

Annual Environmental Performance Report 2020

McArthur Basin 2019-2020 Hydraulic Fracturing Program NT Exploration Permit 161

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Version	Date	Author	Changes made
1	01/04/2021	Mitchell Bird	None

Signature and Certification

I/We hereby declare that the information provided in this annual environment performance report and accompanying documents is to the best of my/our knowledge, true and correct.

Asset/Project Approval


Signature	
Name (print)	Angus McIntyre
Position	Manager – Onshore New Ventures
Date	1 April 2021

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Abbreviations and Units

Acronym / Abbreviation	Description
AEPR	Annual Environmental Performance Report
ALARP	As low as reasonably practicable
Code	Code of Practice
DENR	Department of Environment and Natural Resources
DPIR	Department of Primary Industry and Resources
EMP	Environmental Management Plan
EP	Exploration Permit
NT	Northern Territory
NT EPA	Northern Territory Environmental Protection Authority
SMS	Santos Management System
SSCC	Sacred Site Clearance Certificate

1.0 Introduction

The Petroleum (Environment) Regulations 2016 (NT) include a requirement for the interest holder to provide a report to the Minister on an annual basis that outlines the environmental performance of the interest holder (the Annual Environment Performance Report). The report must include sufficient information to allow the Minister to assess whether the interest holder has met the environmental outcomes and environmental performance standards included in the approved Environment Management Plan (EMP). The report is to consider information required to be recorded, monitored or reported under the Petroleum (Environment) Regulations 2016 (NT) and any other law in force in the Northern Territory related to conduct of the regulated activity.

This Annual Environmental Performance Report (AEPR) applies to the McArthur Basin 2019 - 2020 Hydraulic Fracturing Program EMP that was approved on 23 October 2019. The period covered by this AEPR is from 23 October 2019 – 22 October 2020.

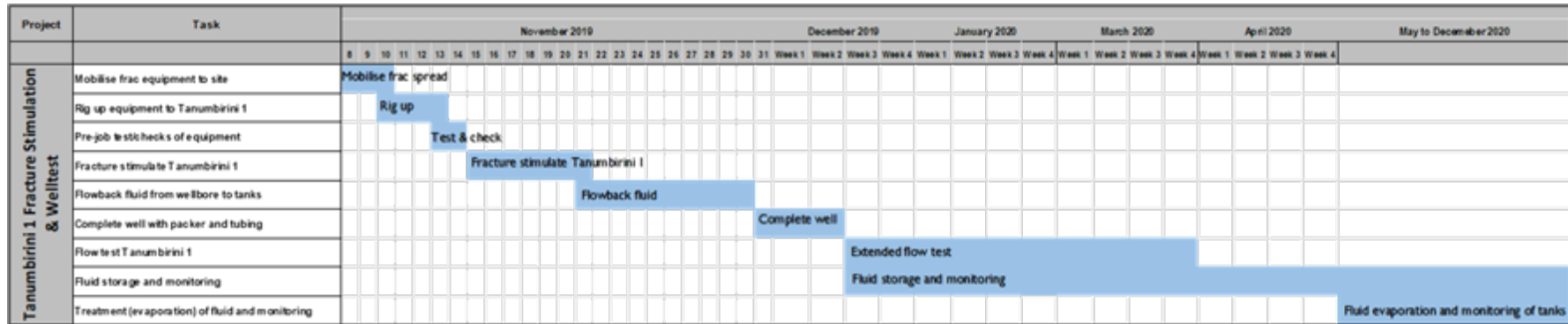


Figure 1 Timing of Regulated Activities Conducted During the Reporting Period

1.1 Background

Santos QNT Pty Ltd (Santos) is the operator of EP 161. Santos submitted the *McArthur Basin 2019 - 2020 Hydraulic Fracturing Program* (EMP 2019) under the *Petroleum (Environment) Regulations (PER)* that came into force 11 June 2019. EMP 2019 was submitted to facilitate a program of hydraulic fracture stimulations and appraisal (production) tests of the Velkerri Formation in the Tanumbirini 1, Tanumbirini 2H and Inacumba 1H wells.

The Drilling and Civil works required to prepare for the Hydraulic Fracturing Program, including the upgrading of access tracks and creation of infrastructure at the leasepad, are covered in separate EMPs which have been approved.

EMP 2018 was approved on 23 October 2019. This AEPR has been prepared to report on activities that have occurred between the 23 October 2019 and 22 October 2020.

1.2 Contents of Performance Report

This AEPR describes the environmental performance of Santos by evaluation of the following:

1. Compliance with Ministerial approval conditions for each EMP.
2. Compliance with each environmental outcome and environmental performance standard within the EMP.
3. Compliance with reporting requirements in accordance with the Code and Regulations.
4. All recordable and reportable incidents, including root cause analysis and related corrective actions to prevent re-occurrence.
5. Findings of all regulatory inspections and audits and related actions to address any findings.

1.3 Assessment of Compliance

Table 1 shows the compliance status indicators used in this AEPR.

Table 1 Compliance Descriptors

Indicator	Description
Compliant	Compliant with requirement for entire 12 month reporting period
Partially Compliant	Compliant with requirement for most of year, short periods of non-compliance
Not Compliant	Interest holder did not comply with the requirement during the reporting period
Not Applicable	Requirement not applicable during the reporting period

1.4 Evidence of Compliance

The following sources of evidence are used to demonstrate compliance:

1. Internal tracking of compliance by Santos through:
 - Internal annual audits of compliance, as follows:
 - i. Daily checklists
 - ii. Water extraction rates reviews.

2. Outcomes from regulatory inspections conducted by the Department of Environment and Natural Resources (DENR), Petroleum Operations.
3. Recordable and reportable incident reports submitted to DENR Petroleum Operations
4. Reports provided to DENR, the Department of Primary Industry and Resources (DPIR) and other government agencies.

2.0 Demonstration of Compliance

Table 2 demonstrates Santos' compliance with Ministerial EMP approval conditions.

