SSD-6038

Annual Review

2018

Santos

Dewhurst Gas Exploration Pilot Expansion

Table of Contents

List of Figures

List of Tables

1. Introduction

This report has been drafted to address the requirements of Condition 4 of Schedule 5 of SSD-6038 – the Dewhurst Gas Exploration Pilot Expansion (the approval).

The Bibblewindi Gas Exploration Pilot Expansion (SSD-5934) was granted on the same day as SSD-6038. No works have been undertaken to commence the Bibblewindi development. As such, the requirement to provide an Annual Review for the Bibblewindi Gas Exploration Pilot Expansion has not been triggered.

The report's format mirrors the sections of the approval, but also includes relevant information from the Annual Review Guideline *Post Approval Requirements for State Significant Mining Developments October 2015*.

Name of Operation	Dewhurst Gas Exploration Pilot Expansion
Name of Operator	Santos NSW (Eastern) Pty Ltd
Development consent / project approval#	SSD-6038
Name of holder of development consent	Santos NSW (Eastern) Pty Ltd
Petroleum Exploration Licence #	PEL238
Name of holder of Petroleum Exploration Licence	Santos NSW Pty Ltd (ACN 094 269 780) and Energy Australia Narrabri Gas Pty Ltd (ACN 147 609 729)
Water licence #	90AL832238
Name of holder of water licence	Santos NSW (Eastern) Pty Ltd
Annual Review start date	1 January 2018
Annual Review end date	31 December 2018
I, Todd Dunn, certify that this audit report is a true and accurate record of the compliance status of the Dewhurst Gas Exploration Pilot Expansion for the period 1 January 2018 to 31 December 2018 and that I am authorised to make this statement on behalf of Santos NSW (Eastern) Pty Ltd.	
Name and Title of authorised reporting officer	[redacted]
Signature and date	[redacted]

2. Description of Development

This section addresses the following requirements:

SSD approval: Schedule 5 Condition 4 (a): *describe the development (including any rehabilitation) that was carried out in the past calendar year and the development that is proposed to be carried over the coming year.*

Guidelines: Provides information sought under Sections 2 & 4 of the Guidelines

Contact details for key personnel responsible for environmental management of the operation: [redacted]

A Development Consent (DC) was issued by the Planning Assessment Commission on 18 July 2014 for the Dewhurst 13-18H Extension and the Dewhurst 30 and 31 Extension.

The development includes the operation of the Dewhurst 13-18H Pilot and the Dewhurst 26-29 Pilot, including the Dewhurst 13-18H Extension and Dewhurst 30 and 31 Extension. This approval was amended in July 2017 to extend the period of operation of the Dewhurst 26-29 wells.

The Dewhurst 13-18H Extension involves the drilling and operation of an additional two horizontal wells at each of Dewhurst 16H, Dewhurst 17H and Dewhurst 18H pilot wells.

The Dewhurst 30 and 31 Extension involves the drilling and operation of two additional wells at the development, namely Dewhurst 30 and Dewhurst 31.

2.1 Dewhurst 13-18H Pilot

The Dewhurst 13-18 Pilot did not operate during the reporting period. The status of all wells is 'suspended'. The drilling of the additional two horizontal wells at each of the Dewhurst 16H, 17H and Dewhurst 18H has not occurred.

There was no land disturbance at any of the sites in the Pilot during 2018. No water was extracted from any of the wells.

The only activities at the Pilot was surveillance by Santos operator/maintainers undertaking their routine surveillance on the wells and Santos environmental staff taking water samples from the shallow aquifer monitoring bores at Dewhurst 14, and their routine inspections.

2.2 Dewhurst 26-31 Pilot

The Dewhurst 26-29 Pilot wells were drilled in 2014, prior to the granting of SSD-6038.

The drilling of the additional two wells in the Pilot (Dewhurst 30 &31) has not yet been undertaken. The leases were cleared and prepared in 2014 as reported in the 2014 and subsequent Annual Reviews.

Partial rehabilitation of each of the sites was undertaken by spreading stockpiled topsoil and mulch over the bare earth prior to the well sites being commissioned.

The Dewhurst 26-29 Pilot (the Pilot) consists of two vertical wells at Dewhurst 26 and Dewhurst 28. Three horizontal wells originating each at Dewhurst 27 and Dewhurst 29, and drilled into three separate coal seams to intersect with the Dewhurst 26 and Dewhurst 28 wells respectively. In the reporting year, all gas produced in the Pilot was piped to the Dewhurst 28 well lease and flared. All water produced in

the Pilot is piped to a fully bunded balance tank at Dewhurst 28 before being pumped via the approved Southern flowline to a 5ML tank at Bibblewindi where it is mixed with water from other Pilots. From there the water is transferred via an underground flowline to the Leewood Water Management facility for storage prior to treatment. There is no release to waters from this facility, or from any section of the pipeline between the Dewhurst South Pilot and Leewood.

