with the AAQ NEPM.

In regard to the appellants concerns about specifying the time of day and ambient conditions, DWER advised that

... the time of day or ambient conditions will not influence the results of the point source emissions monitoring campaign such that these results would no longer be considered an accurate representation of the authorised infrastructure's emissions profile.<sup>9</sup>

In relation to the appellant's submission that monitoring schedules should be unknown to the operator, Santos advised that a third-party NATA-accredited air emissions monitoring specialist will be contracted to undertake the point source monitoring during the commissioning period. The results will be submitted to DWER as a part of the Compliance Report required under condition 8.

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<sup>9</sup> DWER, Response to appeal 008/20, 22 April 2020, page 4.

In relation to the appellant's view that the environmental compliance report required by conditions 2 and 3 is mis-described, DWER advised that the report is not for the purpose of reporting the environmental impacts of the proposed works: rather, it is required to demonstrate that the construction and installation of the infrastructure is compliant with the specifications of the works approval.<sup>10</sup>

As noted above the works approval allows for temporary period of operation to validate performance. The longer term operation of the infrastructure requires a licence to operate under the EP Act. A licence, if granted would contain conditions to monitor and report on long-term point source emissions monitoring for the authorised infrastructure.

DWER considered that the Environmental Compliance Report required by conditions 2 and 3 of the works approval is consistent with published guidance and is adequate for meeting its intended purpose.

### **Conclusion**

Based on the above, having regard for DWER's risk assessment of potential emissions and noting the intent of the monitoring is to validate assumptions and the modelling, it is considered that the conditions applied with respect to monitoring are appropriate and justified.

It is also considered that the environmental compliance report required by conditions 2 and 3 is not intended for the reporting of environmental impacts of the VICPOP but rather to validate that the infrastructure is installed and operating as predicted and therefore confirming that the level of impact is as assessed by DWER.

It is therefore recommended that this ground of appeal be dismissed.

### **CONCLUSIONS AND RECOMMENDATION**

For the reasons stated above, it is considered that the conditions applied to the works approval by DWER were appropriate and no changes are required. It follows that it is recommended that the appeal be dismissed.

However, noting the new information provided by Santos about the volume of GHGe from the premises during operations, it is recommended that the EPA and DWER review the new information in consultation with Santos on what measures (if any) are applicable to those emissions under Parts IV or Part V of the EP Act.

Emma Gaunt  
APPEALS CONVENOR

**Investigating Officer:**  
Tonya Carter, Senior Appeals Officer

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<sup>10</sup> The definition of an Environmental Compliance Report is provided in the works approval as 'a report to satisfy the CEO that the conditioned infrastructure and/or equipment has been constructed and/or installed in accordance with the works approval'.