Table 2 Compliance with Ministerial EMP Approval Conditions

No	Ministerial Condition	Compliance Status	Evidence
1	The Interest Holder must submit to the Department of Environment and Natural Resources (DENR), an updated timetable for the regulated activity prior to the commencement of the activity and provide an updated timetable to the DENR each month, including progressive rehabilitation works. The timetable must include dates for the implementation of commitments, development of key documents and associated hold points.	Partially Compliant	<p>On 29 January 2020 Santos received a letter from DENR confirming compliance with the condition to provide an updated timetable for the regulated activity prior to the commencement of the activity.</p> <p>Santos has submitted updated monthly timetables since June 2020. However monthly updates were not provided across four of the months in the reporting period when activities were minimal and there were no changes to the schedule previously provided.</p>
2	<p>The Interest Holder must provide to DENR :</p> <p>i. results of ongoing groundwater monitoring in accordance with the Code of Practice: Onshore Petroleum Activities in the Northern Territory (the Code) and the Preliminary Guideline: Groundwater Monitoring Bores for Exploration Petroleum Wells in the Beetaloo Sub-basin every quarter for three years from the approval date of the EMP for publishing on the DENR website, to inform the development of site-specific performance standards for groundwater quality</p> <p>ii. notification of any results above the inter-quartile range of all monitored parameters in groundwater that occur at Inacumba and Tanumbirini well site within five days of receipt of laboratory report analyses.</p>	Compliant	<p>Condition 2. i Quarterly reports were sent to the Onshore Petroleum email address on the following dates:</p> <ul style="list-style-type: none"> • 15 October 2020 • 23 July 2020 • 1 May 2020 • 23 January 2020 • 28 October 2019 <p>Condition 2. ii Trigger reports were sent to the Onshore Petroleum email address on the following dates:</p> <ul style="list-style-type: none"> • 8 October 2020 • 9 June 2020 • 30 March 2020 • 10 March 2020 • 13 February 2020 • 24 January 2020 • 17 January 2020

No	Ministerial Condition	Compliance Status	Evidence
3	<p>The Interest Holder must provide to DENR, within 60 days of flowback commencing, a report on the risk assessment of flowback wastewater from the hydraulic fracturing phase. The risk assessment must be:</p> <ul style="list-style-type: none"> i. prepared by a suitably qualified person ii. prepared in accordance with the monitoring wastewater chemistry analytes specified in Section C.3 of the Code of Practice: Onshore Petroleum Activities in the Northern Territory 	Compliant	<p>On the 23 January 2020, a report, prepared by a suitably qualified person, on the risk assessment of flowback wastewater from the hydraulic fracturing phase was sent to the Onshore Petroleum email address.</p> <p>The assessment concludes that the data demonstrate that the chemistry of the produced water is consistent with the target formation and the chemicals approved for hydraulic fracturing.</p>
4	<p>The Interest Holder must store flowback wastewater from hydraulic fracturing only in enclosed tanks during the wet season until otherwise advised in writing by DENR.</p>	Compliant	<p>On 21 April 2020 Santos were advised in writing that Santos could proceed with transfer of wastewater at the Tanumbirini wellsite on EP161 from the enclosed wastewater storage tank to open evaporation tanks in compliance with the approved EMP wastewater management plan.</p>
5	<p>In addition to the methane leak detection requirements of Section D.5.2 and Table 10 of the Code, the Interest Holder must also undertake leak detection and reporting (LOAR) within seven days of commissioning the well.</p>	Not Applicable	<p>No wells were commissioned during the reporting period</p>
6	<p>In the event of any accidental release (overflow, failure, spill or leak), to ground of flowback water that exceeds 200 litres, the Interest Holder must provide a written report to DENR within 24 hours after the incident was detected⁴. The report must include:</p> <ul style="list-style-type: none"> i. details of the incident specifying material facts, actions taken to avoid or mitigate environmental harm ii. the corrective actions taken including the volume and depth of impacted soil 	Not Applicable	<p>There were no accidental releases (overflow, failure, spill or leak) to ground of flowback water that exceeded 200 litres during the reporting period.</p>

No	Ministerial Condition	Compliance Status	Evidence
	<p>removed for appropriate disposal if required</p> <p>iii. any corrective actions proposed to be taken to prevent recurrence of an incident of a similar nature.</p>		
7	<p>The Interest Holder must provide to DENR a soil contamination assessment report of the tank pad and well pad area that includes a comparison to the baseline soil assessment for all monitoring points and parameters undertaken at each well site. The report must be:</p> <p>i. submitted to DENR within six months of removal of flowback water from the wellsite(s)</p> <p>ii. prepared by a suitably qualified person</p>	Not Applicable	Removal of flowback water from the wellsite is yet to commence.
8	<p>The Interest Holder must provide to DENR a fortnightly updated look- ahead weather forecast for risk of onset of wet weather and high bushfire danger for the duration of the regulated activity.</p>	Compliant	Throughout the reporting period the Bureau of Meteorology were engaged to provide fortnightly updated look-ahead weather forecasts for risk of onset of wet weather and high bushfire danger. These reports are sent directly to the onshore petroleum email address as well as to Santos.

Table 3 provides a systematic overview of Santos' compliance with the environmental outcomes and environmental performance standards within the approved EMP.