The Dewhurst 26-29 Pilot began operating for the first time on 19 January 2015, following completion of interference testing.

In 2018, gas gathering infrastructure was extended to connect to an existing flowline, transporting gas to the Wilga Park Power Station. Construction works involved identifying existing infrastructure and trenching in a new section of gas pipeline. This work was outside of the scope of the approval to SSD 6038, and was approved by a modification to the Review of Environmental Factors for the Dewhurst Southern Flowline. Those works took place in November/ December 2018. These activities have reduced the need to flare gas from the Pilot in future.

For the reporting year, the Pilot operated continuously without workovers, except for the period of construction of the gas pipeline to convey gas from the pilot to the existing gas flow pipeline at Bibblewindi East.

Figure 1 Aerial photograph of Dewhurst 26-31 Pilot

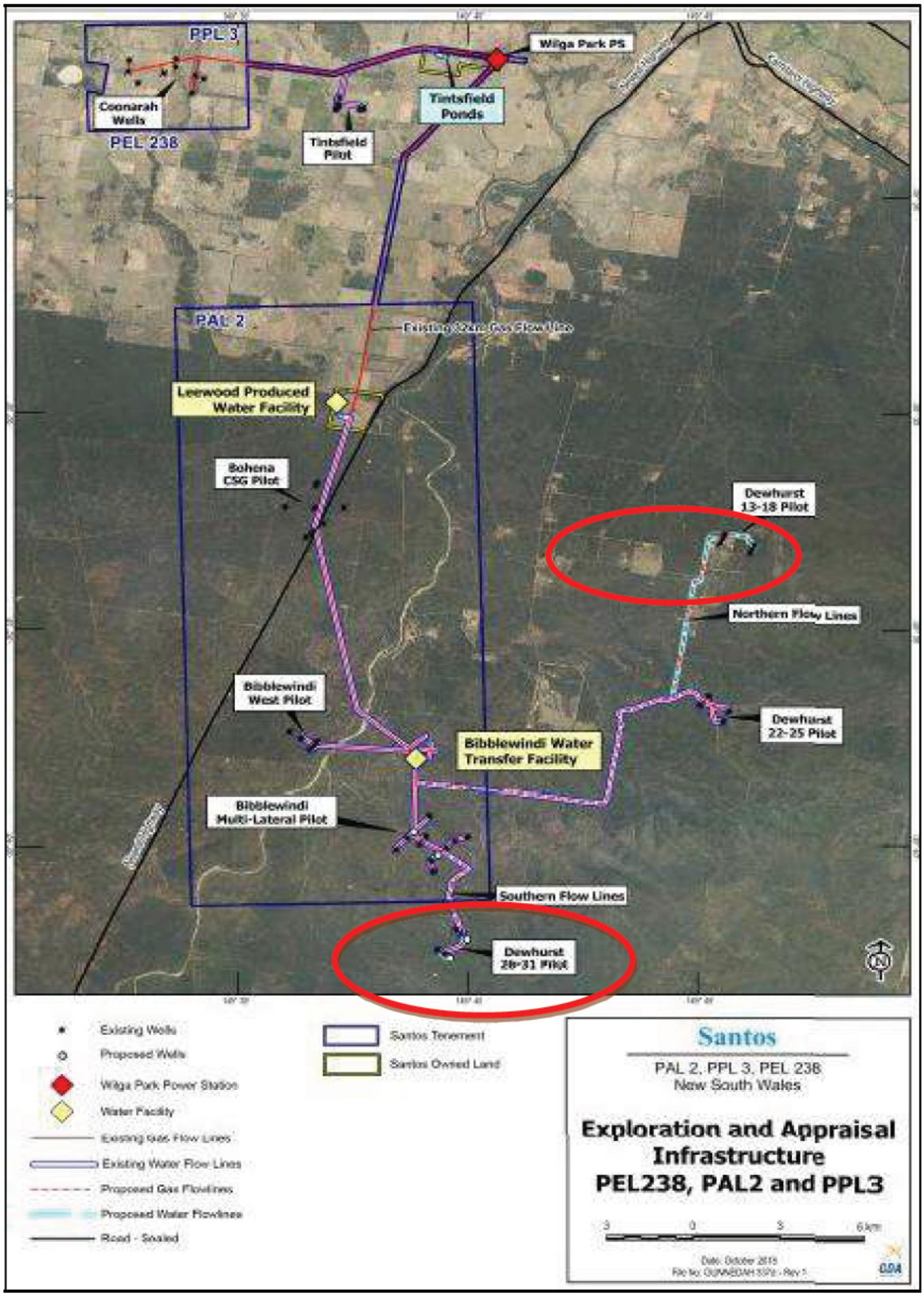

Figure 2 Santos Infrastructure Narrabri Gas Field

3. Review of Monitoring Results and Complaints

This section addresses the following requirements:

SSD approval: Schedule 5 Condition 4 (b)

I. *Include a comprehensive review of monitoring results and complaints records of the development over the past calendar year, which includes a comparison of these results against the: relevant statutory requirements, limits, or performance measures/ criteria*

II. *requirements of any plan or program required under this consent*

III. *monitoring results of previous years and*

IV. *relevant predictions in the EIS*

Guideline: Section 6 Environmental performance, Section 7 Water Management, and Section 8 Rehabilitation

3.1 Noise

The conditions of the SSD approval, PEL 238 and of EPL 20350 set noise limits at any residence or sensitive receiver of 35dB (A) for operational noise. The nearest sensitive receiver is over 10 km away from the site.

The approved Project Environmental Management Plan (PEMP) lists attended monitoring to be undertaken at sensitive receivers in instances of noise complaints. Since no noise complaints have been received, no monitoring at any sensitive receiver has been required.

Santos operator/maintainers carry out regular routine inspections of sites as part of their normal duties. Environmental advisers undertake inspections of the sites to determine if any additional noise mitigation measures are required. These formal inspections are scheduled in the compliance database ComTrack for 6 monthly compliance checks. Additionally, environmental advisers are on site regularly, and deal with any environmental issues at the time of identification. No noise related matters have required attention.

The EIS predicted no impact at any sensitive receiver from the Dewhurst 26 - 29 pilot. As discussed in the introduction, the Dewhurst 13-18 Pilot did not operate during 2018.

3.2 Blasting

Not applicable

3.3 Air Quality

The EPL 20350 does not impose any air quality limits. It has three conditions relating to measures to be taken to prevent or minimise dust generation.

The PEL 238 approval does not include any air quality conditions, but has a general requirement to implement all reasonably practicable measures to prevent and/or minimise harm to the environment.

To avoid the generation of dust, all trafficable areas at the well sites have been covered with blue metal, and the sections of partial rehabilitation have had mulch applied across the surface.

The Dewhurst 30 and 31 sites have had a polymer spray applied across the bare surfaces of the site primarily for erosion and sediment control, but this product also binds the surface to prevent dust generation.

SSD-6038 sets long and short term criteria limits for particulate matter, as well as long term criteria for deposited dust. This approval sets the limits at any residence on privately owned land, the nearest of which is 10 km away. Monitoring is conducted at the Dewhurst 26 site, and as shown in the tables below, that even within an operational site, the monitoring results are significantly below the limits in the approval.

Table 1 Long term criteria for particulate matter

Pollutant	Averaging period	Criterion	Average Result (full year)
Total Suspended particulate (TSP) matter	Annual	90 µg/m^3	18.53 µg/m^3
Particulate matter <10µm(PM_{10})	Annual	30 µg/m^3	7.97 µg/m^3

Table 2 Short term criteria for particulate matter

Pollutant	Averaging period	Criterion	Maximum Result (full year)
Particulate matter <10µm(PM_{10})	24 hour	50 µg/m^3	23.9 µg/m^3

Table 3 Long term criteria for deposited dust

Pollutant	Averaging period	Maximum increase in Total Deposited Dust level		Maximum Total Deposited Dust level	
Deposited dust	Annual	Criteria:	2 g/m^2/month	Criteria:	4 g/m^2/month
		2018 Result:	0.7 g/m2/month	2018 Result:	2.2 g/ m^2/month

The PEMP lists the monitoring frequency for the short and long term particulate matter standards to be conducted every six days. The 2018 full monitoring record is shown in Appendix 1. The measures as described in the 2017 Annual Review to improve the reliability of the monitoring equipment have led to improved alignment with the six day sampling regime. The changes included the purchase of two new high volume air samplers, and hard wiring the power source to the well. This negated the need for a portable generator to be used to provide power to the machines.

The data clearly shows the operation being managed in such a way as to be below the maximum particulate levels.

The PEMP also describes measures to be followed by Santos in order to mitigate against air quality deterioration. These include dust minimisation measures as well as greenhouse gas mitigation measures.

Santos undertakes a Leak Detection and Repair program (LDAR) in accordance with its Leak Detection and Repair Plan. This plan is part of the overall well integrity program for all wells operated by Santos' NSW operations. No reportable leaks were identified by the Santos program during 2018. Santos is required to report on the LDAR program in its annual return for EPL 20350, which is due for submission in June 2019. Santos reported on its LDAR program in the 2018 EPL Annual Return for the period 1 May 2017 to 30 April 2018.

