Resources Regulator

Department of Primary Industries and Regional Development

APO0002071

Approval to undertake assessable prospecting operations

Kahlua Pilot

1 December 2025

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Application summary

Detail	Application
Reference	APO0002071
Date of approval	1 December 2025
Title	PEL 1 (1991)
Applicant	Santos Qnt PTY.LTD.
Project name	Kahlua Pilot
Project location	Lot 6 DP586978
Activity type	Non-complying exploration activity

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Project

Project details

Assessable prospecting activity APO0002071 relates to the Kahlua Pilot at Lot 6 DP586978.

The project has the following approved characteristics.

Detail	Proposal
Activity description	Santos is proposing minimal additional infrastructure to support the continued operation of the Kahlua Pilot (the Proposed Activity). The Kahlua Pilot (Existing Project) currently includes existing coal seam gas (CSG) exploration infrastructure, including four exploration wells, buried gas and water flowlines and power cables, access tracks, water storage, diesel storage and gas flaring infrastructure. On 15 March 2023, Santos received Activity Approval (MAAG0015433/LETT0007997) to reactivate the Kahlua Pilot and to conduct ancillary activities to continue the Kahlua Pilot until 31 December 2025. The civil construction works commenced in late 2023 and dewatering of the pilot wells commenced in February 2024. Gas has not been produced on a consistent basis as of the time of this application. As such, the Proposed Activity is required to continue the exploration and appraisal activities. All works associated with the Proposed Activity will be contained within the Existing Disturbance Footprint of the Existing Project. The Proposed Activity includes: • Operation of the four exploration wells and gas flaring infrastructure will continue to be conducted until whichever is the sooner of: ▯ A further two years until 31 December 2027. ▯ The point in time at which the cumulative produced water extraction volume of 18ML (being the volume assessed by the Existing Activity Approval and calculated from the date of that approval being 15 March 2023) is reached. • Ongoing exploration and appraisal activities until 31 December 2027 including: ▯ Operation of the buried gas and water flowlines and power cables, access tracks, water storage and diesel storage. ▯ Maintenance and well workover activities. ▯ Possible construction and operation of a small solar array, two batteries and inverters, within the Existing Disturbance Footprint to offer an alternative power supply option to diesel power. Note: Relevant Terms are defined in the REF.
Earthworks or vegetation clearing	No vegetation clearing is required for the Proposed Activity. Construction activities would be limited to minor works within the Existing Disturbance Footprint required for the installation of the solar array, including: • Site establishment, including minor earthworks for site levelling and preparation. • Installation of the solar array, including a base pad and the layout of solar panels over an area of approximately 90 m by 50 m, batteries and inverters, subject to business

Detail	Proposal
	requirements and final design. • Electrical connections installed to the existing power supply cables, including underground trenched electrical cable from the solar array system to the existing electrical switchboard. • The solar array itself will be largely prefabricated and installed by a licensed industry professional. • Minor earthworks may be required to level and prepare the site (within the Existing Disturbance Footprint) for the use of plant and equipment in the construction activities.
Access to exploration activities	The construction workforce will access the Proposed Activity via the existing road network and the existing access tracks. Movements of plant and equipment and vehicles will be conducted in a safe and coordinated manner as set out in the existing Landholder Access Agreements.
Ancillary activities	All activities, existing and proposed, are for the sole purpose of undertaking prospecting under the Petroleum (Onshore) Act 1991. The Proposed Activity includes continuation of activities to explore and appraise the CSG resource potential within PEL1, utilising existing CSG infrastructure and equipment, and to construct and operate a solar array. Workover activities were approved as 'construction activities' and are considered as 'operational activities' for this application.
Anticipated start date	1 January 2026
Expected duration (weeks)	A further two years until 31 December 2027 (104 weeks) as described in the Activity description/exploration methods section above.
Expected rehabilitation completion date	31 December 2032
Proposed hours of operation	Other Operating hours will be consistent with the Existing Project in accordance with Environment Protection Licence 20351, with well operations occurring 24hr/day.
On-site employee or contractor numbers	8

Exempted areas

The Kahlua Pilot has not proposed prospecting in an exempted area.

State conservation areas

The Kahlua Pilot has not proposed prospecting in a State Conservation Area.

Site description and existing environment

The project comprises the following existing land uses:

The Proposed Activity is located entirely within the Existing Disturbance Footprint.
The Existing Disturbance Footprint contains existing CSG exploration infrastructure including four exploration wells (K2, K3, K4 and K5), access tracks between the wells, water storage, diesel storage and gas flaring infrastructure located at well K2.
The Study Area encompasses the local environment, including areas within and surrounding the Existing Disturbance Footprint.
The Study Area is predominantly cleared and used for agriculture and related activities with isolated patches of native vegetation.
It should be noted that the Study Area is partially mapped as Biophysical Strategic Agricultural Land (BSAL) under the Resources and Energy SEPP.
However, the Existing Disturbance Footprint is not within, or in close proximity to, any other sensitive land as defined in Appendix 2 of the Exploration Guideline: Application and Assessment Process for Exploration Activities (NSW Resources Regulator, 2023).

The project is located near the following sensitive receptors:

The Study Area is located in a relatively remote setting, in a largely rural and agricultural region.
There are relatively few sensitive receptors surrounding the Study Area. Figure 1.4 depicts the Proposed Activity and surrounding receivers.
The nearest receptors, not leased by Santos, are approximately 1 to 2 km away to the west, south-west and south-east.
It is noted that the homestead located approximately 1.1 km north of the Study Area is leased by Santos and is therefore not considered a sensitive receptor.

The project is located with the following soil types and properties:

Regional soil mapping includes a mosaic of vertosols, ferrosols and chromosols relevant to the Proposed Activity — with primarily vertosols mapped within the Existing Disturbance Footprint itself. There are no known instances of problematic soil properties such as salinity or potential acid sulphate soils at the Existing Project site. Given the site is relatively flat, and the soils are not mapped as dispersive, and are therefore not prone to erosion, it is considered that erosion and sedimentation would be readily controlled by standard measures.
It should be noted that the Study Area is partially mapped as Biophysical Strategic Agricultural Land (BSAL) under the Resources and Energy SEPP. Due to the broad scale of BSAL mapping, there may be circumstances where it does not accurately reflect its presence or absence at the given location.
Regardless of the extent of BSAL, land and soil capability mapping of NSW classifies the Study Area as being class 3 land, defined within the assessment scheme (NSW Government 2012) as ‘High capability land.’

The Study Area is not within, or in close proximity to, any other sensitive land as defined in Appendix 2 of the Exploration Guideline: Application and Assessment Process for Exploration Activities (NSW Resources Regulator, 2023).
Additionally, there are no known instances of problematic soil properties such as salinity or potential acid sulfate soils in the Study Area.

The project has the following existing surface water sources in the area that are likely to be affected by the activity:

There are no mapped minor or major watercourses within the Study Area.
The nearest minor watercourses are Quia Creek about 8 km to the west and Collygra Creek about 3 km to the east.
The nearest major watercourse is the Namoi River about 20 km to the north-east.
Some minor ephemeral drainage lines connecting a series of farm dams are situated about 100 m south-west and 250 m northeast of the Study Area.

The project has the following existing groundwater sources that occur in the area that are likely to be affected by the activity:

A specialist groundwater conceptual model was completed for the Existing Project.
The potential aquifer units identified in the conceptual model were as follows:
a) Quaternary alluvium (Narrabri Formation and Gunnedah Formation)
b) Sandstone units (Napperby Formation and Digby Formation).
With regard to the quaternary alluvium, these aquifer units were not considered present at the Study Area, but about 4 km to the west and more than 130 m above the target Hoskissons Coal Measure within the Black Jack Group.
With regard to the Sandstone units, the main potential aquifer unit identified was the Ulinda Sandstone, which was considered to be present at the Study Area and about 110 to 120 m above the target Hoskissons Coal Measure.
A review of potential groundwater-surface water interactions identified that regional waterways, including Mooki River and Coxs Creek, were likely to be connected to alluvial aquifers however groundwater is generally significantly deeper than the beds of the waterways particularly in reaches where groundwater extraction was occurring.
Modelling results indicate that the potential impacts from the proposed activity would comply with the minimal impact considerations of the Aquifer Interference Policy (DPIE 2012).
Whilst minor drawdown (0.1 to 0.5 metres) is predicted in the Hoskissions coal seam underneath the Cox's creek alluvial area, which forms part of the Namoi Alluvium Groundwater Source (Zone 2), the seam is present at around 500 metres below ground surface at this location. Accordingly, no impact (i.e zero drawdown) is predicted on groundwater levels in the surficial alluvium.

The project is in an area with the following topography, vegetation cover type, density

and condition:

The Study Area is relatively flat with elevations above sea level ranging between about 307 m Australian Height Datum (AHD) in the north-west to 323 m AHD in the south-east, with an average gradient of about one degree.
The Study Area is predominantly cleared for agriculture and related activities with isolated patches of native vegetation.
The area next to the existing disturbance has limited native vegetation, mostly re-established exotic shrubs and grasses, with occasional natives.
Invasive weeds also exist as a biosecurity threat to biodiversity in the Study Area and surrounds.
Overall, the Study Area is considered to be of limited habitat value due to historical uses and disturbance.

The project will impact the following matters of national environmental significance:

The Proposed Activity is located entirely within the Existing Disturbance Footprint, as such no impacts to Matters of National Environmental Significance (MNES) are anticipated to occur from the Proposed Activity.
The Kahlua pilot project has been assessed against the relevant NSW state and Australia federal groundwater impact assessment criteria. This has included relevant, and recently issued, water sharing plan rules for the
MDB porous rock groundwater source (Gunnedah Oxley Basin) and the Namoi Alluvial groundwater source (Zone 2), the NSW AIP minimal impact considerations and the EPBC Act water trigger criteria.
Consistent with the temporary nature and depth of the extraction and the relatively minor volumes to be extracted, impacts are expected to be negligible and unlikely to result in a reduction in the current and future utility of affected aquifers.
As such, the impacts are not considered to represent a ‘significant impact’, and therefore do not require referral under the EPBC Act water trigger.

The project is in an area with the following threatened species, ecological communities (or habitats):

No disturbance will occur outside the Existing Disturbance Footprint.
As such, there is no impact to threatened species, ecological communities or habitats, anticipated from the Proposed Activity.
A specialist biodiversity assessment was completed for the Existing Project (GHD, 2022). Updated threatened species database searches are included as an attachment to the application.
A specialist biodiversity assessment was completed for the Existing Project (GHD, 2022). Updated threatened species database searches are included as an attachment to the application.

The Study Area contains scattered paddock trees including White Box, Bimble Box and White Cypress Pine.
The Study Area is considered to be of limited habitat value due to historical uses, with a low diversity of fauna recorded during field surveys conducted in 2020.
Two threatened fauna species were identified in the Study Area, these being the Koala and Grey-crowned Babbler.
No threatened flora species were identified during the field survey but have historically been found in the locality.

The project is in an area with the following historic cultural or natural heritage items:

A search of the State Heritage Inventory Map was completed and is included as an attachment to the application. No heritage relevant to the Proposed Activity was identified.
The Proposed Activity will be occurring within the confines of the Existing Disturbance Footprint and will have no impact on historic cultural or natural heritage.

The project is in an area with the following critical habitat/area of outstanding biodiversity value:

A specialist biodiversity assessment (GHD, 2022) was completed for the Existing Project. Searches of relevant databases relating to outstanding biodiversity value are included as an attachment to the application. No areas were identified relevant to the Proposed Activity.
No disturbance will occur outside the Existing Disturbance Footprint.
As such, there is no impact to biodiversity values anticipated from the Proposed Activity.
No threatened flora species have been recorded in the Study Area.
There are several individual hollow-bearing trees within the Study Area, as well as individual Koala feed tree species and paddock trees that provide important refuge and foraging habitat in the disturbed and over-cleared landscape in which the Proposed Activity will take place.
Koala feed trees and hollow-bearing trees will not be impacted by the Proposed Activity.