Table 3 Compliance with Environmental Outcomes and Environmental Performance Standards

No	Environmental Outcome	Environmental Performance Standard	Compliance Status	Evidence
1	There are no long term impacts on terrestrial flora and fauna as a result of vehicle and plant movements generating dust.	<p>Vehicle speeds do not exceed 60km/hr on unsealed roads.</p> <p>Dust control measures implemented when required due to atmospheric conditions.</p>	Compliant	<p>There were no incidents in the Incident Management System relating to speed limits.</p> <p>Speed limits are documented in the Project Initiation EMP General Rules on the front of the checklist</p> <p>Daily checklist documents use of water trucks to manage dust emissions from vehicle movement and hydraulic fracture activities as appropriate.</p> <p>Civil works daily report shows Contractors were using water trucks to suppress dust during activities.</p>
2	There are no long term impacts on terrestrial flora and fauna as a result of Noise generation and vibration.	<p>Engines/machinery maintained in accordance with manufacturers specifications and frequencies as detailed in the Santos maintenance system.</p> <p>Engines/machinery fitted with noise suppression devices.</p> <p>Wells are located >8km from the Tanumbirini homestead.</p>	Compliant	<p>EMP daily checklist confirms maintenance of engines/machinery and noise suppression devices.</p> <p>Service provider engines/machinery maintenance declarations are captured in the Halliburton Safety Management Plan (CMP-AUST-HAL-HSE-009) with reference to Noise Management standard (ST-GL-HAL-HSE-0301).</p> <p>Activities conducted under this EMP that generate noise (fracture stimulation operations) extended for a period of only seven days. The risk of impact from vehicle and plant movements generating noise and vibration was minimised as the operation was limited to a short period.</p> <p>Review of the Santos WebGIS shows that all wells are located >8km from the Tanumbirini homestead.</p>

No	Environmental Outcome	Environmental Performance Standard	Compliance Status	Evidence
3	There are no long term impacts on terrestrial flora and fauna as a result of light emissions	<p>Task focused lighting employed (only used as required).</p> <p>All camp boundary lighting positioned inwards.</p> <p>Night time operations restricted (e.g. No HFS pumping will occur at night)</p>	Compliant	<p>Civils daily checklist confirms camp boundary lighting positioned inwards.</p> <p>Checklist confirms task focussed lighting was used.</p> <p>Daily report and fracturing report show that no HFS pumping occurred at night.</p>
4	<p>No impacts to fauna as a result of vehicle movements.</p> <p>All ponds will be fenced at all times</p> <p>Fauna escapes provided in open treatment ponds.</p>	<p>No off-road driving.</p> <p>Vehicle speeds do not exceed 60km/hr on unsealed roads.</p> <p>Storage tanks and treatment ponds will be fenced.</p> <p>All open treatment ponds have fauna escapes provided.</p> <p>Driving is only permitted on designated access roads and seismic lines.</p>	Compliant	<p>Site inductions conducted prior to commencing activity. Induction includes information regarding speed limits. Civils EMP daily checklist confirms no off-road driving and adherence to speed limits.</p> <p>There were no incidents in the Incident Management System relating to speed limits or driving off permitted access tracks.</p> <p>Checklist confirms that pits and dams were fenced.</p> <p>Checklist confirms that fauna ladders were installed at all open pits.</p> <p>Entire lease is fences with a cattle grid.</p> <p>Storage tanks are enclosed or have vertical walls >2m.</p>
5	<p>No introduction of new species of weeds or plant pathogens as a result of project activities.</p> <p>No increase in abundance of existing weed species as a result of project activities.</p>	Compliance with DENR approved weed management plan.	Compliant	<p>A project specific weed management plan was developed in consultation with DENRs weed management officer and attached to the EMP (Appendix E).</p> <p>Weed declarations located at the back of the approved plan were signed for all vehicles and a register of weed declarations is kept.</p> <p>Identification of weed infestations was provided in the annual weed monitoring report sent to DENR's weed management officer on 23 July 2020. No weed treatment was undertaken during the reporting period.</p>

No	Environmental Outcome	Environmental Performance Standard	Compliance Status	Evidence
6	No fires as a result of ignition sources from plant and machinery	<p>SDS available and appropriate fire-fighting equipment next to flammable material stores.</p> <p>Vehicles will have portable fire extinguishers and operational VHF or UHF radio transceivers.</p> <p>Petrol motor vehicles and petrol powered pumps will have spark arresters.</p> <p>Staff trained in use of fire-fighting equipment.</p> <p>Fire-fighting equipment available and serviced as per manufacturer's specifications.</p> <p>All staff inducted to this EMP.</p>	Compliant	<p>NT Senior Supervisor - Civil Works appropriately trained in fire-fighting.</p> <p>Records show contractors trained in the use of basic fire management and use of extinguishers.</p> <p>Civils EMP daily checklist confirms firefighting equipment and personnel, petrol vehicles/pumps fitted with spark arrestors and vehicles fitted with VHF and/or UHF.</p> <p>Site inductions conducted prior to commencing activity. SDSs are available on location.</p> <p>The location of fire-fighting equipment is shown on the camp plan and the location of the fire extinguishers is part of the camp induction.</p> <p>Gate 2 check on certification ensures fire-fighting equipment available and serviced as per manufacturer's specifications.</p>
7	No fires as a result of flaring and production testing.	<p>Firebreaks to be implemented around the lease.</p> <p>Flaring to have an appropriate buffer, with proper barriers to prevent access by livestock.</p> <p>Implementation of Fire Management Plan (Section 7.2).</p> <p>Implementation of the Emergency Response Plan.</p>	Compliant	<p>Checklist confirms that firebreaks were implemented around the lease with minimum setbacks to infrastructure based on flaring design and cleared accordingly.</p> <p>Checklist confirms flares were located at least 30m from vegetation to ensure safe operations during fire danger periods.</p> <p>No records of fire incidents in the Santos Incident Management System.</p>