3.4 Biodiversity

The EPL 20350 contains no biodiversity conditions.

The PEL 238 approval does not contain any specific biodiversity conditions.

SSD-6038 sets performance standards for groundwater dependent ecosystems (negligible environmental consequences) and threatened species, threatened populations, or endangered ecological communities (Minor environmental consequences). Santos engaged ecologists (EcoLogical Australia) to conduct autumn and spring surveys in 2018, who provided the following conclusion and recommendation in their report *Dewhurst 26 – 31 BMP Annual Monitoring Report 2018*.

'This report presents the results from four years' monitoring data collected for the project, and because the Dewhurst 13-18H Pilot and Bibblewindi Multi-lateral Pilot have not yet been constructed; only four of the proposed 10 monitoring sites have been established.

Data analysis in 2018 continues to suggest little difference between impact and control sites in terms of fauna diversity or composition, flora structure or condition and vertebrate pest populations. Although there have been some observable changes apparent between monitoring years (e.g. exotic species cover, native plant species diversity, microbat species richness), these changes are consistent across site type and as such can be considered unrelated to the construction and operation of the pilot wells.

As per the BMP for the project, monitoring at Dewhurst 26-31 should continue to develop a long-term dataset where trends (such as climatic influence) become clearly apparent.

Pre-disturbance monitoring of the Dewhurst 13-18H Pilot and Bibblewindi Multilateral Pilot should be conducted to determine baseline conditions and variation.'

The report noted that vegetation cover remains consistent with the performance criteria of 95% native. It also noted that native plant species richness had decreased consistently in both impact and control sites since 2016, most likely a result of the varied seasonal conditions across the four year monitoring period. However it was also noted that species richness is consistently higher at all impact sites than control sites across all four monitoring years.

Exotic plant cover has shown slight variation between monitoring years, however this effect is consistent across 'impact' and 'control' sites, and is likely a reflection of the high rainfall experienced in the lead up to the 2016 surveys and the low rainfall experienced prior to 2017 and 2018 monitoring surveys.

For woodland birds, they reported *'a slight decline in overall species richness between both autumn and spring for 2016 to 2018, with no difference between 'impact' and 'control' sites.* A similar comment was made for microbats with no meaningful conclusions being made due to the errors between site data overlapping.

For feral animals, low numbers were observed in the surveys across all four sites during the 2015-2018 monitoring events, meaning that no detailed analysis was possible. There are no differences in pest population size or activity between 'impact' and 'control' sites.

3.5 Heritage

Not applicable. There were no new ground disturbances in 2018.

Table 4 Summary table for environmental aspects

Aspect	Approval criteria	Performance	Trend/ key management implications	Implemented/ proposed management actions
Noise	35dB (A) at noise sensitive location	Nearest residence 10km away – no impact	nil	Continued implementation of PEMP
Blasting	N/A	N/A	N/A	N/A
Air Quality	Refer to the tables in section 3.3	Well below maximum limits	Reduced dust levels indicated by monitoring results	Continued implementation of PEMP
Biodiversity	Negligible impact of GDE, and minor on threatened populations	No impact detected to date	Insufficient data for ecologist to advise	Continuation of autumn and spring surveys
Heritage	N/A no new disturbances	N/A no new disturbances	N/A no new disturbances	N/A no new disturbances

3.6 Complaints

No complaints regarding the development were directly made to Santos in the reporting period.

As part of Santos' operations, complaints are entered to a database and the response provided or action taken is recorded. The website is updated monthly in relation to complaints received.

There have been no complaint trends over the previous four years of operation.

3.7 Engagement

Key community consultation activities for the Narrabri Gas Project are managed by Santos on a 'whole-of-project' basis, and relate to activities undertaken across PEL 238, PAL 2 and PPL 3 generally and are not specific to this project (SSD-6038).

There is a comprehensive Community Consultation Plan in place for PEL 238, stakeholders have been identified, and a risk-based assessment undertaken on the level of impact or benefit that activities may potentially have on stakeholders and the community.