The project is located in an area with the following location, type and distance to the nearest Aboriginal heritage sites:

A specialist Aboriginal Heritage Due Diligence Assessment (AHDDA) was completed for the Existing Project (OzArk, 2022).
The AHDDA did not identify any Aboriginal heritage items within the Existing Project area.
An updated search of the Aboriginal Heritage Impact Management System (AHIMS) database is included as an attachment to the application. No heritage relevant to the Proposed Activity was identified.
The Proposed Activity will be occurring within the Existing Disturbance Footprint and will have no new impact on Aboriginal or Non-Aboriginal cultural heritage.

The AHDDA found six items of aboriginal heritage within the Existing Project area. These items included five modified trees and one grass tree (which could not be located). Further, it is noted that the Proposed Activity is not:

- Located within 200 metres of waters.
- Located within sand dune system.
- Located on a ridge top, ridge line or headland.
- Located within 200 metres below or above a cliff face.
- Within 20 metres of or in a cave, rock shelter, or a cave mouth and is on land that is not disturbed land.

Exploration activities

The following exploration activities have been approved.

Drill holes

Id/ Regulator no.	Type	Surface disturbance (m^2)	Veg. Clearing (m^2)	Excavations (m^3)	Produced water (ml)	Depth (m)	Block number	Unit letters
K3 EDH0022254	DDH drill hole	0	0	0	2.25	0	2521	armi
K2 EDH0022253	DDH drill hole	0	0	0	2.25	0	2521	armi
K4 EDH0022255	DDH drill hole	0	0	0	2.25	0	2521	armi
K5 EDH0022256	DDH drill hole	0	0	0	2.25	0	2521	armi

Other exploration activities

There are no other exploration activities for this application.

Impact management

The project includes the following measures to manage surface water impacts:

Mitigation measures will be implemented to minimise potential impacts to surface water, including:
• Suitable erosion and sediment controls in place.
• Vehicles and machinery properly maintained and routinely inspected to minimise the risk of fuel/oil leaks.
• Spill kits appropriate to products used in the machinery and vehicles available.
• Spills of fuel, oil, chemicals, or the like would be cleaned immediately, and the environmental manager notified of the location of the incident, extent of the incident and type of material spilled.
• Light vehicles refuelled off-site, outside of the Study Area.

The project includes the following measures to manage groundwater impacts:

Impacts on groundwater level are predicted to be minimal due to the relatively minor volumes of water extracted (18 ML over the life of the Proposed Activity). The mitigation measures relevant to surface water are also considered relevant to preventing potential impacts to groundwater.
The following actions are proposed, consistent with relevant management plans:
• Specific actions, including notification to DCCEEW Water Group within seven days, if the groundwater take limit trigger of 4.5 ML per 6-month period has or will be exceeded.
• Daily monitoring of extraction rates (in pumping wells) in the pilot wells.
• Continuous monitoring of formation pore pressure and groundwater levels from the shallow aquifer monitoring bores (SAMBs).
• Collation and review of groundwater level data from all available NSW state monitoring points within 10km of the Proposed Activity every 12 months and at completion.
• Reporting of results of review findings to NSW Office of Water as required.

The project includes the following measures to manage waste and excess materials:

Anticipated waste types and quantities are summarised below:
Civil and construction
• General construction waste: 10m3
• Sewage and greywater: 50m3
• General solid waste: 10m3
Workovers and completions
• General construction water: 10m3
• Wellbore solids: 50m3
• Workover fluid: 70m3 / well for each rig activity
Appraisal activities

• Produced water: 25m3/day

Any waste generated will be stored, maintained and disposed in accordance with the industry standards.
Mitigation measures will be implemented to minimise potential impacts, including:
• All waste generated by the Proposed Activity must be classified in accordance with the Waste Classification Guidelines (EPA 2014) and in line with all relevant Australian standards including AS1940:2017.
• General construction waste and other general solid waste stored on site must be held in suitable containers and regularly collected for disposal.
• Produced water would be stored separately and in accordance with relevant Australian standards.

The project includes the following measures regarding the handling, use, storage and transportation of any chemicals and hydrocarbons:

The Proposed Activity includes the option for installation of a solar array and associated batteries. This infrastructure will be owned by a third party who will be responsible for the maintenance and disposal.
Workovers and completions are expected to generate around 70 m3 of waste fluid / well for each rig activity.
The site contains existing CSG exploration infrastructure with the potential to contain hazardous materials including natural gas that may have accumulated in the existing gas wells, and potentially, residual drill cuttings, drilling fluids and/or other chemicals remaining on site from prior activities. The drilling fluids utilised are inert and low toxicity substances composed primarily of water (70-80%) with most of the remainder being weighting agents, typically bentonite clay, and some minor additives including biocide to prevent the accumulation of bacteria.
Chemicals and hydrocarbons will be handled, stored and transported as in the REF.

The project includes the following measures of how noise impacts will be managed to minimise impacts on nearby sensitive receptors:

No construction noise impacts above the limits prescribed by EPL 20351 are predicted.
Noise impacts for continued operational appraisal activities were modelled and assessed and are within acceptable noise limits.
Predicted noise levels at the identified sensitive receivers during operation will remain consistent with those provided for in the Existing Project.
The option to install a solar array and possible reduction in the use of the diesel generator, may reduce noise levels.
Noise predictions indicated that noise levels from periodic well workover activities will exceed the noise limits outside standard construction hours in the day, evening and night

period during noise enhancing meteorological conditions at two sensitive receptors (R1 and R2 refer Figure 1.4).
Noise levels associated with well workovers for the Proposed Activity will be consistent with levels for the Existing Project.
Mitigation measures will be implemented as described in the REF.

The project includes the following measures to manage air quality impacts:

The Proposed Activity will have very limited potential to generate air emissions which would have a substantiative impact on any economic, health, ecosystem or amenity considerations nor impact the identified sensitive receivers.
The potential impact on the surrounding receivers is considered to be negligible with the implementation of mitigation measures.
The following mitigation measures will be implemented to minimise potential impacts on air quality, including:
• Carry out water-based dust suppression as required.
• Implement on site speed limits to minimise dust generation.
• Water, cover or otherwise stabilise stockpiled excavated material.
• Maintenance of plant and equipment.
• Turn off plant and equipment when not in use.

Sensitivity of the land to be disturbed

Question	Yes/no
Conservation areas	
Land reserved under the *National Parks and Wildlife Act 1974*?	No
Land acquired by the Minister under Part 11 of the *National Parks and Wildlife Act 1974*??	No
Land subject to a "conservation agreement" under the *National Parks and Wildlife Act 1974* and/or *the Biodiversity Conservation Act 2016*?	No
Land declared as an aquatic reserve under the *Marine Estate Management Act 2014*?	No
Land declared as a marine park under the *Marine Estate Management Act 2014*?	No
Land within State Forests set aside under the *Forestry Act 2012* for conservation values, including Flora Reserves or Special Management (and other) Zones?	No
Land reserved or dedicated under the *Crown Lands Act 1989/Crown Lands Management Act 2016* (as applicable) for the preservation of flora, fauna, geological formations or other environmental protection purposes?	No
Land identified as wilderness or declared a wilderness area under the *Wilderness Act 1987*?	No
Land subject to a Biobanking agreement (established under the now repealed Threatened Species Conservation Act 1995) or a Biodiversity Stewardship agreement established under the Biodiversity	No

Question	Yes/no
Conservation Act 2016?	
Land subject to a Wildlife Refuge agreement under the *Biodiversity Conservation Act 2016*?	No
Land subject to existing conservation agreements on private land under repealed legislation that continue to have effect (e.g., trust agreements under Native Conservation Trust Act 2001, Property vegetation plans under Native Vegetation Act 2003, Registered property agreements under Native Vegetation Conservation Act 1997)?	No
Drinking water catchment protection areas	
Land declared to be a "controlled area" or a "special area" under the *Water NSW Act 2014*?	No
Land declared to be a "special area" under the *Water Management Act 2000* or *Hunter Water Act 1991*?	No
Sensitive areas	
Land declared as area of outstanding biodiversity value under the *Biodiversity Conservation Act 2016* or critical habitat under Part 7A of the *Fisheries Management Act 1994*?	No
Wetlands of international significance listed under the Ramsar Wetlands Convention?	No
Land designated as a nationally important wetland in the Directory of Important Wetlands?	No
Coastal wetlands mapped under State Environmental Planning Policy (Resilience and Hazards) 2021?	No
Littoral rainforests mapped under State Environmental Planning Policy (Resilience and Hazards) 2021?	No
Coastal zone as defined in the *Coastal Management Act 2016*?	No
Land identified in an environmental planning instrument as being of biodiversity/conservation significance or zoned for environmental conservation, protection and/or management?	No
Waterfront land defined under the *Water Management Act 2000*?	No
Land with a slope greater than 18 degrees measured from the horizontal?	No
Land with potential for soil and water contamination	
Land mapped as Actual Acid Sulfate Soils (AASS) or Potential Acid Sulfate Soils (PASS) on the Acid Sulfate Soils Risk Maps for NSW?	No
Aboriginal protection areas	
Land identified in an environmental planning instrument (such as a State Environmental Planning Policy or Local Environment Plan) as being of Aboriginal cultural significance?	No
Land declared as an Aboriginal place under the *National Parks and Wildlife Act 1974*?	No
Historic or natural heritage protection areas	
Land listed on the World Heritage List, National Heritage List or Commonwealth Heritage List?	No
Land, places, buildings or structures listed on the NSW State Heritage Register?	No

Question	Yes/no
Land identified in an environmental planning instrument (such as a State Environmental Planning Policy or Local Environment Plan) as being of heritage significance or a heritage conservation area?	No
Critical industry clusters	
Land identified as Critical Industry Cluster under State Environmental Planning Policy (Resources and Energy) 2021?	No
Community land	
Public land classified as community land under the *Local Government Act 1993*?	No
Other areas	
Land identified on the authority (e.g., exploration licence or assessment lease) as environmentally sensitive land?	No
Ecology	
Will the activity have a significant effect on threatened species or their habitats?	No
Will the activity have a significant effect on threatened ecological communities or their habitats?	No
Will vegetation be removed as part of access track upgrade works in waterfront land?	No
Aboriginal and European heritage	
Will the activity harm Aboriginal objects as defined under the *National Parks and Wildlife Act 1974*?	No
Will the activity damage any listed heritage items?	No

Attachment 1 – Statement of commitments

Item	Commitment
Activity type	Exploration activity comprising: • 4 diamond drill holes
Activity location	Lot 6 DP586978, within PEL 1 (1991).
Activity scope (including any ancillary activities)	Santos is proposing minimal additional infrastructure to support the continued operation of the Kahlua Pilot (the Proposed Activity). The Kahlua Pilot (Existing Project) currently includes existing coal seam gas (CSG) exploration infrastructure, including four exploration wells, buried gas and water flowlines and power cables, access tracks, water storage, diesel storage and gas flaring infrastructure. On 15 March 2023, Santos received Activity Approval (MAAG0015433/LETT0007997) to reactivate the Kahlua Pilot and to conduct ancillary activities to continue the Kahlua Pilot until 31 December 2025. The civil construction works commenced in late 2023 and dewatering of the pilot wells commenced in February 2024. Gas has not been produced on a consistent basis as of the time of this application. As such, the Proposed Activity is required to continue the exploration and appraisal activities. All works associated with the Proposed Activity will be contained within the Existing Disturbance Footprint of the Existing Project. The Proposed Activity includes: • Operation of the four exploration wells and gas flaring infrastructure will continue to be conducted until whichever is the sooner of: ▯ A further two years until 31 December 2027. ▯ The point in time at which the cumulative produced water extraction volume of 18ML (being the volume assessed by the Existing Activity Approval and calculated from the date of that approval being 15 March 2023) is reached. • Ongoing exploration and appraisal activities until 31 December 2027 including: ▯ Operation of the buried gas and water flowlines and power cables, access tracks, water storage and diesel storage. ▯ Maintenance and well workover activities. ▯ Possible construction and operation of a small solar array, two batteries and inverters, within the Existing Disturbance Footprint to offer an alternative power supply option to diesel power. Note: Relevant Terms are defined in the REF. All activities, existing and proposed, are for the sole purpose of undertaking prospecting under the Petroleum (Onshore) Act 1991. The Proposed Activity includes continuation of activities to explore and appraise the CSG resource potential within PEL1, utilising existing CSG infrastructure and equipment, and to construct and operate a solar array. Workover activities were approved as 'construction activities' and are considered as 'operational activities' for this application.
Hours of operation	Other Operating hours will be consistent with the Existing Project in accordance with