No	Environmental Outcome	Environmental Performance Standard	Compliance Status	Evidence
8	No fauna congregating at waste storage areas.	<p>All waste segregated and stored Appropriately in accordance with this EMP.</p> <p>Routine inspections of waste storage areas to ensure all waste are in the appropriate place.</p> <p>Only waste from approved wastewater systems and grey water disposed of to land.</p> <p>Licenced waste contractor used for any offsite transfer or disposal.</p>	Compliant	<p>Daily civils checklist confirms that waste was segregated and stored on site and all putrescible waste material will be held in fauna proof containers and appropriately stored.</p> <p>Licenced waste transportation was carried out utilising a number of licenced contractors. Licences provided demonstrate wastes to be transported in accordance with the NT Waste Management and Pollution Control Act.</p> <p>Wastewater Works Design Approval (Approval Number: WW2019/124) demonstrates that wastewater systems used under this EMP were approved by Department of Health.</p>
9	No disturbance outside designated areas	No off-road driving.	Compliant	<p>There were no incidents in the Incident Management System relating to speed limits or driving off permitted access tracks.</p> <p>Only designated were used.</p> <p>Major hydraulic fracturing activities conducted under this EMP extended for a total of 14 days (8-11-2019 to 21-11-2019). During that time the camp was located on the well pad to minimise the need for driving.</p>
10	No spills of hazardous substances or fuels.	<p>Secondary spill containment employed for storage of liquid chemicals and hydraulic fluid.</p> <p>Spill kits, spill containment, and appropriate bunding in all relevant areas.</p> <p>All spills and leaks are remediated as soon as possible.</p> <p>Fuel and other lubricants will be appropriately stored and managed, in accordance with industry standards.</p> <p>Compliance with the Spill Management Plan (Appendix H).</p>	Partially Compliant	<p>During fuel transfer in the laydown yard, approximately 90L was released to the hard stand around the Santos fuel skid. A faulty fuel breather valve was identified as the cause.</p> <p>The fuel delivery occurred on the 20 April.</p> <p>The impacted soil from within the hardstand was removed and stored in a covered intermediate bulk container.</p> <p>Soil sampling of the impacted material and validation sampling was undertaken to ensure all impacted material was collected.</p> <p>Impacted material was transported off site by a licenced transporter and will be disposed of at a licenced facility.</p>

No	Environmental Outcome	Environmental Performance Standard	Compliance Status	Evidence
11	No overflowing tanks or treatment ponds.	<p>Daily monitoring of weather and for predicted significant rainfall events will be undertaken.</p> <p>For produced water and flowback fluid treatment processes occurring outside of enclosed tanks, the minimum freeboard requirements detailed in the WWMP (1.5m for the wet season and 0.3m for the dry season) will be maintained in all tanks/ponds that are treating flowback fluid.</p> <p>Hydraulic fracture fluid system mixed into small volumes as needed, contained and monitored in engineered fluid storage tanks.</p> <p>All wastewater will be stored in enclosed tanks.</p> <p>All HFS work/mixing tanks are enclosed.</p> <p>Bunded containment for storage of liquid hydraulic fracturing materials.</p> <p>Implementation of the Wastewater Management Plan (Appendix G).</p> <p>Implementation of the Spill Management Plan (Appendix H).</p>	Compliant	<p>Daily Fluid Management reports include pond levels and EMP checklist including verification of the minimum freeboard of 1.5m has been maintained in all tanks/ponds (except enclosed) that contain flowback fluid during the wet season.</p> <p>Fortnightly forecast provided by the Bureau of Meteorology are sent to Santos and DEPWS's onshore petroleum email address.</p> <p>Site photos and contractor design specifications show all HFS work/mixing tanks are enclosed.</p> <p>Daily checklist demonstrates that liquid hydraulic fracturing chemicals were bunded to provide secondary containment.</p> <p>The Bureau of Meteorology have been engaged to undertake daily monitoring of weather including predicted significant rainfall events. The Bureau of Meteorology will provide notification to Santos of any predicted significant rainfall events.</p> <p>Weather observations are made in the daily report.</p>
12	No long-term impacts to soil quality along transport route	<p>All wastes to be transported in accordance with the NT Waste Management and Pollution Control Act</p> <p>All dangerous goods to be transported in accordance with the NT Dangerous Goods Act and Australian Dangerous Goods Code.</p>	Compliant	<p>Licensed waste transportation was carried out utilising a number of licensed contractors. Licences provided demonstrate wastes to be transported in accordance with the NT Waste Management and Pollution Control Act.</p>

No	Environmental Outcome	Environmental Performance Standard	Compliance Status	Evidence
13	No reduction in groundwater and surface water quality recorded.	<p>A WOMP will be developed to cover well activities. The Project will not commence until a WOMP has been approved.</p> <p>Shallow aquifers are isolated behind cemented concentric casing strings.</p> <p>Cemented casing design criteria utilised following the Code of Practice requirements, will prevent aquifer cross-flow once well is constructed and passes well acceptance criteria.</p>	Compliant	<p>Tanumbirini Control Monitoring Bore was completed in December 2018 and baseline monitoring conducted. Hydraulic fracture operations occurred in November 2019.</p> <p>The WOMP was approved by DPIR on 30 October 2019 prior to hydraulic fracturing commencing on 15 November 2019.</p> <p>Groundwater monitoring conducted in accordance with the <i>Preliminary Guideline: Groundwater Monitoring Bores for Exploration Petroleum Wells in the Beetaloo Sub-Basin</i> as updated from time to time or an alternative process agreed with DENR.</p> <p>Quarterly groundwater monitoring reports were sent to the Onshore Petroleum email address on the following dates:</p> <ul style="list-style-type: none"> • 15 October 2020 • 23 July 2020 • 1 May 2020 • 23 January 2020 • 28 October 2019
		<p>Installation of blow-out prevention equipment systems.</p>	Not Applicable	<p>No further wells constructed and no blow-out prevention equipment required.</p>