Santos does not retain separate consultation records for the Dewhurst Gas Exploration Pilot Expansion; however community activities undertaken in the similar reporting period (1 September 2017 to 31 August 2018) for the PEL 238 licence area demonstrate the comprehensive community engagement activity for this licence area, including this project:

- There were around 600 visitors to Santos shopfronts;
- Around 150 visitors attended the Santos information stand at AgQuip in 2018;
- More than 40 community and field site tours were hosted in the licence area;
- The Narrabri Gas Project website had 25,270 page views; and
- Monthly Activity Updates for PEL 238 activities were distributed to over 300 individuals each month

There are well established consultation tools in place and this is complementary to the mature relationship that Santos has with stakeholders in the PEL 238 licence area. These tools provide ongoing opportunities for stakeholders and members of the community to learn about, provide input to, and raise concerns about activities that Santos is conducting, or planning to conduct including those relating to this project. This includes:

Consultation Activity	Frequency
Narrabri Gas Project CCC	• Meetings are held at least every two months or more often as determined by the Independent Chair.
Face to face meetings	• Regular face to face meetings are held with key stakeholders relevant to their level of interest in activities
Community Site Tours	• Community Site Tours to visit operational sites are advertised monthly in the local newspaper and on the Santos website • Site tours are also provided upon request from interested community groups and other stakeholders
Communication tools	• An email and a contact telephone number for the Narrabri Shopfront is referenced on Santos website and external printed documentation • Enquiries are answered promptly and issues raised are recorded in a consultation database
Website	• The Narrabri Gas Project website is maintained and updated with current information www.narrabrigasproject.com.au
Brochures and fact sheets	• Brochures and fact sheets are regularly reviewed and updated • New publications will be produced as required
Activity Update Reports	• Monthly activity updates are prepared and emailed to key stakeholders and uploaded to the website and included monthly in the local newspaper • Updates are distributed to the Narrabri Gas Project CCC members to disseminate to members of their respective organisations
Media Updates	• Advertisements and media releases for key announcements

Consultation Activity	Frequency
Social Media	• Santos' Facebook and Twitter pages provide information through social media channels
Santos shopfront	• The Shopfront in Narrabri is open during business hours and has printed information and displays
Attendance at community events and agricultural shows	• Santos attends relevant local agricultural shows, NSW Farmers Annual Conference, AgQuip and other community events
Community Participation	• Santos participates in relevant local groups and committees

3.8 Water and Waste Management

Santos extracts saline water from the coal seams in order to collect the gas entrained in the coal cleats. All water produced in the Pilot is piped to a bunded balance tank at Dewhurst 28 before being transferred via the approved Southern flowline to Bibblewindi and onto the Leewood Water Management facility. The bunded balance tank at Dewhurst 28 is on a compacted base, with a HDPE liner. The tank levels are monitored by SCADA and the valves are equipped with high level and low level alarms to warn of abnormal tank levels. The trip system on the tank allows the wells to be shut down automatically on high level and valves to operate automatically at pre-set levels to minimise risk of spills or overflow. These valves can also be operated manually by on site personnel.

Table 5 Water Use For the year 1 January 2018 to 31 December 2018

Water Licence #	Water Sharing Plan	Entitlement	Passive Take/inflows	Active pumping	TOTAL
90AL832238	NSW Murray Darling Basin Porous Rock Groundwater Sources	600ML	Nil	138.1 ML	138.1 ML

Condition 22 of Schedule 3 requires reporting on waste management and minimisation in the Annual Review. The primary waste stream generated at the development is produced water. Given the gas extraction requires the de-watering of the wells, it is not possible to minimise the extraction of this water. However, Santos has constructed a reverse osmosis water treatment plant at Leewood so that the produced water can be treated to a standard capable of being beneficially re-used by irrigating on site at Leewood. Santos commenced irrigating crops at Leewood on 15 August 2017. A summary report on irrigation activities was provided in the PAL2 Annual Environmental Management Report to the Division of Resources and Geosciences for the period 1 January 2018 to 8 February 2018, when irrigation ceased. The beneficial re-uses approved under the Leewood Beneficial Reuse Project, and the Produced Water Management Plan include crop irrigation, dust suppression and firefighting. Currently the water from the project is stored in lined ponds at Leewood, and when the water treatment plant re-commences operation, the water will be used for one of the above purposes.

A comparison between anticipated waste generation as predicted in the EIS, and actual is shown in Table 6.

Table 6. Comparison between predicted waste generation and actual in the reporting period

Source	Classification	Estimated Quantity	Actual quantity 2018
Construction Activities			*No construction activities undertaken in 2018
Drill fluid	Liquid waste	825m^3	0*
Drilling fluid-contaminated cement		160m^3	0*
Produced water		450m^3	0*
Fuels, engine coolant and		< 200L	0*
Human waste including pump out		< 60m^3	0*
General waste including food waste	General solid waste (putrescible)	<40m^3	0*
Drill cuttings	General solid waste (non-putrescible)	350m^3	0*
Drained oil filters, empty oil containers and oil absorbent materials that do not contain free liquids, plastics (e.g. packaging pipe caps).		< 80m^3	0*
Contaminated soil ^	Dependent on waste	Undetermined	0*
Recyclables including glass, PET bottles, aluminum, scrap metal (e.g. pipe cuttings).	Recyclable	<40m^3	0*
Operational Activities			
Produced water	Liquid waste	Max. 845 m^3 per day	378.1 m^3 per day (average)
Waste generated from maintenance works	Various	Undetermined	<1 cubic metre

No hazardous wastes were generated at the development for the reporting period.