Item	Commitment
	Environment Protection Licence 20351, with well operations occurring 24hr/day.
Expected duration (weeks)	A further two years until 31 December 2027 (104 weeks) as described in the Activity description/exploration methods section above.
Anticipated start date	1 January 2026
Expected rehabilitation completion date	Estimated 31 December 2032
Maximum area of disturbance	0 square metres
Agricultural impact	Not applicable.
Air quality	The Proposed Activity will have very limited potential to generate air emissions which would have a substantiative impact on any economic, health, ecosystem or amenity considerations nor impact the identified sensitive receivers. The potential impact on the surrounding receivers is considered to be negligible with the implementation of mitigation measures. The following mitigation measures will be implemented to minimise potential impacts on air quality, including: • Carry out water-based dust suppression as required. • Implement on site speed limits to minimise dust generation. • Water, cover or otherwise stabilise stockpiled excavated material. • Maintenance of plant and equipment. • Turn off plant and equipment when not in use.
Protection of water sources	Mitigation measures will be implemented to minimise potential impacts to surface water, including: • Suitable erosion and sediment controls in place. • Vehicles and machinery properly maintained and routinely inspected to minimise the risk of fuel/oil leaks. • Spill kits appropriate to products used in the machinery and vehicles available. • Spills of fuel, oil, chemicals, or the like would be cleaned immediately, and the environmental manager notified of the location of the incident, extent of the incident and type of material spilled. • Light vehicles refuelled off-site, outside of the Study Area. Impacts on groundwater level are predicted to be minimal due to the relatively minor volumes of water extracted (18 ML over the life of the Proposed Activity). The mitigation measures relevant to surface water are also considered relevant to preventing potential impacts to groundwater. The following actions are proposed, consistent with relevant management plans: • Specific actions, including notification to DCCEEW Water Group within seven days, if the groundwater take limit trigger of 4.5 ML per 6-month period has or will be exceeded. • Daily monitoring of extraction rates (in pumping wells) in the pilot wells. • Continuous monitoring of formation pore pressure and groundwater levels from the shallow aquifer monitoring bores (SAMBs). • Collation and review of groundwater level data from all available NSW state monitoring points within 10km of the Proposed Activity every 12 months and at completion. • Reporting of results of review findings to NSW Office of Water as required.
Soil and land stability	Mitigation measures will be implemented to minimise potential impacts associated with soil and stability, including: • Carry out the proposed activity in consultation with the landholder and through the

Item	Commitment
	development of a land access and compensation agreement. • Stockpile topsoil separately so that the soil profile is maintained when backfilled. • Manage stockpiled material in accordance with standard sediment and erosion control management measures. • Carry out decommissioning and rehabilitation in consultation with the landholder and in accordance with the relevant guidelines including the Exploration Code of Practice: Rehabilitation (NSW government 2012c). • Vehicles and machinery properly maintained and routinely inspected to minimise the risk of fuel/oil leaks. • Spill kits appropriate to products used in the machinery and vehicles available. • Spills of fuel, oil, chemicals or the like cleaned immediately, and the environmental manager notified of the location of the incident, extent of the incident and type of material spilled. • Light vehicles refuelled off-site, outside of the Study Area.
Noise and vibration	No construction noise impacts above the limits prescribed by EPL 20351 are predicted. Noise impacts for continued operational appraisal activities were modelled and assessed and are within acceptable noise limits. Predicted noise levels at the identified sensitive receivers during operation will remain consistent with those provided for in the Existing Project. The option to install a solar array and possible reduction in the use of the diesel generator, may reduce noise levels. Noise predictions indicated that noise levels from periodic well workover activities will exceed the noise limits outside standard construction hours in the day, evening and night period during noise enhancing meteorological conditions at two sensitive receptors (R1 and R2 refer Figure 1.4). Noise levels associated with well workovers for the Proposed Activity will be consistent with levels for the Existing Project. Mitigation measures will be implemented as described in the REF.
Coastal processes and hazards	Nil/Not applicable
Hazardous substances or chemicals	The Proposed Activity includes the option for installation of a solar array and associated batteries. This infrastructure will be owned by a third party who will be responsible for the maintenance and disposal. Workovers and completions are expected to generate around 70 m3 of waste fluid / well for each rig activity. The site contains existing CSG exploration infrastructure with the potential to contain hazardous materials including natural gas that may have accumulated in the existing gas wells, and potentially, residual drill cuttings, drilling fluids and/or other chemicals remaining on site from prior activities. The drilling fluids utilised are inert and low toxicity substances composed primarily of water (70-80%) with most of the remainder being weighting agents, typically bentonite clay, and some minor additives including biocide to prevent the accumulation of bacteria. Chemicals and hydrocarbons will be handled, stored and transported as in the REF.
Wastes and emissions	Anticipated waste types and quantities are summarised below: Civil and construction • General construction waste: 10m3 • Sewage and greywater: 50m3 • General solid waste: 10m3 Workovers and completions • General construction water: 10m3 • Wellbore solids: 50m3 • Workover fluid: 70m3 / well for each rig activity Appraisal activities • Produced water: 25m3/day Any waste generated will be stored, maintained and disposed in accordance with the industry standards. Mitigation measures will be implemented to minimise potential impacts, including: • All waste generated by the Proposed Activity

Item	Commitment
	must be classified in accordance with the Waste Classification Guidelines (EPA 2014) and in line with all relevant Australian standards including AS1940:2017. • General construction waste and other general solid waste stored on site must be held in suitable containers and regularly collected for disposal. • Produced water would be stored separately and in accordance with relevant Australian standards.
Vegetation	Mitigation measures will be implemented to minimise potential impacts to vegetation, including: • Provide all workers with a site induction on the biodiversity values of the Study Area where relevant. • If any threatened fauna or flora are identified within the Study Area notify the environmental representative and will not carry out works in the Study Area until approved. • Implement weed hygiene protocols to prevent introduction and/or spread of weeds. • Manage weeds in accordance with the requirements of the Biosecurity Act 2015 and additional requirements for any weeds of National Significance.
Threatened fauna and flora species	Mitigation measures will be implemented to minimise potential impacts to threatened species, including: • Provide all workers with a site induction on the biodiversity values of the Study Area where relevant. • If any threatened fauna or flora are identified within the Study Area notify the environmental representative and do not carry out works in the Study Area until approved. • Implement weed hygiene protocols to prevent introduction and/or spread of weeds. • Manage weeds in accordance with the requirements of the Biosecurity Act 2015 and additional requirements for any weeds of National Significance.
Areas of outstanding biodiversity value/critical habitat	Mitigation measures will be implemented to minimise potential impacts to biodiversity including: • Provide all workers with a site induction on the biodiversity values of the Study Area where relevant. • If any threatened fauna or flora are identified within the Study Area notify the environmental representative and do not carry out works in the Study Area until approved. • Implement weed hygiene protocols to prevent introduction and/or spread of weeds. • Manage weeds in accordance with the requirements of the Biosecurity Act 2015 and additional requirements for any weeds of National Significance.
Endangered ecological community or critically endangered ecological community	Mitigation measures will be implemented to minimise potential impacts to endangered or critically endangered ecological communities, including: • Provide all workers with a site induction on the biodiversity values of the Study Area where relevant. • If any threatened fauna or flora are identified within the Study Area notify the environmental representative and do not carry out works in the Study Area until approved. • Implement weed hygiene protocols to prevent introduction and/or spread of weeds. • Manage weeds in accordance with the requirements of the Biosecurity Act 2015 and additional requirements for any weeds of National Significance.
Habitat of a	Mitigation measures will be implemented to minimise potential impacts to the habitat of

Item	Commitment
threatened species or ecological community	a threatened species or ecological community, including: • Provide all workers with a site induction on the biodiversity values of the Study Area where relevant. • If any threatened fauna or flora are identified within the Study Area notify the environmental representative and do not carry out works in the Study Area until approved. • Implement weed hygiene protocols to prevent introduction and/or spread of weeds. • Manage weeds in accordance with the requirements of the Biosecurity Act 2015 and additional requirements for any weeds of National Significance.
Key threatening processes	Mitigation measures will be implemented to minimise potential impacts on key threatening processes, including: • Provide all workers with a site induction on the biodiversity values of the Study Area where relevant. • If any threatened fauna or flora are identified within the Study Area notify the environmental representative and do not carry out works in the Study Area until approved. • Implement weed hygiene protocols to prevent introduction and/or spread of weeds. • Manage weeds in accordance with the requirements of the Biosecurity Act 2015 and additional requirements for any weeds of National Significance.
Barriers to movement of fauna	Mitigation measures will be implemented to minimise potential impacts regarding barriers to movement of fauna, including: • Provide all workers with a site induction on the biodiversity values of the Study Area where relevant. • If any threatened fauna or flora are identified within the Study Area notify the environmental representative and do not carry out works in the Study Area until approved. • Implement weed hygiene protocols to prevent introduction and/or spread of weeds. • Manage weeds in accordance with the requirements of the Biosecurity Act 2015 and additional requirements for any weeds of National Significance.
Ecological and biosecurity impacts	Mitigation measures will be implemented to minimise potential ecological and biosecurity impacts, including: • Provide all workers with a site induction on the biodiversity values of the Study Area where relevant. • If any threatened fauna or flora are identified within the Study Area notify the environmental representative and do not carry out works in the Study Area until approved. • Implement weed hygiene protocols to prevent introduction and/or spread of weeds. • Manage weeds in accordance with the requirements of the Biosecurity Act 2015 and additional requirements for any weeds of National Significance.
Community resources	Mitigation measures will be implemented to minimise potential impacts to community resources, including: • Carry out stakeholder consultation in addition to the previous extensive consultation undertaken for the medium impact level assessment for the approved Activity Approval dated 15 March 2023, in accordance with the Exploration code of practice: Community Consultation (Department of Regional NSW, May 2023). • Carry out the Proposed Activity in consultation with the landholder. • Adopt local hiring practices and local procurement of goods and services, where

Item	Commitment
	practicable and feasible, so as to maximise the potential for regional economic benefits.
Natural resources	Mitigation measures regarding natural resources are to be consistent with those outlined previously including the mitigation measures implemented for: • protection of water sources • soil and land stability • vegetation.
Social impacts	Mitigation measures will be implemented to minimise potential social impacts, including: • Carry out stakeholder consultation in addition to the previous extensive consultation undertaken for the medium impact level assessment for the approved Activity Approval dated 15 March 2023, in accordance with the Exploration code of practice: Community Consultation (Department of Regional NSW, May 2023). • Carry out the Proposed Activity in consultation with the landholder. • Adopt local hiring practices and local procurement of goods and services, where practicable and feasible, so as to maximise the potential for regional economic benefits.
Economic impacts	Mitigation measures will be implemented to minimise potential social impacts, including: • Carry out stakeholder consultation in addition to the previous extensive consultation undertaken for the medium impact level assessment for the approved Activity Approval dated 15 March 2023, in accordance with the Exploration code of practice: Community Consultation (Department of Regional NSW, May 2023). • Carry out the Proposed Activity in consultation with the landholder. • Adopt local hiring practices and local procurement of goods and services, where practicable and feasible, so as to maximise the potential for regional economic benefits.
Heritage impacts	Mitigation measures will be implemented to minimise potential heritage impacts, including: • Work crews will receive site inductions that include the contents of the Unanticipated Finds Protocol and a cultural heritage awareness component to assist them in recognising Aboriginal artefacts and make them aware of legislative protections of Aboriginal objects under the National Parks and Wildlife Act 1974. • If during works, Aboriginal artefacts or skeletal material are noted, all work will cease and the procedures in the Unanticipated Finds Protocol will be followed.
Aesthetic impacts	Mitigation measures will be implemented to minimise potential aesthetic impacts, including: • Carry out stakeholder consultation. • Carry out the Proposed Activity in consultation with the landholder. • Adopt local hiring practices and local procurement of goods and services, where practicable and feasible, so as to maximise the potential for regional economic benefits.
Aboriginal cultural heritage	Mitigation measures will be implemented to minimise potential heritage impacts, including: • Work crews will receive site inductions that include the contents of the Unanticipated Finds Protocol and a cultural heritage awareness component to assist them in recognising Aboriginal artefacts and make them aware of legislative protections of Aboriginal objects under the National Parks and Wildlife Act 1974. • If during works, Aboriginal artefacts or skeletal material are noted, all work will cease and the procedures in the Unanticipated Finds Protocol will be followed.