No	Environmental Outcome	Environmental Performance Standard	Compliance Status	Evidence
14	The supply and quantity of water in surface water and groundwater features not impacted from project activities.	<p>Daily monitoring of weather and for predicted significant rainfall events will be undertaken.</p> <p>For produced water and flowback fluid treatment processes occurring outside of enclosed tanks, the minimum freeboard requirements detailed in the WWMP (1.5m for the wet season and 0.3m for the dry season) will be maintained in all tanks/ponds that are treating flowback fluid.</p> <p>Spill containment employed for storage of liquid chemicals and hydraulic fluid.</p> <p>Spill kits, spill containment, and appropriate bunding in all relevant areas.</p> <p>All spills and leaks are remediated as soon as possible.</p> <p>Fuel and other lubricants will be appropriately stored and managed, in accordance with industry standards.</p> <p>Compliance with the Spill Management Plan (Appendix H).</p>	Compliant	<p>Daily reports show that the minimum freeboard requirements detailed in the WWMP (1.5m for the wet season and 0.3m for the dry season) were complied with.</p> <p>Fortnightly forecast provided by the Bureau of Meteorology are sent to Santos and DEPWS's onshore petroleum email address. There were no significant rainfall events.</p> <p>Daily checklist confirms in-situ spill kits, spill containment, bunding and appropriate management and storage of fuel and lubricants.</p> <p>Incident Management System demonstrates that no spills infiltrated surface or groundwater features.</p> <p>All recorded spills contained within lease area and reported. Compliant with Spill Management Plan.</p> <p>The Bureau of Meteorology have been engaged to undertake daily monitoring of weather including predicted significant rainfall events. The Bureau of Meteorology will provide notification to Santos of any predicted significant rainfall events.</p> <p>Weather observations are made in the daily report.</p>
15	No long-term impacts to surface and groundwater water quality along transport route.	<p>All wastes to be transported in accordance with the NT Waste Management and Pollution Control Act.</p> <p>All dangerous goods to be transported in accordance with the NT Dangerous Goods Act and Australian Dangerous Goods Code.</p>	Compliant	Licensed waste transportation was carried out utilising a number of licenced contractors. Licences provided demonstrate wastes to be transported in accordance with the NT Waste Management and Pollution Control Act.

No	Environmental Outcome	Environmental Performance Standard	Compliance Status	Evidence
16	No long-term impacts to groundwater resources in the area.	Compliance with groundwater extraction licence approval conditions (i.e. volume limits will not be exceeded).	Compliant	<p>All water extracted from waterbores recorded and cumulative water usage less than water licence GRF10280 entitlement of 193.5ML/yr.</p> <p>Groundwater monitoring conducted in accordance with the <i>Preliminary Guideline: Groundwater Monitoring Bores for Exploration Petroleum Wells in the Beetaloo Sub-Basin</i> as updated from time to time or an alternative process agreed with DENR. Quarterly groundwater monitoring reports were sent to the Onshore Petroleum email address on the following dates:</p> <ul style="list-style-type: none"> • 15 October 2020 • 23 July 2020 • 1 May 2020 • 23 January 2020 • 28 October 2019 <p>A report on Groundwater monitoring results at Santos Tanumbirini and Inacumba well sites in the Beetaloo Sub-basin is provided here: https://denr.nt.gov.au/_data/assets/pdf_file/0006/920841/Santos-GW-Monitoring-report-Dec-18-March-20.pdf</p>
17	No impact to air quality due to increased inefficient vehicle and plant emissions.	<p>Vehicles and fixed plant maintained as per in accordance with manufacturers specifications and frequencies.</p> <p>Vehicles compliant with Northern Territory Motor Vehicle registry regulation and work health and safety regulations.</p>	Compliant	<p>Service provider engines/machinery maintenance declarations are captured in the Halliburton Safety Management Plan (CMP-AUST-HAL-HSE-009) with reference to Noise Management standard (ST-GL-HAL-HSE-0301).</p>

No	Environmental Outcome	Environmental Performance Standard	Compliance Status	Evidence
18	No impact to air quality due flaring and loss of fugitive emissions.	<p>Gas detection monitoring will be conducted during all phases of the hydraulic fracturing operations.</p> <p>All wells will be tested every six months for any leaks</p> <p>Flaring will be used rather than venting</p> <p>The Methane Emissions Management Plan (Appendix J) will be implemented</p>	Compliant	<p>Daily reports from the well test show:</p> <ul style="list-style-type: none"> Gas detection used during hydraulic fracturing and well testing operations. Gas volumes tested via separator recorded and reported daily. Gas rate, temperature and properties recorded at least every 5 minute intervals. Flaring was primary method of safely testing gas rate from Tanumbirini 1, however venting was used for a short period as the well pressure was too low to be safely directed through separator for measurement. Venting only occurred between 15 December 2019 and 28 December 2019. <p>All casing and tubing string pressures recorded during frac, coiled tubing and flowback operations, proving a testing frequency well within 6 months.</p> <p>All equipment e.g. wellhead and separator, were frequently inspected and monitored for leaks as per the Methane Emissions Management Plan.</p>

No	Environmental Outcome	Environmental Performance Standard	Compliance Status	Evidence
19	No public nuisance/visual amenity impacts from dust generated by project activities.	<p>Driving is only permitted on designated access roads</p> <p>Speeds on unsealed roads will be limited to a maximum of 60 km/hr.</p> <p>No dust nuisance to users of adjacent land.</p> <p>Amicable resolution of complaints.</p> <p>No off-road driving.</p> <p>Vehicle speeds do not exceed 60km/hr on unsealed roads.</p>	Compliant	<p>Civil works daily report shows water trucks were used to manage dust emissions from vehicle movement and hydraulic fracture activities as appropriate.</p> <p>Only designated access were used.</p> <p>Stakeholder engagement record shows that there are no complaints regarding injury or death of livestock.</p> <p>There were no incidents in the Incident Management System relating to night driving, speed limits or driving off permitted access tracks.</p> <p>Major hydraulic fracturing activities conducted under this EMP extended for a total of 14 days (8-11-2019 to 21-11-2019) during that time the camp was located on the well pad to minimise the need for driving.</p> <p>No injury or death to livestock reported in the Incident Management System.</p>
20	No noise complaints	<p>Vehicle speeds do not exceed 60km/hr on unsealed roads.</p> <p>Active stakeholder engagement and complaints management.</p> <p>Night time operations restricted (e.g. No HFS pumping will occur at night)</p>	Compliant	<p>There were no incidents in the Incident Management System relating to gates night driving, speed limits or driving off permitted access tracks.</p> <p>Stakeholder engagement record shows that there was active stakeholder engagement and no complaints received.</p> <p>Major hydraulic fracturing activities conducted under this EMP extended for a total of 14 days (8-11-2019 to 21-11-2019) during that time the camp was located on the well pad to minimise the need for driving.</p> <p>Daily hydraulic fracturing reports and frac data show pumping only occurred at night.</p>