Figure 3 Dewhurst 28 – Balance tank

3.9 Rehabilitation

No additional rehabilitation was undertaken during 2018. The partial rehabilitation works described in the Annual Review submitted in 2017 were maintained by Santos' weed management program and the site specific erosion and sediment control plans.

Each of the six sites are located within a fenced enclosure of 1 Ha in size, and the standard practice is that once the rig has left the site and surface infrastructure has been installed, partial rehabilitation occurs. A fenced area of approximately 30m x 30m is retained for the well site equipment. A blue metal access track around the perimeter of this enclosure separates the rehabilitation from the well facilities. The revegetation occurs naturally from the seed bank in the removed topsoil.

The sites are monitored for weeds, and when necessary treated as per the weed management program. The only relevant performance criterion in table 4-13 of the EIS for the Development relates to weed management i.e. weeds to not dominate after disturbance or rainfall. The active weed management program in place restricts weed populations; however as seen by the photos, the dominant vegetation at all sites is as a result of natural regeneration with native species. All other performance criteria in Table 4-13 of the EIS are not triggered until after the sites are abandoned, or rehabilitation is completed. No wells have been abandoned, and although Santos has undertaken partial rehabilitation of the sites, the rehabilitation work has not been completed. It is sometimes necessary to re-clear partially rehabilitated areas for operational needs such as setting up for workover rigs.

Figure 4 Dewhurst 26

Figure 5 Dewhurst 27

Figure 6 Dewhurst 28

Figure 7 Dewhurst 29

Figure 8 Dewhurst 30

Figure 9 Dewhurst 31

4. Compliance Statement

This section addresses the following requirements:

SSD approval: Schedule 5 Condition 4 (c) *Identify any non-compliance over the past calendar year, and describe what actions were (or are being) taken to address non compliances*

Guidelines: Section 10 Independent Audit and Section 11 Incidents and non-compliances.

The relevant approvals for the development are:

- SSD 6038 approval;
- PEL 238;
- EPL 20350;
- Approval Dewhurst 26-29 Pilot (DRE) 16 August 2013.

Table 7 Statement of Compliance

Were all conditions of the relevant approval complied with as they relate to the development in 2018	
SSD 6038	Yes
PEL 238	Yes
EPL 20350	Yes
Approval Dewhurst 26-29 Pilot	Yes
Water Management Act 2000	No. See below for details

Although not part of the development, but for completeness of this report, it should be noted that on 8 February 2018 Santos received a notice, issued under Section 193 of the Protection of the Environment Operations Act 1997 for information and records in relation to a Water Use Approval at Leewood. Santos ceased irrigating at Leewood on 8 February 2018, with treated water from the Water Treatment Plant being recirculated back to the Leewood ponds, and mixed with produced water. At the completion of their investigation on 12 October 2018, EPA issued Santos with a Penalty Infringement Notice for an offence against the Water Management Act 2000 for the offence of 'Use water otherwise than as authorised by a Water Use Approval (WUA) required under that Act'. Santos will not operate the Leewood irrigation area without holding the appropriate water use approval.

4.1 Independent Audit

Under the approval of SSD 6038 Schedule 5, condition 8, Santos was required to engage an approved Independent Environmental Auditor to conduct a full audit of the development. Damien Taylor of SMEC

(Australia) Pty Ltd was approved by the Department of Planning and Environment (DPE) to undertake the audit.

The audit was completed on 9 January 2019, and the final report was submitted to DPE on 18 February 2019.

The audit concluded that *'the overall compliance for the Dewhurst Gas Exploration Pilot Expansion project is of a high standard. The administrative items identified in the previous independent audit have been addressed and closed out, and no additional non-compliant items were identified during this audit.'*

The only recommendation made by the auditor was as the following; *'the level of monitoring required by the consent conditions were found to be disproportionate to the level of risk of the activity to the location environment, particularly with respect to air quality monitoring needed to carry out real time high volume sampling when the nearest resident is some ten kilometres away. The auditor suggested that the air quality monitoring aspect of the Dewhurst Gas Exploration Project could be reduced and still provide the regulator with a sufficient level of knowledge of what the project impacts are.'*

The next Independent Environmental Audit is scheduled in ComTrack to be completed by 4 November 2021.

4.2 Incidents and non-compliances

There were no reportable environmental incidents for the development in 2018, nor were there any exceedances of any limits in any approval.