Item	Commitment
Land use impacts	Mitigation measures will be implemented to minimise potential impacts on land use including: • Carry out the Proposed Activity in consultation with the landholder and through the development of a land access and compensation agreement. • Stockpile topsoil separately so that the soil profile is maintained when backfilled. • Manage stockpiled material in accordance with standard sediment and erosion control management measures. • Carry out decommissioning and rehabilitation in consultation with the landholder and in accordance with the relevant guidelines including the Exploration Code of Practice: Rehabilitation (NSW Government 2012c).
Transportation impacts	Mitigation measures will be implemented to minimise potential impacts on transportation including: • Develop and implement a Traffic Management Plan (inclusive of security measures).
Matters of national environmental significance	Not applicable
Cumulative impacts	While it is unlikely that significant cumulative impacts would result from the Proposed Activity, an additional proposed measure has been provided to monitor and adapt the traffic management plan as necessary if any issues arise.
Rehabilitation commitments	The activity will be undertaken in accordance with the rehabilitation objectives and targets provided for this project.
Risk assessments	The titleholder must monitor the risks associated with activities and, if the risk associated with an activity changes, implement revised environmental management controls.
Incident management	The Resources Regulator will be notified of all incidents in accordance with the requirements of PEL 1 (1991).
Reporting	Reporting to the Resources Regulator and NSW Resources – Department of Primary Industries and Regional Development will be in accordance with the legislation and conditions of PEL 1 (1991).
Codes of Practice	Kahlua Pilot will be operated in accordance with: • Exploration Code of Practice: Environmental Management • Exploration Code of Practice: Rehabilitation • Exploration Code of Practice: Produced Water Management, Storage and Transfer
Other (as applicable)	1. No additional terms specified.

Attachment 2 – Definitions

To search for NSW legislation, visit www.legislation.nsw.gov.au. Commonwealth legislation can be found at www.legislation.gov.au.

Word	Definition
Aboriginal object	Has the same meaning as it has in the *National Parks and Wildlife Act 1974*.
Aboriginal place	Has the same meaning as it has in the *National Parks and Wildlife Act 1974*.
Acid Sulfate Soils	Sediments and soils containing iron sulfides which, when exposed to oxygen, generate sulfuric acid. Acid sulfate soils include actual acid sulfate soils (AASS) or potential acid sulfate soils (PASS).
Activity	Any activity carried out in connection with exploration, including: • the use of land • means of accessing land • the carrying out of a work.
Activity approval	An approval to carry out assessable prospecting operations granted under the *Mining Act 1992* / *Petroleum (Onshore) Act 1991* – as relevant.
Actual Acid Sulfate Soils (AASS)	Sediments and soils containing highly acidic soil horizons or layers resulting from the aeration of sediments and soils that are rich in iron sulfides, primarily sulphide.
Applicant	In relation to an exploration activity, the person proposing to carry out the exploration activity.
Aquatic reserve	Has the same meaning as it has in the *Marine Estate Management Act 2014*.
Areas of Outstanding Biodiversity Value (AOBVs)	Has the same meaning as it has in the *Biodiversity Conservation Act 2016*. Note: Areas of declared critical habitat under the now repealed *Threatened Species Conservation Act 1995* have become Areas of Outstanding Biodiversity Value (AOBVs) under the *Biodiversity Conservation Act 2016*.
Assessable prospecting operation	Any prospecting operation that is not exempt development within the meaning of *State Environmental Planning Policy (Resources and Energy) 2021*.
Clearing of vegetation	Any one or more of the following: • cutting down, felling, thinning, lopping, logging or removing vegetation, or • killing, destroying, poisoning, ringbarking, uprooting or burning vegetation.
Complying exploration activities (CEA)	Exploration activities that are considered unlikely to significantly affect the environment as set out in *Exploration guideline: Application and assessment process for exploration activities*.
Critical habitat	Has the same meaning as it has in the *Fisheries Management Act 1994*.

Word	Definition
	Areas of declared critical habitat under the now repealed *Threatened Species Conservation Act 1995* have become Areas of Outstanding Biodiversity Value (AOBVs) under the *Biodiversity Conservation Act 2016.*
Drill hole	A hole made by drilling or boring, but excludes: • sampling and coring using handheld equipment, • petroleum wells.
Drilling	The perforation of the earth's surface crust by mechanical means to form a hole, whether the hole caused by the perforation is vertical, inclined or horizontal, and includes all operations for preventing collapse of the sides of such hole or for preventing it from being filled with extraneous materials including water
Environment	Has the same meaning as it has in the *Mining Act 1992 / Petroleum (Onshore) Act 1991* – as relevant.
Environmentally sensitive area of State significance	Has the same meaning as it has in *State Environmental Planning Policy (Resources and Energy) 2021.*
Excavation	The removal of the surface layer to a depth greater than 500 mm from the natural surface level.
Exempt development	Has the same meaning as it has in *State Environmental Planning Policy (Resources and Energy) 2021.*
Exploration	Has the same meaning as it has in *State Environmental Planning Policy (Resources and Energy) 2021.*
Fauna	Has the same meaning as it has in the *National Parks and Wildlife Act 1974.*
Groundwater	Water that occurs beneath the ground surface in the saturated zone.
Habitat	Has the same meaning as it has in *the Biodiversity Conservation Act 2016* or the *Fisheries Management Act 1994* (as relevant).
Harm	In relation to matters of national environmental significance, has the same meaning as "significant impact" as provided by the "Significant Impact Guidelines" used to determine whether assessment and approval is required under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999.* In relation to the environment, has the same meaning as it has in the *Protection of the Environment Operations Act 1997.* In relation to threatened species or ecological communities, has the same meaning as: • "harm an animal" in the *National Parks and Wildlife Act 1974* • "pick a native plant" in the *National Parks and Wildlife Act 1974* • "harm" in the *Fisheries Management Act 1994.*

Word	Definition
	In relation to an aquifer or waterfront land, has the same meaning as it has in the *Water Management Act 2000*. In relation to Aboriginal places or Aboriginal objects has the same meaning as it has in the *National Parks and Wildlife Act 1974*. In relation to items of heritage significance, has the same meaning as it has in the *Heritage Act 1977*. In relation to protected marine vegetation, has the same meaning as it has in the *Fisheries Management Act 1994*.
Items of heritage significance	Means: • any heritage items listed in one or more of the following: ◦ the Commonwealth Heritage List ◦ the World Heritage List ◦ the National Heritage List ◦ the State Heritage Register ◦ an Environmental Planning Instrument • any relic (being any deposit, object or material evidence which relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and which is 50 or more years old), or • within State Conservation Areas: ◦ items that are listed on the DECC Historic Heritage Information Management System, or ◦ any deposit, object or material evidence relating to the settlement or occupation of New South Wales or a part of New South Wales (not being Aboriginal settlement or occupation) if the deposit, object or material evidence is more than 25 years old at the date of the interference or removal.
Land	Includes: • the sea or an arm of the sea • a bay, inlet, lagoon, lake or body of water, whether inland or not and whether tidal or non-tidal • a river, stream or watercourse, whether tidal or non-tidal, and • a building erected on the land
Marine vegetation	Has the same meaning as it has in the *Fisheries Management Act 1994*.
Matters of national environmental significance	"Matters of national environmental significance" protected under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*.
Minister	The Minister administering the *Mining Act 1992* / *Petroleum (Onshore) Act 1991* – as relevant.
Native vegetation	Has the same meaning as it has in the *Local Land Services Act 2013*.

Word	Definition
Potential acid sulphate soils (PASS)	Sediments and soils that contain iron sulfides or sulfidic material which have not been exposed to air and oxidised
Produced water	Any form of groundwater that is actively extracted from a borehole or excavation, excluding incidental groundwater mixed with drilling fluids.
Rehabilitation	Has the same meaning as it has in the *Mining Act 1992* / *Petroleum (Onshore) Act 1991* – as relevant.
Seismic survey	The use of shock waves (generated in the ground using either small explosive charges detonated below the surface, hand-held mechanical hammers or vehicle-mounted hammers) and an array of geophones, which are connected to measuring instruments, to differentiate the geophysical properties of the subsurface of the earth.
Sensitive receiver	Includes: • dwellings • libraries • educational and research institutions (including schools, colleges and universities) • childcare centres • kindergartens • hospitals, surgeries and other medical institutions • places of worship • milking sheds and holding yards associated with dairies • animal boarding or training establishments • aquaculture • intensive livestock agriculture
Site	The land on which an activity is located.
State Conservation Area	Has the same meaning as it has in the *National Parks and Wildlife Act 1974*.
Surface disturbance	Means: • disturbance or exposure of the soil or surface rock layer, or • degradation or deterioration in any manner of the physical surface of land.
Terms	In relation to activity approvals, the terms imposed by the decision-maker on the grant of an activity approval.
Threatened species or ecological communities	Has the same meaning as it has in the *Biodiversity Conservation Act 2016* or *Fisheries Management Act 1994* (as relevant).
Title	An authority under the *Mining Act 1992* / a title under the *Petroleum (Onshore) Act 1991* – as relevant.
Titleholder	A person or company to whom a title has been issued.
Track	All unsealed routes that will be traversed multiple times, but does not include

Word	Definition
	single pass (ingress and egress) routes or seismic shot and receiver lines.
Waste	Has the same meaning as it has in the *Protection of the Environment Operations Act 1997*.
Water source	Has the same meaning as it has in the *Water Management Act 2000*.
Water land	Has the same meaning as it has in the *Fisheries Management Act 1994*.
Waterfront land	Has the same meaning as it has in the *Water Management Act 2000*.
Wetlands	Has the same meaning as it has in the *Fisheries Management Act 1994*.
Wilderness	Lands identified as wilderness under the *Wilderness Act 1987*.
Wilderness area	Lands (including subterranean lands) declared to be a wilderness area under the *Wilderness Act 1987* or the *National Parks and Wildlife Act 1974*.

Attachment 3 - Review of environmental factors

Air impacts

Provide a brief description of likely impacts to air quality, including the distance to, and impacts on, nearby sensitive receivers.

The following terms have been defined for the purposes of the accompanying APO application and this REF:
Existing Activity Approval: Activity Approval granted on 15 March 2023 for the reactivation of the Kahlua Pilot.
Existing Disturbance Footprint: Refers to the area that has been disturbed to establish the Kahlua Pilot and associated infrastructure (Existing Project).
Existing Project: The Kahlua Pilot and associated infrastructure comprising existing coal seam gas (CSG) exploration infrastructure, including four exploration wells, buried gas and water flowlines and power cables, access tracks, water storage, diesel storage and gas flaring infrastructure.
Proposed Activity: Encompassing minor construction works and program clarifications for continued CSG exploration and appraisal activities at the Kahlua Pilot.
Study Area: The area including and surrounding the Existing Disturbance Footprint, which may be impacted by the Proposed Activity, which has been assessed in this application.