No	Environmental Outcome	Environmental Performance Standard	Compliance Status	Evidence
21	<p>No disturbance, injury or death to livestock from vehicle movements</p> <p>No entrapment of livestock in open ponds.</p>	<p>Vehicle speeds do not exceed 60km/hr on unsealed roads.</p> <p>No livestock access to ponds and tanks.</p> <p>Gates left in the condition in which they were found.</p> <p>Routine daily inspection ponds and tanks to ensure no trapped livestock.</p>	Compliant	<p>There were no incidents in the Incident Management System relating to gates, night driving, speed limits or driving off permitted access tracks.</p> <p>Lease is fenced and cattle grids/gate installed at entrance/exit to lease. No injury or death to livestock reported in the Incident Management System.</p> <p>Daily checklist confirms that ponds were inspected.</p> <p>Ponds were managed daily by onsite water storage management team. No reported incidents of livestock accessing ponds. Storage tanks were enclosed or have vertical walls >2m.</p>
22	<p>No complaints from landholders.</p> <p>Amicable resolution of complaints.</p>	<p>Night time operations restricted (e.g. No HFS pumping will occur at night)</p> <p>All gates are left in the condition in which they were found (i.e. open / closed).</p> <p>Damage to station tracks and fences is reported and restored to satisfaction of landowner / managers.</p>	Compliant	<p>Stakeholder engagement record shows that there was active stakeholder engagement and no complaints received.</p> <p>The Incident Management System shows that incidents relating to gates or damage to station tracks were resolved.</p>
23	<p>No public health concerns resulting from ingesting dust.</p>	<p>Water trucks will be used, to manage dust emissions from vehicle movement and hydraulic fracture activities as appropriate.</p> <p>No off-road driving.</p> <p>Vehicle speeds do not exceed 60km/hr on unsealed roads.</p> <p>Dust control measures implemented.</p>	Compliant	<p>Civil works daily report shows water trucks were used to manage dust emissions from vehicle movement and hydraulic fracture activities as appropriate.</p> <p>There were no incidents in the Incident Management System relating to speed limits or driving off permitted access tracks.</p> <p>Only designated access were used.</p>

Table 4 demonstrates Santos' compliance with reporting requirements in the Code of Practice: Onshore Petroleum Activities in the Northern Territory (Code of Practice) and the Petroleum (Environment) Regulations 2016 (NT).

Table 4 Compliance with Mandatory Reporting Requirements

No	Reference	Requirement	Compliance Status	Evidence
1	Code cl A.3.5	Geospatial information depicting areas cleared is to be provided to the Minister.	Not Applicable	Clearing was not part of the scope of this EMP.
2	Code cl A.3.6 (b)	Weed management plan developed as part of the EMP must provide for ongoing weed monitoring.	Compliant	<p>Weed Management plan developed and attached to the EMP was endorsed by DENR (Appendix E of approved EMP) contains monitoring requirements. This plan was complied with during the reporting period.</p> <p>Weed declarations located at the back of the approved plan were signed for all vehicles and a register of weed declarations is kept.</p> <p>Ongoing weed monitoring was conducted and the annual weed monitoring report sent to DENR's weed management officer on 23 July 2020. No weed treatment was undertaken during the reporting period.</p>
3	Code cl A.3.7(a)vi	The fire management plan developed as part of the EMP must provide for annual fire mapping to monitor changes to fire frequency in the relevant areas.	Compliant	<p>Fire management plan, section 7.2 of approved EMP makes provision for this requirement of the code.</p> <p>In accordance with the fire management plan if a fire has occurred in and around the project footprint, Santos in consultation with the landholder and with the landholders approval endeavour to map the extent of the fire and provide that information to DENR.</p> <p>There were no fires in and around the project footprint during the reporting period.</p>
4	Code cl A.3.9(c) Code cl A.3.9(e)	The rehabilitation plan developed as part of the EMP requires progressive rehabilitation of significantly disturbed land which is required to commence no longer than 12 months following the cessation of activities on the land. It also requires regular maintenance and annual monitoring of rehabilitated areas.	Not Applicable	<p>A rehabilitation management pan was included in Section 7.3 of the approved EMP. The rehabilitation management plan section includes:</p> <p>A requirement that progressive rehabilitation of significantly disturbed land which is not required for the ongoing conduct of the petroleum activities or future activities, will commence as soon as practicable, but not longer than 12 months following the cessation of the activity (Section 7.3.2).</p>

				This requirement is yet to be triggered.
5	Code cl B.4.13.2(c)	<p>As a minimum, the following must be recorded and reported for each stage (where a stage in this context means all fluids pumped at a particular depth interval):</p> <ol style="list-style-type: none"> total volume of hydraulic fracturing fluid pumped, quality of water used (tested for analytes in section C.8 of this Code. Analyses do not need to be repeated if the same water source is used for multiple stages) and typical and maximum concentrations of chemicals or other substances used. 	Compliant	<p>Hydraulic fracturing post job reports provide:</p> <ul style="list-style-type: none"> the total volume of hydraulic fracturing fluid pumped. detailed water analysis completed before and after hydraulic fracturing. actual concentrations of chemicals or other substances used
6	Code cl B.4.13.2(k)iv	Where venting is the only technically feasible option for managing produced gas, the technical considerations preventing the use of the recovered gas must be recorded and included in the operator's annual report.	Compliant	<p>Flaring was the primary method of safely disposing of gas produced from the Tanumbirini 1 flow test. Venting was used for a short period when the well pressure was too low to be safely directed through test separator and on to the flare. Venting only occurred between 15 December 2019 and 28 December 2019.</p> <p>On 9 December 2020 DITT approved suspension and extension of EP 161 term two permit year one. The permit year one now ends on 20 December 2021, accordingly the Annual Report required under Section 59 of the Petroleum Act is due for lodgement on 17 January 2022. The technical considerations preventing the use of the recovered gas will be recorded and included in this operator's Annual Report.</p>
7	Code cl B.4.14.2(c)	All new barriers or new well operating envelopes must be verified and clearly documented and reported by submission of an updated well barrier integrity validation (WBIV) report to DPIR.	Not Applicable	Activities conducted during the reporting period did not include new barriers or new well operating envelopes.
8	Code cl B.4.15.2(j)	Complete and accurate records of the entire decommissioning procedure must be kept, with these records submitted as part of the legislative reporting requirements for the decommissioning of petroleum wells.	Not Applicable	No decommissioning activities have been undertaken