5. Identification Trends

All monitoring complies with the relevant approval limits. This is also discussed in the relevant sections of this report.

The EcoLogical biodiversity assessment did not identify any detrimental impacts from the development.

The Leak Detection and Repair Program conducted by Santos shows all equipment is operating in good condition.

6. Forecast of operations and activities for the next reporting period.

For the 2019 calendar year, Santos proposes to continue to operate the Dewhurst 26-29 pilot. Now that the gas flowline has been constructed, it is proposed to use the gas produced from the development in generating electricity at the Wilga Park Power Station.

Water from the development will continue to be piped to Leewood and managed in accordance with approval and licence conditions.

It is not proposed to drill Dewhurst 30 and 31 wells in 2019.

The Dewhurst 13-18 pilot will remain suspended.

The activities undertaken in 2019 at the pilots will be similar to 2018; however, should it become necessary to do so, Santos would bring in a workover rig to undertake downhole maintenance.

7. Discrepancies between predicted and actual impacts

No discrepancies have been detected. The project area is very small, and is isolated from any sensitive receiver or ecological community.

8. Continuing or proposed measures to improve the environmental performance of the development

Santos will continue with its implementation of the Project Environmental Management Plan in managing environmental aspects associated with the project. There will be a continuation of the leak detection and repair program to minimise gas loss from infrastructure. Through the use of the latest technology, and the detailed knowledge of operational infrastructure, Santos will ensure that gas leaks are minimised.

END OF REPORT

Appendix 1: HiVol Air Samplers – TSP and PM10

PM10 (µg/m3) (DWH26AQ2PM10)				Total Suspended Particulates (µg/m3) (DWH26AQ2TSP)			
COA (certificate of analysis)	Sample Date	Result	Comments	COA (certificate of analysis)	Sample Date	Result	Comments
EN1801106	2/01/2018	15.5		EN1801106	2/01/2018	23.9	
EN1801140	8/01/2018	7.4		EN1801140	8/01/2018	38.7	
EN1801276	14/01/2018	9.4		EN1801276	14/01/2018	20.2	
EN1801276	20/01/2018	23.9		EN1801276	20/01/2018	40.4	
EN1801599	26/01/2018	9.1		EN1801599	26/01/2018	17.8	
EN1801599	1/02/2018	9.6		EN1801599	1/02/2018	15.8	
EN1801600	7/02/2018	7		EN1801600	7/02/2018	18.1	
EN1801753	13/02/2018	12.3		EN1801753	13/02/2018	22.3	
EN1801753	19/02/2018	21.7		EN1801753	19/02/2018	42.3	
EN1801836	25/02/2018	1.8		EN1801836	25/02/2018	8.3	
EN1801962	3/03/2018	13.4		EN1801962	3/03/2018	25.3	
EN1802059	9/03/2018	4.7		EN1802059	9/03/2018	12.5	
EN1802154	15/03/2018	5.7		EN1802154	15/03/2018	19.3	
EN1802304	21/03/2018	15		EN1802304	21/03/2018	37.4	
EN1802304	27/03/2018	5.6		EN1802304	27/03/2018	9.5	
EN1802327	2/04/2018	10.6		EN1802327	2/04/2018	15.4	
EN1802469	8/04/2018	5.9		EN1802469	8/04/2018	11.2	
EN1802577	14/04/2018	10.4		EN1802577	14/04/2018	24.1	
EN1802717	20/04/2018	4.5		EN1802717	20/04/2018	11.5	
EN1802795	26/04/2018	5.7		EN1802795	26/04/2018	20.2	
EN1802847	2/05/2018	9		EN1802847	2/05/2018	16.5	
EN1802949	8/05/2018	5.8		EN1802949	8/05/2018	30.2	
	14/05/2018		No result – no power to units		14/05/2018		No result – no power to units
	20/05/2018		No result – no power to units		20/05/2018		No result – no power to units
	26/05/2018		No result – no power to units		26/05/2018		No result – no power to units
EN1803499	1/06/2018	3.9		EN1803499	1/06/2018	14	
EN1803571	7/06/2018	5.6		EN1803571	7/06/2018	19.3	
EN1803903	13/06/2018	4.6	Unit operated over two 24 hour periods (13-19/06/2018)	EN1803903	13/06/2018	10	Unit operated over two 24 hour periods (13-19/06/2018)
EN1803903	19/06/2018		Unit operated over two 24 hour periods (13-19/06/2018)	EN1803903	19/06/2018		Unit operated over two 24 hour periods (13-19/06/2018)
EN1803903	25/06/2018	5.9		EN1803903	25/06/2018	14	
EN1804082	1/07/2018	2.1		EN1804082	1/07/2018	3.2	
EN1804294	7/07/2018	3.2		EN1804294	7/07/2018	6.3	
EN1804440	13/07/2018	2.1		EN1804440	13/07/2018	2.1	
	19/07/2018		No result – no power to units		19/07/2018		No result – no power to units
EN1804705	23/07/2018	5.6		EN1804705	23/07/2018	13.3	
EN1804846	25/07/2018	13.3		EN1804846	25/07/2018	22.7	
EN1804846	31/07/2018	3.4		EN1804846	31/07/2018	6.1	
EN1805041	6/08/2018	5.7		EN1805041	6/08/2018	17.7	
EN1805211	12/08/2018	2.7		EN1805211	12/08/2018	8.4	
	18/08/2018		No result – no power to units		18/08/2018		No result – no power to units
EN1805557	24/08/2018	12.2		EN1805557	24/08/2018	27	
EN1805689	30/08/2018	4.9		EN1805689	30/08/2018	14.5	
EN1806215	5/09/2018	2.1		EN1806215	5/09/2018	6.4	
EN1806210	11/09/2018	5.6		EN1806210	11/09/2018	11.2	
EN1806210	17/09/2018	10.7		EN1806210	17/09/2018	26.1	
EN1806215	23/09/2018	5.4		EN1806215	23/09/2018	14.2	
EN1806500	29/09/2018	9		EN1806500	29/09/2018	23.4	
EN1806604	5/10/2018	2.1		EN1806604	5/10/2018	7	
EN1806900	11/10/2018	2.1		EN1806900	11/10/2018	4.9	
EN1807011	17/10/2018	2.4		EN1807011	17/10/2018	3.8	
EN1807082	23/10/2018	3.6		EN1807082	23/10/2018	11.3	
EN1807485	29/10/2018	10.3		EN1807485	29/10/2018	19.6	
EN1807518	4/11/2018	5.6		EN1807518	4/11/2018	30	
EN1807724	10/11/2018	5.2		EN1807724	10/11/2018	12.9	
EN1807865	16/11/2018	5.7		EN1807865	16/11/2018	15.5	
EN1808035	22/11/2018		(Extracted result 97.2) regional dust storm occurred on same day	EN1808035	22/11/2018		Extracted result 192) regional dust storm occurred on same day
EN1808192	28/11/2018	9.6		EN1808192	28/11/2018	32	
EN1808406	4/12/2018	15.6	unit ran twice with sample filter papers	EN1808406	4/12/2018	33.2	unit ran twice with sample filter papers
no sample	10/12/2018			no sample	10/12/2018		
EN1808498	16/12/2018		(Extracted result 45.6) regional dust storm occurred on same day	EN1808498	16/12/2018		extracted result 75.9) regional dust storm occurred on same day
EN1900369	22/12/2018	19.1		EN1900369	22/12/2018	53.4	
EN1900369	28/12/2018	9.8		EN1900369	28/12/2018	24	
	Max Result	**23.9**			**Max Result**	53.4	
	Average Result	**8.101960 784**			**Average Result**	18.83922	