A search of the National Pollutant Inventory (NPI) did not return any major sources of pollution in the region (DCCEEW, 2024).
The average air quality for Gunnedah is categorised as good based on data collected at both the Gunnedah and Gunnedah 2 stations (NSW Government, 2024).
The Study Area is located in a relatively remote setting, in a largely rural and agricultural region.
There are relatively few sensitive receptors surrounding the Study Area.
The nearest receptors to the Study Area, not leased by Santos, are approximately 1 to 2 km away to the west, south-west and south-east.
It is noted that the homestead located approximately 1.1 km north of the Study Area is leased by Santos and is therefore not considered a sensitive receptor.
The Proposed Activity will have very limited potential to generate air emissions which would have a substantiative impact on any economic, health, ecosystem or amenity considerations nor impact the identified sensitive receivers.
For the Existing Project the current total greenhouse gases emissions for the site are approximately 18,245 tonnes CO 2-e per year, when all four wells are operating for 365 days a year — about 0.004 percent of Australia's annual inventory. Since the commencement of the Existing Project in Q4 2023, flaring has occurred on only a limited number of occasions. As such, the proposed greenhouse gas emissions for the Proposed Activity are consistent with the proposed emissions.
Due to the small scale of the solar array works, the nature of ongoing operational and maintenance activities and the distance of the sensitive receivers from the Study Area; the potential impact on the surrounding receivers is considered to be negligible with the implementation of mitigation measures.
The potential impacts include the following:
• Construction activities:
 Temporary activities for the installation and commissioning of the solar array and associated infrastructure.
 The use of vehicles, plant and equipment are likely to be the sole contributor to emissions through exhaust emissions and dust generation.
• Operational activities:
 Exhaust emissions and dust generations from Santos personnel travelling to/from Study Area.
 Other emissions, including from gas flaring and well operations.
• Maintenance and workovers:

Air impacts

 The use of a workover rig may also release small amounts of emissions and dust generation.
• Decommissioning and rehabilitation:
 Limited to a number of vehicles and machinery that may generate dust and exhaust emissions.

What is the activity's likely impact due to generation of greenhouse gases emissions or release of chemicals which affect the ozone layer or produce photo-chemical smog?

Low Adverse

What is the likely level of any impacts?

Low adverse

Outline any proposed management controls and/or mitigation measures.

Mitigation measures will be implemented to minimise potential air impacts from the Proposed Activity as follows:
• Carry out water-based dust suppression as required.
• Implement on site speed limits to minimise dust generation.
• Water, cover or otherwise stabilise stockpiled excavated material.
• Maintain plant and equipment.
• Turn off plant and equipment when not in use.

Water impacts

Provide a brief description of the likely impacts to water quality and/quantity.

The Proposed Activity does not include additional disturbance outside the Existing Disturbance Footprint.
A specialist groundwater conceptual model was completed for the Existing Project which forecasted average pumping rates during CSG production of between 6 and 24m3/day (2 to 8.8ML/yr) for a period of up to 24 months of production.
While the Proposed Activity will allow for an extension of the period during which appraisal activities are undertaken, the duration and pumping rates will remain less than the cumulative extraction volume (18ML) as outlined in the groundwater assessment for the Existing Project.
Based on the modelled water extraction rates, the cumulative extraction volume (18ML) would be exceeded within 28 months of commencement (July 2026) based on continuous extraction. Actual pumping rates recorded to date have reduced to below the modelled rates, indicating this is a conservative estimate of when the cumulative extraction limit would be exceeded. Based on the actual pumping rates the cumulative extraction limit would be exceeded within 35 months of commencement (January 2027). Actual pumping rates have been lower in part due to fluctuations in the number of wells operating. The fluctuations in wells online may extend the timeframe that the cumulative extraction limit is reached. No variation to the maximum water extraction limit is sought by the Proposed Activity.
The Proposed Activity includes the continuation of appraisal activities (including groundwater extraction) for a further two years until 31 December 2027 or until whichever is the sooner of the two-year period or the point in time at which a produced water extraction volume of 18ML is reached. Cumulative water extraction would continue to be monitored in accordance with the groundwater monitoring program.
Potential impacts to groundwater quality and quantity were assessed as negligible for the Existing Project. The impacts from the Proposed Activity on groundwater quality or quantity are consistent with the Existing Project as such no impacts to water quality/quantity are anticipated.
The potential for a change in water availability on groundwater dependent ecosystems (GDEs) and/or inflow dependent ecosystems (IDEs) is also considered negligible.

What is the activity's impact due to the storage of water?

Water impacts
Low adverse
What is the activity's impact to natural water bodies, wetlands or runoff patterns?
Low adverse
What is the activity's impact due to aquifer interference, including changes to inter-aquifer connectivity?
Low adverse
What is the activity's impact due to changes to flooding or tidal regimes?
Negligible
What are the impacts from any hydraulic fracturing (well stimulation), including through gas and fluid migration?
Negligible
What is the activity's impact due to changes in surface or groundwater quality and quantity?
Low adverse
What is the likely level of any water impacts?
Low adverse
Outline any proposed management controls and/or mitigation measures.
Impacts on groundwater level are predicted to be minimal due to the relatively minor volumes of water extracted (18 ML over the life of the Existing Approved Activity and Proposed Activity combined). To confirm impacts to groundwater levels are negligible the following groundwater monitoring program and Trigger Action Response Plan (TARP) are proposed, consistent with relevant management plans: • Specific actions, including notification to DCCEW Water Group within seven days, if a groundwater take limit trigger of 4.5 ML per 6-month period has or will be exceeded. • Daily monitoring of extraction rates (in pumping wells) in the pilot wells. • Continuous monitoring of formation pore pressure and groundwater levels from the shallow aquifer monitoring bores (SAMBs). • Collation and review of groundwater level data from all available NSW state monitoring points within 10km of the Proposed Activity every 12 months and at completion. • Reporting of results of review findings to NSW Office of Water as required. • Carry out works in accordance with relevant standards including the Code of Practice for Coal Seam Gas Well Integrity. • Induction to new site workers/personnel on the protocols and procedures of the Groundwater Monitoring and Management Plan where considered relevant. Mitigation measures will be implemented to minimise potential impacts to water, including: • Suitable erosion and sediment controls in place. • Vehicles and machinery properly maintained and routinely inspected to minimise the risk of fuel/oil leaks. • Spill kits appropriate to products used in the machinery and vehicles available. • Spills of fuel, oil, chemicals, or the like would be cleaned immediately, and the environmental manager notified of the location of the incident, extent of the incident and type of material spilled. • Light vehicles refuelled off-site, outside of the Study Area. The Produced Water Management Plan, Rev0A, dated 9 November 2023 (PWMP) was developed in accordance with the requirements of condition 19 of PEL 1, incorporating the requirements of the Exploration Code of Practice: Produced Water Management, Storage and Transfer (Resources Regulator, 2022) as

Water impacts
required by condition 3 of the Activity Approval. The PWMP was considered to be adequate by the Resources Regulator on 8 May 2024. The Groundwater Monitoring and Management Plan, Rev0, dated 23 October 2023 (GMMP) was developed in accordance with condition G2.1 of EPL 20351 and incorporates the requirements of the Notice of Determination (Reference A031056/90WA822547) of the associated Water Supply Works Statement of Approval. The GMMP provides for strategic and proactive management of any potential impacts on the groundwater environment, including to groundwater dependent users and ecosystems, as a consequence of extraction of CSG groundwater. The GMMP was accepted by the former Department of Planning and Environment – Water on 2 November 2023. The GMMP includes a number of obligations as outlined in measure W1 of Table 6-5. In addition, the GMMP required the completion of a census of groundwater supply bores at private landholders within a 2km radius of the site within six months of the commencement of the Approved Activity and the submission of an annual report for the 12 month period from the commencement of the Approved Activity. The results of the census were provided to the NSW Department of Climate Change, Energy, the Environment and Water on 1 May 2024. The requirement to complete a census of groundwater supply bores is now complete. The Annual Report was provided to the Resources Regulator on 18 March 2025 and resubmitted on 30 July 2025. The Annual Report concluded that the monitoring data indicates that groundwater pressure and levels conducted for the 12- month period from the commencement of the Approved Activity has shown no adverse effects, with groundwater pressure and level trends generally either stable or increasing throughout the reporting period. Annual reporting will continue until the completion of the Proposed Activity.
Soil and stability impacts
Provide a brief description of the likely impacts to soil quality or land stability.
During construction of the solar array, minor excavation and earthworks may be undertaken within the Existing Disturbance Footprint. The solar array is proposed to be located on well pad K2, however the final location is subject to final design. Given the Existing Disturbance Footprint is relatively flat and the soils are not mapped as dispersive, and are therefore not prone to erosion, it is considered that erosion and sedimentation would be readily controlled by the mitigation measures proposed. The solar array would therefore have no long-term impacts on topography and stability of the Study Area.
What is the activity's impact on the degradation of soil quality including contamination, salinisation or acidification?
Low adverse
What is the activity's impact on land with high agricultural capability?
Negligible
What is the activity's impact due to loss of soil from wind or water erosion?
Negligible
What is the activity's impact due to the loss of structural integrity of the soil?
Negligible
What is the activity's impact due to increased land instability with high risks from landslides or subsidence?
Negligible

Soil and stability impacts

What is the activity's impact due to any induced seismicity or ground movements associated with fracture stimulation or injection or extraction of groundwater?

Low adverse

What is the likely level of any impacts?

Low adverse

Outline any proposed management controls and/or mitigation measures.

Mitigation measures will be implemented to minimise potential impacts associated with soil and stability, including:
• Carry out the proposed activity in consultation with the landholder and through the development of a land access and compensation agreement.
• Stockpile topsoil separately so that the soil profile is maintained when backfilled.
• Manage stockpiled material in accordance with standard sediment and erosion control management measures.
• Carry out decommissioning and rehabilitation in consultation with the landholder and in accordance with the relevant guidelines including the Exploration Code of Practice: Rehabilitation (NSW government 2012c).
• Vehicles and machinery properly maintained and routinely inspected to minimise the risk of fuel/oil leaks.
• Spill kits appropriate to products used in the machinery and vehicles available.
• Spills of fuel, oil, chemicals or the like cleaned immediately, and the environmental manager notified of the location of the incident, extent of the incident and type of material spilled.
• Light vehicles refuelled off-site, outside of the Study Area.

Noise and vibration impacts

Provide a brief description of the likely noise and/or vibration impacts.

The noise assessment for the Existing Project is available in the 2023 application (refer - https://www.resources.nsw.gov.au/sites/default/files/2023-03/pel1-santos-kahlua-application-package.pdf).
The Proposed Activity would result in noise during construction of the solar array and associated infrastructure.
An assessment of noise impacts during construction and operation are summarised below.
Construction:
The Proposed Activity would result in additional noise during the construction of the solar array and associated infrastructure.
Conservatively, this has been compared to the construction activity for trenched gathering line installation (CS2) included in the Noise and Vibration Assessment for the Existing Project which includes the use of an excavator, roller and water cart. Noise predictions for the assessment predicted that construction noise levels comply with the noise limits, including outside standard construction hours in the night period during noise enhancing meteorological conditions.
As such no impacts above noise limits are predicted for the Proposed Activity.