9	Code cl B.4.17.2(d)	Any guidelines published by the Northern Territory Government from time to time relating to reporting and data submission, and groundwater monitoring data standards must be followed.	Compliant	Results of ongoing groundwater monitoring in accordance with the Code and the <i>Preliminary Guideline: Groundwater Monitoring Bores for Exploration Petroleum Wells in the Beetaloo Sub-basin</i> were submitted every quarter from the approval date of the EMP and published on the DENR website. This applied for every quarter of this AEPR reporting period.
10	Code cl C.3(e)	The components of the wastewater management framework, include: Monitor, manage and report in accordance with the Wastewater Management Plan and Spill Management Plan.	Compliant	The wastewater management plan, Appendix G and spill management plan Appendix H, of the approved EMP makes provision for this requirement of the code.
11	Code cl C.6.1(d)	Wastewater tracking documentation must be reported to the Minister at least annually in accordance with the framework (Spill Management Plan and Wastewater Management Plan) outlined in the EMP	Not Applicable	Not applicable, no wastewater has been removed from site and therefore no wastewater tracking documentation has been generated.
12	Code cl C.7.1(d)ii	Wastewater Management Plan must include a program for monitoring and reporting against the effectiveness of the measures for the mitigation of interaction with wildlife, stock and human receptors with wastewater.	Compliant	The wastewater management plan, Appendix G of the approved EMP makes provision for this requirement of the code. There have been no interactions between wildlife, stock or humans with wastewater recorded in the IMS.
13	Code cl D.4.3.2(f)	A written report detailing the levels of methane measured, the duration of the unusual readings and the results of the investigation (including remedial actions) must be submitted within one month of the significantly higher-level methane event being detected.	Not Applicable	Not applicable. During hydraulic fracturing and well testing operations the well test crew are required to have gas detectors on them and check readings at specified intervals. If gas is detected during these monitoring operations it will be reported in the daily report and lodged within the Santos Incident Management System. Throughout these monitoring events no significantly higher-level methane event have been detected.
14	Code cl D.5.9.2(c)	Emissions from exploration, well construction (including during flowback) and workovers must be measured and reports submitted.	Not Applicable	No well construction (including during flowback) and workovers is included in the scope of this EMP.
15	Code cl D.5.9.3(a)	Where natural gas is vented or flared at a gas processing or other downstream facility, emissions must be estimated and reported.	Not Applicable	Not applicable, the exploration program approved in this EMP does not include any activities associated with a gas processing or other downstream facility

16	Code cl D.6.1	All mandated government reporting is complied with; and all detectable leaks and emissions are reported on an annual basis.	Compliant	Santos has been reporting under the NGER scheme since its inception in 2008. Scope 1 greenhouse gas emissions for all projects are independently audited each year. As there was no detectable leaks during the activities conducted under this EMP, the reporting under the Code cl D.6.1 is not required for any leaks.
17	Code cl D.6.2(a)	Reports of baseline assessments must be submitted at the conclusion of each field campaign.	Compliant	Baseline assessment reports have been submitted in the form of groundwater monitoring reports, ecological assessment reports and weed management plans appended to the approved EMP.
18	Code cl D.6.2(b)	Emissions reporting must be in accordance with Section D.5.6. Emissions associated with venting and flaring as described in Section D.5.9 must be provided separately to the Northern Territory Government in accordance with this Code.	Compliant	Santos has been reporting under the NGER scheme since its inception in 2008. Scope 1 greenhouse gas emissions for all projects are independently audited each year.
19	Reg 14	A current EMP remains in force until the interest holder notifies the Minister the activity is no longer being carried out and all of the environmental outcomes and obligations under the plan have been met, and the Minister advises the interest holder the notice is accepted and the plan ceases to be in force.	Compliant	The current EMP remains in force.
20	EMP s 9.4 Ongoing Consultation Schedule 1, item 9(2)	Interest holders are required to conduct future engagement with stakeholders, in accordance with the description in the EMP.	Compliant	Stakeholder engagement logs indicate that engagement with stakeholders has been undertaken.
21	EMP Section 8.6 Incident Reporting Reg 33	DENR is notified of reportable incidents within 2 hours of the interest holder becoming aware of the incident, or within 2 hours of the incident occurring. A written report must be provided within 24 hours if the initial report was made orally.	Not Applicable	There were no reportable incidents during this period.