Total Insoluble Matter (g/m².month) (DWH26AQ2)						
Total Insoluble Matter (g/m².month)	COA (certificate of analysis)	Month	Sample Period	Result	Change/month	Comments
DWH26AQ2	EN1801599	JAN	5/01/2018 to 06/02/2018	1.2		
DWH26AQ2	EN1801962	FEB	6/02/2018 to 05/03/18	0.8	**0.4**	
DWH26AQ2	EN1802327	MAR	5/03/2018 to 3/04/2018	0.4	**0.4**	
DWH26AQ2	EN1802847	APR	3/04/2018 to 03/05/2018	0.5	**-0.1**	
DWH26AQ2	EN1803499	MAY	3/05/2018 to 4/06/2018	0.5	**0**	
DWH26AQ2	EN1804082	JUN	4/06/2018 to 4/07/2018	0.4	**0.1**	
DWH26AQ2	EN1804846	JUL	4/07/2018 to 1/08/2018	0.7	**-0.3**	
DWH26AQ2	EN1805689	AUG	1/08/2018 to 3/09/2018	2.2	**-1.5**	
DWH26AQ2	EN1806500	SEPT	3/09/2018 to 2/10/2018	1.5	**0.7**	
DWH26AQ2	EN1807485	OCT	2/10/2018 to 01/11/2018	1.3	**0.2**	
DWH26AQ2	EN1808192	NOV	1/11/2018 to 3/12/2018			(extracted result 4) dust storms experienced within the month
DWH26AQ2	EN1900369	DEC	3/12/2018 to 31/12/2018			(extracted result: 3.8) dust storms experienced within the month
			AVERAGE	0.95		
			MAX	2.2	0.7	