Operations:
The noise impacts for continued operational appraisal activities were modelled and assessed for the Existing Project and remain valid for the Proposed Activity.
The predicted noise levels at the identified sensitive receivers during these works will remain consistent with those provided for the Existing Project.
With the option of installing a solar array (and possible reduction in the use of the diesel generator), noise levels would be reduced by the Proposed Activity in comparison with the Existing Project.
Noise levels for the Proposed Activity during workovers were assessed for the Existing Project by GHD

Noise and vibration impacts
(2022) through a Noise and Vibration Assessment. Noise predictions indicated that noise levels will exceed the noise limits outside standard construction hours in the day, evening and night period during noise enhancing meteorological conditions at two sensitive receptors from the use of a workover rig. An exceedance of the nighttime criteria was also predicted during standard meteorological conditions from the same equipment. It was predicted that construction noise levels are compliant with the adopted noise management level inside standard construction hours as defined in the Interim Construction Noise Guideline (DECC, 2009). Noise levels for the Proposed Activity during workovers would be consistent with the Existing Project, and mitigation, including landowner agreements, would be implemented.
What is the likely level of any impacts?
Negligible
Outline any proposed management controls and/or mitigation measures.
Mitigation measures will be implemented to minimise potential impacts from noise, including: • Prior to carrying out the Proposed Activity all reasonable efforts would be made to provide notice to landholders of activities with the potential to cause disturbance and accommodate reasonable request in relation to the scheduling of activities. • Maintain vehicles and equipment in good working order. • As far as practicable, avoid scheduling noisy activities out of standard hours. • Promptly respond to noise complaints and carry out monitoring if necessary. • Plant or machinery would not be permitted to warm-up near residential dwellings before the nominated working hours. • Appropriate plant would be selected for each task; to minimise the noise impact (e.g. All stationary and mobile plant would be fitted with residential type silencers). • Plant, vehicles and machinery would be regularly inspected and maintained in good working order. • Schedule noisier activities during recommended standard construction hours and minimise the use of heavy machinery during the out of hours periods as far as practically possible (provisions allowed for emergency works). • Establish agreements with exceeding receivers R1 and R2 (refer Figure 1.4) for use of the workover rig outside standard construction hours, prior to workover activities occurring.
Coastal locations and processes
Provide a brief description of likely impacts on coastal environments, coastal processes and coastal hazards.
Nil/Not applicable
What is the likely level of any impacts?
Nil/Not applicable
Outline any proposed management controls and/or mitigation measures.
Nil/Not applicable
Hazardous substances and chemicals
Provide a brief description of likely impacts associated with the use, generation, storage or transport of hazardous substances or chemicals.
The potential for impacts to the Study Area from the Proposed Activity from the storage or use of hazardous substances or chemicals include loss of containment of the diesel storage. There is also the potential for

Hazardous substances and chemicals

ignition to surrounding vegetation to occur as a result of the gas flare, however this is considered unlikely given mitigations in place.
Overall, the potential impacts concerning hazardous materials is low.
The Proposed Activity includes the potential option for the installation of a solar array and associated batteries.
The infrastructure will be stored, maintained and disposed (at the end of its operational life) in accordance with industry standards.
The solar array and associated batteries are owned by a third party who will be responsible for the maintenance and disposal of the solar array and batteries.

What is the likely level of the impact associated with the use, generation, storage or transport of hazardous substances or chemicals?

Low adverse

Outline any proposed management controls and/or mitigation measures.

The mitigation measures associated with the use, generation, storage or transport of hazardous substances or chemicals are outlined below:
• The diesel fuel storage will be designed and operated in accordance with all relevant Australian standards; diesel fuel storage will be situated within an appropriately bunded area, at least 110% of the largest container.
• All chemicals and dangerous goods transported, stored and handled in line with all relevant Australian standards including AS1940:2017 The storage and handling of flammable and combustible liquids and the Australian Code for the Transport of Dangerous Goods by Road.
• If a spill is identified in the Study Area it would be acted upon including stopping the spill at its source and carrying out measures to contain and remediate the spill affected area; all statutory notifications would be carried out in accordance with the requirements of the Protection of the Environment Operations Act 1997.
• An emergency response procedure has been developed and will be used in the event of a spill.
• Vegetation management will continue to be undertaken around the gas flare, removing potential ignition pathways (in addition to inherent flare design minimising this potential occurrence).
• An enclosed box flare is utilised.

Wastes and emissions

Provide a brief description of likely impacts to the environment from the generation or disposal of gaseous, liquid or solid wastes or emissions.

All waste generated by the Proposed Activity would be classified in accordance with the Waste Classification Guidelines (EPA 2014) and would be transported and reused, recycled or disposed of by suitably licensed waste contractors and waste management facilities.
The predicted volumes of waste that will be generated are relatively small and it is expected that there would be sufficient capacity at regional waste management facilities. The expected volumes of waste for the proposed activity are:

Waste Source: Civil and construction
Waste Types and Volumes:
• General construction waste – 10m3
• Sewage and greywater – 50m3
• General sold waste – 10m3.

Waste Source: Workovers and completions

Wastes and emissions

Waste Types and Volumes:
• General construction water – 10m3
• Wellbore solids – 50m3
• Workover fluid – 70m3 / well for each rig activity.

Waste Source: Appraisal activities
Waste Types and Volumes:
• Produced water – 25m3/day.

The largest waste stream from the Proposed Activity is produced water which is produced progressively over the two years of appraisal activities. Produced water is sent to the produced water treatment facility at Leewood authorised by EPL 20351, or a third party for beneficial reuse subject to receiving a resource recovery order and exemption. To reduce on site risk, the storage of up to 10 mega litres (ML) of produced water is held in holding tanks that have been designed to Australian standards and subject to integrity testing. The holding tanks are routinely emptied with produced water transported to the Santos Leewood facility for treatment. Alternatively, produced water may be transported off-site for lawful re-use, remediation, recycling or disposal in accordance with legislative requirements. Tank levels are continuously monitored via telemetry and high-level trip systems mitigate the risk of a tank overflow.
General construction waste and other general solid waste will be stored on site in suitable containers and routinely collected. Surplus excavated material will be temporarily stockpiled and watered or covered as necessary prior to collection and disposal. Sewage and greywater will be contained in portable amenities and will be routinely collected. Overall, the potential impacts concerning waste and resources are considered to be low.

Provide a brief description of likely impacts on areas sensitive to this type of impact.

With implementation of appropriate management measures, impacts from waste on sensitive areas are not anticipated to occur.
The predicted volumes of waste that will be generated are relatively small and it is expected that there would be sufficient capacity at regional waste management facilities. The expected volumes of waste for the proposed activity are:

Waste Source: Civil and construction
Waste Types and Volumes:
• General construction waste – 10m3
• Sewage and greywater – 50m3
• General sold waste – 10m3.

Waste Source: Workovers and completions
Waste Types and Volumes:
• General construction water – 10m3
• Wellbore solids – 50m3
• Workover fluid – 70m3/ well for each rig activity.

Waste Source: Appraisal activities
Waste Types and Volumes:
• Produced water – 25m3/day.

What is the likely level of the impacts?

Low adverse

Wastes and emissions

Outline any proposed management controls and/or mitigation measures.

Mitigation measures will be implemented to minimise potential impacts associated with waste and emissions, including:
• All waste generated by the Proposed Activity must be classified in accordance with the Waste Classification Guidelines (EPA 2014) in line with all relevant Australian standards including AS1940:2017.
• The storage and handling of flammable and combustible liquids and the Australian Code tor the Transport of Dangerous Goods by Road & Rail Edition 7.6, 2018, and transported and reused, recycled or disposed of by suitably licensed waste contractors and facilities.
• General construction waste and other general solid waste stored on site must be held in suitable containers and regularly collected for disposal.
• Produced water would be stored separately and in accordance with relevant Australian standards and managed in accordance with the measures described to manage surface water quality impacts above.
• Engage a suitably licensed and responsible solar contractor with appropriate disposal methods in place.

Vegetation

Provide a brief description of any vegetation clearing or modification and the likely impacts to the environment.

No vegetation clearing is required for the Proposed Activity. As such, there is no impact to vegetation anticipated from the Proposed Activity.

What is the likely level of the impacts?

Negligible

Outline any proposed management controls and/or mitigation measures.

Mitigation measures will be implemented to minimise potential impacts to vegetation, including:
• Provide all workers with a site induction on the biodiversity values of the Study Area where relevant.
• If any threatened fauna or flora are identified within the Study Area notify the environmental representative and will not carry out works in the Study Area until approved.
• Implement weed hygiene protocols to prevent introduction and/or spread of weeds.
• Manage weeds in accordance with the requirements of the Biosecurity Act 2015 and additional requirements for any weeds of National Significance.

Threatened species

Provide a brief description of any likely impacts to threatened fauna and flora species.

No disturbance will occur outside the Existing Disturbance Footprint.
As such, there is no impact to threatened species, ecological communities (or habitats) anticipated from the Proposed Activity.

What is the likely level of the impacts?

Negligible

Outline any proposed management controls and/or mitigation measures.

Mitigation measures will be implemented to minimise potential impacts to threatened species, including:
• Provide all workers with a site induction on the biodiversity values of the Study Area where relevant.
• If any threatened fauna or flora are identified within the Study Area notify the environmental representative and do not carry out works in the Study Area until approved.

Threatened species
• Implement weed hygiene protocols to prevent introduction and/or spread of weeds. • Manage weeds in accordance with the requirements of the Biosecurity Act 2015 and additional requirements for any weeds of National Significance.
Area of outstanding biodiversity value (AOBV) / Critical habitat
Provide a brief description of any likely impacts to AOBV/critical habitat.
There are no AOBV/critical habitats within the Existing Disturbance Footprint.
What is the likely level of the impacts?
Nil/Not applicable
Outline any proposed management controls and/or mitigation measures.
Mitigation measures will be implemented to minimise potential impacts to biodiversity including: • Provide all workers with a site induction on the biodiversity values of the Study Area where relevant. • If any threatened fauna or flora are identified within the Study Area notify the environmental representative and do not carry out works in the Study Area until approved. • Implement weed hygiene protocols to prevent introduction and/or spread of weeds. • Manage weeds in accordance with the requirements of the Biosecurity Act 2015 and additional requirements for any weeds of National Significance.
Endangered ecological community or critically endangered ecological community
Is the activity likely to have an adverse effect on an endangered ecological community or critically endangered ecological community? Select as relevant:
N/A
Provide a brief description of any impacts.
No disturbance will occur outside the Existing Disturbance Footprint. As such, there is no impact to threatened species, ecological communities (or habitats) anticipated from the Proposed Activity.
What is the likely level of the impacts?
Negligible
Outline any proposed management controls and/or mitigation measures.
Mitigation measures will be implemented to minimise potential impacts to endangered or critically endangered ecological communities, including: • Provide all workers with a site induction on the biodiversity values of the Study Area where relevant. • If any threatened fauna or flora are identified within the Study Area notify the environmental representative and do not carry out works in the Study Area until approved. • Implement weed hygiene protocols to prevent introduction and/or spread of weeds. • Manage weeds in accordance with the requirements of the Biosecurity Act 2015 and additional requirements for any weeds of National Significance.
Habitat of a threatened species or ecological community
Is the activity likely to have an adverse effect on the habitat of a threatened species or ecological community (including protected aquatic species)? Select as relevant:

Habitat of a threatened species or ecological community
N/A
Describe the impacts.
No disturbance will occur outside the Existing Disturbance Footprint. As such, there is no impact to threatened species, ecological communities (or habitats) anticipated from the Proposed Activity.
What is the likely level of the impacts?
Negligible
Outline any proposed management controls and/or mitigation measures.
Mitigation measures will be implemented to minimise potential impacts to the habitat of a threatened species or ecological community, including: • Provide all workers with a site induction on the biodiversity values of the Study Area where relevant. • If any threatened fauna or flora are identified within the Study Area notify the environmental representative and do not carry out works in the Study Area until approved. • Implement weed hygiene protocols to prevent introduction and/or spread of weeds. • Manage weeds in accordance with the requirements of the Biosecurity Act 2015 and additional requirements for any weeds of National Significance.
Key threatening process
Provide a brief description of whether the activity will constitute, or form part of, a key threatening process - or is likely to increase the impact of a key threatening process.
Key threatening processes are generally those that: • Adversely affects threatened species or ecological communities • Could cause species or ecological communities to become threatened. No disturbance will occur outside the Existing Disturbance Footprint. As such, the Proposed Activity will not constitute or form part of a key threatening process.
What is the likely level of any impacts?
Negligible
Outline any proposed management controls and/or mitigation measures.
Mitigation measures will be implemented to minimise potential impacts on key threatening processes, including: • Provide all workers with a site induction on the biodiversity values of the Study Area where relevant. • If any threatened fauna or flora are identified within the Study Area notify the environmental representative and do not carry out works in the Study Area until approved. • Implement weed hygiene protocols to prevent introduction and/or spread of weeds. • Manage weeds in accordance with the requirements of the Biosecurity Act 2015 and additional requirements for any weeds of National Significance.
Barriers to movement of fauna
Provide a brief description regarding the potential of the activity to endanger, displace or disturb fauna or create a barrier to their movement.
No disturbance will occur outside the Existing Disturbance Footprint. As such, the Proposed Activity is not anticipated to endanger, displace or disturb fauna or create barrier to