22	EMP Section 8.6 Incident Reporting Reg 34	Reports on reportable incidents are to be provided to DENR as soon as practicable and within 72 hours of the event occurring. A final report must be provided to DENR within 30 days after remediation/cleanup of the affected area.	Not Applicable	There were no reportable incidents during this period.
23	EMP Section 8.6 Incident Reporting Reg 35	A written report of all recordable incidents must be provided to DENR not later than 15 days after the 90 day reporting period (unless otherwise agreed).	Partially Compliant	Reports on all recordable incidents were provided: <ul style="list-style-type: none"> • 1st report provided 10 February 2020, 6 days late • 2nd report provided 5 May 2020, met timeframes • 3rd report provided 3 August 2020, met timeframes • 4th report provided 21 October 2020, met timeframes
24	Reg 37A	A report about flowback fluid from hydraulic fracturing must be provided to the Minister within 6 months of the flowback occurring.	Partially Compliant	On 29 May 2020, Santos submitted the EP161 Santos Flowback Fluid report to the Department. Flowback from the Tanumbirini-1 well commenced on 25 November 2019 and the report was due 25 May 2020.
25	Reg 37B	A report about produced water from hydraulic fracturing must be provided to the Minister within 6 months of the produced water being extracted.	Not Applicable	No produced has been extracted to date. All fluid recovered to date is considered to be hydraulic fracturing flowback fluid.
26	Schedule 1, item 12	Interest holder must notify the Minister, occupier of the land and owner of the land on which the activity is to be carried out before commencement of activity.	Compliant	<ul style="list-style-type: none"> • EMP approved on 23 October 2019. • DIPR notified of Tanumbirini 1 frac program on 31 October 2019 via email and DIPR approved Tanumbirini 1 Fracture Stimulation Program on 4 November 2019. • Works commenced on 10 November 2019. • LAA in place with landholder to allow hydraulic fracturing activities and notification of anticipated start to activities sent to landholder on 25 October 2019. • Occupier of land – Notice Of Entry (No 1133) for Hydraulic Fracturing Activities activity on date 25 October 2019, via email.
	EMP Section 8.9.1	Weed Monitoring: Annual survey to coincide with the end of the wet season	Compliant	The weed survey was undertaken on 16th – 17th June 2020 by two EcOz Environmental Consultants with experience surveying for weeds in the NT. Identification of weed infestations was provided in the annual weed monitoring report sent to DENR's weed management officer on 23 July 2020. No weed treatment was undertaken during the reporting period.

EMP Section 8.9.1	Groundwater Monitoring: Ongoing in accordance with the groundwater monitoring plan	Compliant	Quarterly laboratory reporting to DENR for publication on DENR website.
EMP Section 8.9.1	Weather Monitoring: Fortnightly forecast provided by the Bureau of Meteorology	Compliant	Fortnightly forecast provided by the Bureau of Meteorology are sent to Santos and DEPWS's onshore petroleum email address.
EMP Section 8.9.1	Wastewater Storage Tank Monitoring: Ongoing in accordance with the WWMP	Compliant	Volume of tanks reported daily in the daily report
EMP Section 8.9.1	Flowback Monitoring: Ongoing in accordance with the WWMP	Compliant	Flowback volumes reported daily in the daily report when flowback was occurring
EMP Section 8.9.1	Rehabilitation Monitoring Photo points established to monitor rehab	Not Applicable	Rehabilitation monitoring to be conducted at the cessation of activities.

3.0 Summary of Compliance

3.1 Overview of Compliance

Table 5 provides a summary of the results of the compliance assessment against the 64 total compliance items.

Table 5: Compliance Summary

Compliance Indicator	Number	Percentage
Compliant	44	68.75
Partially Compliant	4	6.25
Not Compliant	0	0
Not Applicable	16	25

3.2 Overview of Items Found Not Compliant or Partially Compliant

The following sections describe:

- the specific compliance requirements not met for the reporting period
- an analysis of the possible potential environmental harm or impact to environmental values resulting from non-compliance or partial compliance, using multiple lines of evidence
- a summary of the corrective actions already implemented, and further actions still required, as applicable, to ensure compliance is fully achieved in the future.

3.2.1 Ministerial EMP Approval Conditions

3.2.1.1 Description

Monthly updates were not provided as required across four of the months in the reporting period when activities were minimal and there were no changes to the schedule previously provided.

3.2.1.2 Analysis of Potential Environmental Harm or Impact

There was no potential for environmental harm or impact.

3.2.1.3 Corrective Actions

An updated monthly schedule process has been implemented and a monthly schedule is delivered to the department email address following a monthly scheduling meeting.

3.2.2 Environmental Performance Standards

3.2.2.1 Description

During fuel transfer in the laydown yard approximately 90L was released to the hard stand around the Santos fuel skid. A faulty fuel breather valve was identified as the cause.

3.2.2.2 Analysis of Potential Environmental Harm or Impact

There was no environmental harm and potential harm was minimal give the location of the spill and volume. Soil sampling of the impacted material and validation sampling was undertaken to ensure all impacted material was collected.

3.2.2.3 Corrective Actions

The impacted soil from within the hardstand has been removed and stored in a covered intermediate bulk container. The impacted material was transported by a licenced transporter and will be disposed of at a licenced facility.

Replacement vent parts have now been ordered and will be installed. Inspections of all other fuel breather valves has been conducted.

A weekly inspection checklist specific for this tank has been developed and will be completed during other inspections. Incident alert has been distributed through Santos' NT project team and Contractor responsible for refuelling.

3.2.3 Regulatory Reporting

3.2.3.1 Description

Recordable Incidents Summary Reports were not lodged within 15 days of the reporting period.

3.2.3.2 Analysis of Potential Environmental Harm or Impact

There was no potential for environmental harm or impact.

3.2.3.3 Corrective Actions

Santos will submit recordable incident reports for this EMP at 90 day intervals as required. The requirements to submit these recordable incident reports for this EMP has been added to Santos' compliance tracking system. No recordable incident reports for this EMP or any other EMPs have been late in 2020.

3.2.3.4 Description

On 29 May 2020, Santos submitted the EP161 Santos Flowback Fluid report to the Department. Flowback from the Tanumbirini-1 well commenced on 25 November 2019 and the report was due 25 May 2020.

3.2.3.5 Analysis of Potential Environmental Harm or Impact

There was no potential for environmental harm or impact.

3.2.3.6 Corrective Actions

This was impacted by working from home arrangements and communications in response to Covid-19. The requirements to submit this flowback fluid report and subsequent reports for this EMP have been added to Santos' compliance tracking system.

3.3 Application of Lessons Learned Across Santos' Onshore Interests

Daily EMP checklist was very useful to check compliance with the EMP during activities on site and to provide evidence of compliance for this AEPR. Santos will continue with this approach.

The project's central document storage could be better set up at the beginning of the project to allow us to easily locate documents that provide evidence of compliance. This has improved as the project as a whole has become more mature.

Santos will submit recordable incident reports for this EMP at 90 day intervals as required. The requirements to submit these recordable incident reports for this EMP has been added to Santos' compliance tracking system.