Barriers to movement of fauna
their movement.
What is the likely level of any impacts?
Negligible
Outline any proposed management controls and/or mitigation measures.
Mitigation measures will be implemented to minimise potential impacts regarding barriers to movement of fauna, including: • Provide all workers with a site induction on the biodiversity values of the Study Area where relevant. • If any threatened fauna or flora are identified within the Study Area notify the environmental representative and do not carry out works in the Study Area until approved. • Implement weed hygiene protocols to prevent introduction and/or spread of weeds. • Manage weeds in accordance with the requirements of the Biosecurity Act 2015 and additional requirements for any weeds of National Significance.
Ecological and biosecurity impacts
Is the activity likely to have any adverse ecological or biosecurity impacts? Select as relevant:
N/A
Provide a brief description of any impacts.
No disturbance will occur outside the Existing Disturbance Footprint. As such, the Proposed Activity is not anticipated to have any adverse ecological or biosecurity impacts.
What is the likely level of any impacts?
Negligible
Outline any proposed management controls and/or mitigation measures.
Mitigation measures will be implemented to minimise potential ecological and biosecurity impacts, including: • Provide all workers with a site induction on the biodiversity values of the Study Area where relevant. • If any threatened fauna or flora are identified within the Study Area notify the environmental representative and do not carry out works in the Study Area until approved. • Implement weed hygiene protocols to prevent introduction and/or spread of weeds. • Manage weeds in accordance with the requirements of the Biosecurity Act 2015 and additional requirements for any weeds of National Significance.
Community resources
Describe whether the activity is likely to degrade or significantly increase the demand for services and infrastructure resources.
The Proposed Activity is expected to contribute no further impacts on the surrounding community or demographics of the region, due to the small scale of the construction works and limited duration.
Describe whether the activity is likely to result in any diversion of resources to the detriment of other communities or natural systems.
A small workforce would be generated for the construction of the solar array and associated infrastructure; however, this would be significantly less than what was required for the Existing Project. Therefore the Proposed Activity is not likely to result in any diversion of resources to the detriment of other communities or natural systems.

Community resources
What is the likely level of the impact?
Negligible
Outline any proposed management controls and/or mitigation measures.
Mitigation measures will be implemented to minimise potential impacts to community resources, including: • Carry out stakeholder consultation in addition to the previous extensive consultation undertaken for the medium impact level assessment for the approved Activity Approval dated 15 March 2023, in accordance with the Exploration code of practice: Community Consultation (Department of Regional NSW, May 2023). • Carry out the Proposed Activity in consultation with the landholder. • Adopt local hiring practices and local procurement of goods and services, where practicable and feasible, so as to maximise the potential for regional economic benefits.
Natural resources
Describe any likely impacts that would disrupt, deplete or destroy natural resources.
The Proposed Activity will be contained entirely within the Existing Disturbance Footprint. Therefore, the Proposed Activity is not likely to disrupt, deplete or destroy natural resources.
Describe whether the activity is likely to disrupt existing activities which rely upon natural resources, including forestry, farming or extractive industries (or will reduce options for future activities).
The Proposed Activity will be contained entirely within the Existing Disturbance Footprint. Therefore, the Proposed Activity is not likely to disrupt existing activities which rely upon natural resources, including forestry, farming or extractive industries (or will reduce options for future activities).
Describe whether the activity is likely to result in the degradation of any area reserved for conservation purposes.
The Proposed Activity will be contained entirely within the Existing Disturbance Footprint. Therefore, the Proposed Activity is not likely to result in the degradation of any area reserved for conservation purposes.
What is the likely level of the impact?
Negligible
Outline any proposed management controls and/or mitigation measures.
Mitigation measures regarding natural resources are to be consistent with those outlined previously including the mitigation measures implemented for: • protection of water sources • soil and land stability • vegetation.
Social impacts
Describe whether the activity is likely to result in a change to the demographic structure of the community, including changes to the workforce or industry structure of the area/region.
The Proposed Activity is expected to contribute no further impacts on the surrounding community or demographics of the region than the Existing Project, due to the small scale of the construction works and limited duration. A small workforce would be generated for the construction of the solar array and associated infrastructure; however, this would be significantly less than what was required for the Existing Project.

Social impacts

Describe whether the activity is likely to have an environmental impact that may cause substantial change or disruption to the community, including loss of facilities, reduced links to other communities or loss of community identity.

The Proposed Activity is expected to have no further impacts on the surrounding community or demographics of the region due to the small scale of the construction works and limited duration. Stakeholder consultation has been undertaken for the Proposed Activity to:
• increase overall awareness and understanding of Santos' activities and the CSG industry
• keep landholders, neighbours, residents, local council and relevant government agencies informed of the activity and progress
• consider the interests of stakeholders in the Project design and execution
• identify key issues or concerns for stakeholders and the community, and address these through the environmental assessment process
• provide timely, accurate and credible information to stakeholders and the broader community

The stakeholder consultation undertaken and the resulting engagement outcomes is as follows:
• Landholders and Residents: An email was sent to the landholder on 3 March 2025 regarding the Proposed Activity. The feedback was positive, highlighting appreciation for better geological information, gas composition testing and solar installations.
• Local Government: A personal briefing was provided to the Gunnedah Shire Council Mayor on 22 January 2025, with updates included in monthly activity reports. No issues were raised by the council regarding the Proposed Activity.
• NSW Government Representatives: Email and personal briefings were provided to the Member for Tamworth and ministerial advisers to the Premier, Energy Minister and Resources Minister between January and May 2025. Although no specific concerns regarding the Proposed Activity were raised, the Member for Tamworth raised concerns about general exploration and future CSG development. Santos committed to provide updates on progress and future activities.
• General Community: Monthly activity updates were disseminated through the Hunter Gas Pipeline and Narrabri Gas Project websites, along with advertisements in the Gunnedah Times in January 2025, inviting public feedback. A community information session was held in Gunnedah on 12 March 2025. No feedback was received from the advertisement or specific concerns raised during the session.
• Community Consultation Committee (CCC): Information was shared during the December 2024 and March 2025 meetings with the Narrabri Gas Project CCC. No specific concerns or written responses were received from committee members.
• Native Titleholders and Aboriginal Land Councils: The Gomeroi Native Title claimants and Red Chief Local Aboriginal Land Council (LALC) were engaged through letters and follow-up phone calls and email communication throughout January to May 2025. No specific concerns were raised during these engagements, although a procurement opportunity inquiry was received and addressed by providing relevant resources.
• Community Groups / Interested Stakeholders: Letters were sent on 1 May 2025 to groups including the Gunnedah Chamber of Commerce, Mullaley Gas and Pipeline Accord, North West Alliance, the Wilderness Society (Newcastle), Country Women's Association of NSW (CWA NSW) and NSW Farmers. The CWA NSW raised objections in a letter to the NSW Government that was shared with Santos. The concerns raised including potential environmental impacts and groundwater management. Santos responded to the CWA NSW and the NSW Government in letters dated 25 June 2025 providing detailed explanations of environmental assessment processes and offering further briefings. An outline of the issues raised and how/where the issue is addressed in the Assessable Prospecting Operation (APO) application is outlined below:
o Application process adequacy: The Proposed Activity is considered an APO and requires an Activity Approval in accordance with the Petroleum (Onshore) Act 1991 (PO Act). An assessment of the cumulative

Social impacts

environmental impacts from the Proposed Activity with other existing or future activities is included in the Cumulative Impacts section of the Review of Environmental Factors (REF). As outlined in the Cumulative Impacts section, the potential for cumulative impacts to occur from the Proposed Activity is considered to be negligible due to the limited scale of the Proposed Activity and its separation distance from nearby projects.
o Risks to local water resources: The Groundwater sources section of the Site description and existing environment Tab outlines that a groundwater conceptual model was completed for the Existing Project. The modelling results indicated that the potential impacts from the Proposed Activity would comply with the minimal impact considerations of the Aquifer Interference Policy and no impacts (i.e. zero drawdown) is predicted on groundwater levels in the surficial alluvium. In addition, the Water Impacts section of the REF outlines the potential impacts to groundwater quality and quantity were assessed as negligible for the Existing Project. Given that the Proposed Activity is a continuation of the Approved Activity, the impacts from the Proposed Activity on groundwater quality or quantity are considered to be consistent with the Approved Activity. Groundwater extraction will not exceed the approved 18ML cumulative extraction volume under the Water Access Licence (WAL) and Water Supply Work (WSW) approvals issued by Water NSW under the Water Management Act 2000. The well-established groundwater management framework in NSW ensures that Water Access Licences are issued in accordance with the objectives of the NSW Water Management Act 2000 to provide sustainable and integrated management of water resources in NSW for the benefit of both present and future generations.
o Baseline environmental studies on neighbouring landholder properties: An environmental assessment of the impacts from the Approved Activity was undertaken for the Approved REF. This included a greenhouse gas emissions assessment, a specialist groundwater assessment, a Biophysical Strategic Agricultural Land assessment, a noise and vibration assessment, a specialist Aboriginal heritage due diligence assessment and a biodiversity assessment. The Approved REF assessed the potential impacts of the proposed activity under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act) and found the overall impact to be low, with a low likelihood of significant environmental effects (a copy of the environment assessment for the Approved REF can be accessed here - https://www.resources.nsw.gov.au/sites/default/files/2023-03/pel1-santos-kahlua-application-package.pdf). As outlined in the Water Impacts section of the REF, a census was undertaken of groundwater supply bores at private landholders within a 2km radius of the site within the first six months of the commencement of the Approved Activity in accordance with the requirements of the Notice of Determination for Water Supply Works 90WA822547. Of the seven bores prescribed in the GMMP targeted by the census, none could be surveyed because either the landholder would not permit access, or the bores could not be found. An additional six (6) groundwater bores located within a 2km radius of the site were included in the census at the request of the landholder.
o Notification requirements prior to the commencement of assessable prospecting operations: In 2023, Santos undertook seismic survey operations in PEL 1. The survey operations were undertaken in accordance with section 72(7) of the PO Act, as confirmed in correspondence from the Resources Regulator dated April 2023. As outlined in the dot points above on stakeholder consultation, consultation for the Proposed Activity has been undertaken with the landholder of the site. Further correspondence will be provided to the landholder prior to the commencement of construction works if/when works are undertaken. Stakeholder consultation for the Proposed Activity has been undertaken in accordance with the Exploration code of practice: Community Consultation (Department of Regional NSW, 2023c).
o Public consultation and stakeholder engagement: The information outlined above details the stakeholder consultation undertaken to support the Proposed Activity in addition to the extensive consultation undertaken for the Approved Activity. Stakeholders were provided multiple opportunities to provide feedback on the Proposed Activity in response to the advertisement in the Gunnedah Times, the January 2025 monthly activity update and a community information session held in March 2025.

Santos will continue engagement through face-to-face meetings, shopfront services, community site tours, and communication tools such as a free-call hotline and updated online resources. Media updates and social

Social impacts
media initiatives will continue to ensure transparency and community involvement. Santos upholds proactive communication strategies to resolve disputes, maintaining a complaint register in accordance with condition M3 of EPL 20351, ensuring stakeholder concerns are addressed effectively. This approach reflects Santos' dedication to transparent, informed and inclusive community interaction, aligning with regulatory expectations and community values throughout the project lifecycle.
Describe whether the activity is likely to result in some individuals or communities being significantly disadvantaged, including a change in the level of demand for community resources (e.g. community facilities / services, and labour force).
The Proposed Activity is expected to contribute no further impacts on the surrounding community or demographics of the region than the Existing Project, due to the small scale of the construction works and limited duration.
Describe whether the activity likely to result in any impacts on the health, safety, privacy or welfare of individuals or communities because of factors such as pollution, odour, noise, vibration, lighting, visual impacts, etc.
The scale of environmental impacts will not be significantly different as a result of the Proposed Activity than the Existing Project and will not result in a substantial change or disruption to the community. The Proposed Activity is expected to have no further impacts on the surrounding community or demographics of the region due to the small scale of the construction works and limited duration. The Study Area's distance from nearby residences and receivers limits any visual or aesthetic impacts imposed by the installation of a solar array and continued operation of the Kahlua Pilot. In addition, an enclosed box flare is currently in place. Although the potential for any visual impacts to nearby residences is minimal this is mitigated by the use of the enclosed box flare.
Describe if the activity is likely to have any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations.
The Proposed Activity is expected to contribute no further impacts on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations than the Existing Project, due to the small scale of the construction works and limited duration.
What is the likely level of any social impacts?
Negligible
Outline any proposed management controls and/or mitigation measures.
Mitigation measures will be implemented to minimise potential social impacts, including: • Carry out stakeholder consultation in addition to the previous extensive consultation undertaken for the medium impact level assessment for the approved Activity Approval dated 15 March 2023, in accordance with the Exploration code of practice: Community Consultation (Department of Regional NSW, May 2023). • Carry out the Proposed Activity in consultation with the landholder. • Adopt local hiring practices and local procurement of goods and services, where practicable and feasible, so as to maximise the potential for regional economic benefits.
Economic impacts
Provide a brief description of any likely economic impacts.

Economic impacts
The Proposed Activity is expected to have no further impacts on the local economy due to the small scale of the construction works and limited duration. The Proposed Activity will generate short-term employment opportunities, and a small construction workforce may be accommodated in the local community.
What is the likely level of any impacts?
Positive
Outline any proposed management controls and/or mitigation measures.
Mitigation measures will be implemented to minimise potential social impacts, including: • Carry out stakeholder consultation in addition to the previous extensive consultation undertaken for the medium impact level assessment for the approved Activity Approval dated 15 March 2023, in accordance with the Exploration code of practice: Community Consultation (Department of Regional NSW, May 2023). • Carry out the Proposed Activity in consultation with the landholder. • Adopt local hiring practices and local procurement of goods and services, where practicable and feasible, so as to maximise the potential for regional economic benefits.
Heritage impacts
Describe whether the activity is likely to cause impacts on localities, places, landscapes, buildings or archaeological relics of heritage significance.
No disturbance will occur outside the Existing Disturbance Footprint. As such, the Proposed Activity is not anticipated to cause impacts on localities, places, landscapes, buildings or archaeological relics of heritage significance.
What is the likely level of the impact?
Negligible
Outline any proposed management controls and/or mitigation measures.
Mitigation measures will be implemented to minimise potential heritage impacts, including: • Work crews will receive site inductions that include the contents of the Unanticipated Finds Protocol and a cultural heritage awareness component to assist them in recognising Aboriginal artefacts and make them aware of legislative protections of Aboriginal objects under the National Parks and Wildlife Act 1974. • If during works, Aboriginal artefacts or skeletal material are noted, all work will cease and the procedures in the Unanticipated Finds Protocol will be followed.
Aesthetic impacts
Describe whether the activity is likely to cause impacts on the visual or scenic landscape, including any lighting, venting or flaring of gas.
The Proposed Activity is expected to have no further aesthetic impacts on the on the visual or scenic landscape due to the small scale of the construction works and limited duration. The Study Area's distance from nearby residences and receivers limits any visual or aesthetic impacts imposed by the installation of a solar array and continued operation of the Kahlua Pilot. In addition, an enclosed box flare is currently in place. Although the potential for any visual impacts to nearby residences is minimal this is mitigated by the use of the enclosed box flare.
What is the likely level of any impacts?

Aesthetic impacts
Negligible
Outline any proposed management controls and/or mitigation measures.
Mitigation measures will be implemented to minimise potential aesthetic impacts, including: • Carry out stakeholder consultation. • Carry out the Proposed Activity in consultation with the landholder. • Adopt local hiring practices and local procurement of goods and services, where practicable and feasible, so as to maximise the potential for regional economic benefits.
Cultural impacts
Describe the likely impacts associated with any disturbance of the ground surface or any culturally modified trees.
No disturbance will occur outside the Existing Disturbance Footprint. As such, the Proposed Activity will have no new impact on Aboriginal or Non-Aboriginal cultural heritage, including the disturbance of ground surface and culturally modified trees.
Describe whether the activity will affect known Aboriginal objects or Aboriginal places.
No disturbance will occur outside the Existing Disturbance Footprint. As such, the Proposed Activity will have no new impact on items or places of Aboriginal cultural heritage.
Describe whether the activity is located in areas where landscape features indicate the presence of Aboriginal objects.
A specialist Aboriginal Heritage Due Diligence Assessment (AHDDA) was completed for the Existing Project (OzArk, 2022). The AHDDA identified a total of six aboriginal culture heritage items / sites within the Existing Project area, however the Proposed Activity does not pose a risk of damage to these items as there is no new disturbance outside the Existing Disturbance Footprint. The proposed surface disturbance associated with the proposed solar array will be undertaken on the existing disturbance area of well pad K2. There are no identified aboriginal culture heritage items / sites on well pad K2.
Describe whether the activity will affect areas where native title exists or land subject to native title claims, indigenous land use agreements or joint management agreements.
The Proposed Activity does not exist within or will impact areas subject to native title, indigenous land use agreements or joint management agreements.
What is the likely level of any cultural impacts?
Negligible
Outline any proposed management controls and/or mitigation measures.
Mitigation measures will be implemented to minimise potential heritage impacts, including: • Work crews will receive site inductions that include the contents of the Unanticipated Finds Protocol and a cultural heritage awareness component to assist them in recognising Aboriginal artefacts and make them aware of legislative protections of Aboriginal objects under the National Parks and Wildlife Act 1974. • If during works, Aboriginal artefacts or skeletal material are noted, all work will cease and the procedures in the Unanticipated Finds Protocol will be followed.

Land use impacts
Provide a brief description of any impacts on land use including any major changes to land use and/or curtailment of other beneficial land uses.
The Proposed Activity is contained within the Existing Disturbance Footprint. The solar array is proposed to be located on well pad K2, however the final location is subject to final design. The solar array would have limited impacts on existing land uses, and all activities will be conducted pursuant to landholder access agreements.
What is the likely level of any impacts?
Negligible
Outline any proposed management controls and/or mitigation measures.
Mitigation measures will be implemented to minimise potential impacts on land use including: • Carry out the Proposed Activity in consultation with the landholder and through the development of a land access and compensation agreement. • Stockpile topsoil separately so that the soil profile is maintained when backfilled. • Manage stockpiled material in accordance with standard sediment and erosion control management measures. • Carry out decommissioning and rehabilitation in consultation with the landholder and in accordance with the relevant guidelines including the Exploration Code of Practice: Rehabilitation (NSW Government 2012c).
Transportation impacts
Provide a brief description of any significant impacts on transportation.
No significant impacts are anticipated from the Proposed Activity on transportation. Impacts from the Proposed Activity on traffic would be generally consistent with the Existing Project if not to a lesser extent. Traffic generation would continue during construction and operation of the Proposed Activity at volumes less than those considered for the construction of the Existing Project.
What is the likely level of any impacts?
Negligible
Outline any proposed management controls and/or mitigation measures.
Mitigation measures will be implemented to minimise potential impacts on transportation including: • Develop and implement a Traffic Management Plan (inclusive of security measures).
Consistency with applicable local strategic planning statements, regional strategic plans or district strategic plans
Provide a brief description of any relevant local strategic planning statements, regional strategic plans or district strategic plans and whether the proposed activity is consistent with these.
The Review of Environmental Factors detailing the Proposed Activity has been prepared in accordance with Gunnedah Local Environmental Plan 2012. The proposed activity would not affect any applicable local strategic planning statements, regional strategic plans or district strategic plans.
What is the likely level of any impacts?
Negligible

Consistency with applicable local strategic planning statements, regional strategic plans or district strategic plans
Outline any proposed management controls and/or mitigation measures.
No additional management controls and/or mitigation measures are proposed, beyond those outlined above to ensure that the Proposed Activity is consistent with the Gunnedah Local Environmental Plan 2012.
Matters of national environmental significance
Is the activity likely to impact on any of the following matters of national environmental significance under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*? Select as relevant:
N/A
Provide further details relating to any impacts on matters of national environmental significance.
No impacts to MNES are anticipated as the Proposed Activity will be undertaken within the Existing Disturbance Footprint. The Kahlua pilot project has been assessed against the relevant NSW state and Australia federal groundwater impact assessment criteria. This has included relevant, and recently issued, water sharing plan rules for the MDB porous rock groundwater source (Gunnedah Oxley Basin) and the Namoi Alluvial groundwater source (Zone 2), the NSW AIP minimal impact considerations and the EPBC Act water trigger criteria. Consistent with the temporary nature and depth of the extraction and the relatively minor volumes to be extracted, impacts are expected to be negligible and unlikely to result in a reduction in the current and future utility of affected aquifers. As such, the impacts are not considered to represent a 'significant impact' and therefore do not require referral under the EPBC Act water trigger.
What is the likely level of any impacts?
Nil/Not applicable
Outline any proposed management controls and/or mitigation measures.
Not applicable
Cumulative impacts
Is the activity likely to result in cumulative environmental effects with other existing or likely future activities?
No
Describe the impact.
Due to the limited scale of the Proposed Activity and its separation distance from existing projects such as the Gunnedah Coal Handling and Preparation Plan, Gunnedah Waste Facility and Gunnedah Quarry, it is generally not expected that significant cumulative impacts will occur.
What is the likely level of any impacts?
Negligible
Outline any proposed management controls and/or mitigation measures.
While it is unlikely that significant cumulative impacts would result from the Proposed Activity, an additional

Cumulative impacts
proposed measure has been provided to monitor and adapt the traffic management plan as necessary if any issues arise.
Environmental assessment conclusions
Having regard to the potential significance of the individual impacts of the proposed activity (as well as the aggregation of all the impacts of the activity) determine whether (select as relevant):
the activity is not likely to significantly affect the environment, including threatened species or ecological communities (or their habitats), or declared areas of outstanding biodiversity value/critical habitat.
Provide any further details as relevant.
The Proposed Activity is located within, and will result in minimal additional disturbance to the Existing Disturbance Footprint, largely being a continuation of the Existing Project. The total impact of the Proposed Activity, based on the classification of individual impacts, has been found to be low adverse. The Proposed Activity would not be likely to have a significant impact on the environment or a significant impact on Matters of National Environmental Significance. Accordingly, an environmental impact statement or species impact statement are not required under the EP&A Act and a referral is not required under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Attachment 4 – List of supporting documents

- OPS - OUT - EPA Advice - APO0002071 | APO0002071 - Kahlua Pilot - Santos Qnt PTY.LTD.eml
- AINST0017145Survey Results.pdf
- AINST0017145Survey Results.pdf
- AINST0017145Survey Results.pdf
- AINST0017145Survey Results.pdf
- RE: ![EXT]: APO0002071 | APO0002071 - Kahlua Pilot - Santos Qnt PTY.LTD..eml
- image007.png
- image006.png
- RE: ![EXT]: APO0002071 | APO0002071 - Kahlua Pilot - Santos Qnt PTY.LTD..eml
- image001.png
- OPS - OUT - Email - EPA Advice - APO0002071 - Kahlua Pilot - Santos Qnt PTY.LTD..eml
- image001.png
- image009.png
- image005.png
- Santos PEL 1 Rehabilitation Cost Estimate revision (RCE002685 / APO0002071).eml
- AINST0017145Survey Results.pdf
- AINST0017145Survey Results.pdf
- AINST0017145Survey Results.pdf
- Kahlua Pilot ADP location and protected areas v1.pdf
- Protected Matters - MNES layers - October 7th 2025.pdf
- APO Figure 8 State Heritage Inventory Map JPEG 0209202502_v1.jpeg
- Photographs.zip
- Aboriginal cultural heritage records search.zip
- Threatened species or ecological communities records search.zip
- Site Plan and location details.zip
- AINST0017145Survey Results.pdf
- AINST0017145Survey Results.pdf
- AINST0017145Survey Results.pdf