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12 September 2022

Santos Reference: NSW22-01

NSW Resources Regulator
Mining Act Inspectorate
PO Box 344
Hunter Region Mail Centre NSW 2310

Dear Resources Regulator,

Application to conduct exploration activities for assessable prospecting operations, PEL 1 - Seismic Survey including a Guideline Review of Environmental Factors

Santos QNT Pty Ltd (Santos) as Operator of PEL 1 held by Santos and Australian Coalbed Methane Pty Limited has prepared the attached application to conduct exploration activities for assessable prospecting operations and a Guideline Review of Environmental Factors in accordance with Section 5.5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), clause 228 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) and the ESG2: Guideline for Preparing a Review of Environmental Factors (DISRD, 2015a).

Santos is seeking to undertake a seismic survey within the Gunnedah Basin within PEL 1.

The following information is attached in support of the application:

- Attachment 1 – ESF4 Application to conduct exploration activities for assessable prospecting operations;
- Attachment 1a – ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure;
- Attachment 1b – Rehabilitation Cost Estimate;
- Attachment 2 – Plans; and
- Attachment 3 – Review of Environmental Factors.

Please contact Santos should you have any further enquiries.

Yours sincerely,



**Team Leader - Environment
Santos**

ATTACHMENT 1 – ESF4 Application to conduct exploration activities for assessable prospecting operations

FORM

ESF4 Application to conduct exploration activities for assessable prospecting operations

May 2020

Mining Act 1992, Petroleum (Onshore) Act 1991 and Work Health and Safety (Mines and Petroleum Sites) Act 2013.

When to use this form

This form must be used to:

- seek approval to conduct assessable prospecting operations in NSW (refer to Sections 23A and 44A of the *Mining Act 1992*)
- seek approval to modify an approved assessable prospecting operation.

This form may also be used to:

- notify the NSW Resources Regulator of the appointment of a mine operator of a workplace where exploring for minerals is taking place, prior to commencement (refer to clauses 6 and 7 of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014, which requires notification of the appointment of a 'mine operator', being the operator of a workplace where 'mining operations' are being carried out, prior to commencement. Mining operations includes exploring for minerals by mechanical means.
- notify the NSW Resources Regulator of the commencement of exploring for minerals (refer to clause 129 of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014, which requires notification prior to the commencement of 'mining operations' - which includes exploring for minerals, however, excludes exploring by non-mechanical means.

You do not need to complete this form if you are conducting prospecting operations identified as exempt development under State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.

This form has been prepared and approved in accordance with the *Mining Act 1992*, *Mining Regulation 2016*, *Petroleum (Onshore) Act 1991*, *Petroleum (Onshore) Regulation 2016*, *Work Health and Safety (Mines and Petroleum Sites) Act 2013* and *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*.

The information requested in this form may not be specifically referenced in the *Mining Act 1992*, *Mining Regulation 2016*, *Petroleum (Onshore) Act 1991*, *Petroleum (Onshore) Regulation 2016*, *Work Health and Safety (Mines and Petroleum Sites) Act 2013* or *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*, however, its inclusion in the approved form validates the authority of the NSW Department of Planning, Industry and Environment, NSW Resources Regulator to request it.

If there is insufficient room in the fields please provide the information as an attachment.

Important notes

Any information or template that is required to accompany this application should be lodged within 10 business days of the lodgement date. Failure to supply the information within this timeframe may be considered as grounds for refusing the application according to Schedule 1B, clause 6(d) of the *Mining Act 1992*.

If this application is lodged by any party other than the authority holder (i.e. an agent), the department may seek confirmation of that authority and any limits of that authority (*Mining Act 1992* Section 163F and *Mining Regulation 2016* Clause 97).

The department may make the information in the form and any supporting information available for inspection by members of the public, including by publication on the department's website or by displaying the information at any of its offices. If you consider any part of your application to be confidential, please provide that part in a separate addendum clearly marked 'Confidential'.

Please read the following guides before completing this form:

- [ESG5: Assessment requirements for exploration activities](#)
- [ESG2: Guideline for preparing a review of environmental factors](#)
- [Guideline for agricultural impact statements at the exploration stage](#)

Exploration in exempted areas

Exempted areas are defined in the *Mining Act 1992* and the *Petroleum (Onshore) Act 1991* as lands set aside for public purposes. Exempted areas include travelling stock routes, road reserves, state forests, state conservation areas, public reserves/commons and land held under a lease for water supply.

The Minister's consent is required before the department can approve exploration activities in exempted areas.

This application cannot be processed until Ministerial consent has been obtained.

To apply for approval to prospect in an exempted area, contact the Division of Resources and Geoscience – Resource Operations by phone: (02) 4063 6600 or email:

titles.services@planning.nsw.gov.au

Exploration in State Conservation Areas

The Department of Planning, Industry and Environment (National Parks and Wildlife Service) is responsible for management of [State Conservation Areas](#) (SCAs) under the *National Parks and Wildlife Act 1974*. This application cannot be processed until approval from the National Parks and Wildlife Service has been obtained. If you are applying to carry out activities in a State Conservation Area, you must first obtain the following before your application can be processed by the department:

- approval from the Minister administering the [National Parks and Wildlife Act 1974](#) (Section 47J(7))
- a Review of Environmental Factors (REF) approved by the [National Parks and Wildlife Service](#).

Surface Disturbance Notice

The conditions of some older authorities require authority holders to provide a Surface Disturbance Notice before carrying out exploration activities. This application is regarded as a Surface Disturbance Notice (SDN) for the notification of exploration activities.

Modification of approved exploration activities

To modify an already approved exploration activity, the modification must be substantially the same as the existing approval and have environmental impacts consistent with those already assessed and approved. Otherwise, a new application for the entire activity must be made.

A modification could include:

1. A change to the timing/scheduling of the activity (including extending a time-based approval).
2. A change to the location and/or layout of the activity. For example:
 - within the boundary of an area already assessed
 - within an area already disturbed
 - within an area where the impact will be similar to that already assessed.

This could include the relocation of approved drill holes within a reasonable distance of the original location/s that meet the above standards.

3. A reduction in the nature and scale, and related disturbance, of the originally approved activity.

A modification does not include:

- a change to the location of the activity outside of the area previously assessed.
- an increase in the nature and scale, and related disturbance, of the original activity.
- an increase in the quantity/number of activities (e.g. number of drill holes, number of excavations, increased clearing etc.).

How to submit this form

- By email: Send an electronic copy of the form including any attachments to:
nswresourcesregulator@service-now.com
- By mail: Mail your form and attachments to: NSW Resources Regulator, Mining Act Inspectorate, PO Box 344, Hunter Region Mail Centre NSW 2310.
- In person: Submit your application in person at Department of Planning, Industry and Environment, NSW Resources Regulator, 516 High Street, Maitland, NSW. Office hours are 9.30am to 4.30pm.

How this application will be processed

Once your application has been registered and checked, it will be assessed by the department. The Minister (or their delegate) will consider the department's recommendation and all relevant information and may propose to grant or refuse the application.

1. Authority details

Exploration licence (EL) or Assessment lease (AL) number	Petroleum Exploration Licence 1
Act	Petroleum (Onshore) Act 1991
Authority expiry date	12 April 2028

2. Authority holder/s details

Provide the full name of authority holder/s and if applicable, the ACN or ARBN (for foreign companies)

Name	Australian Coalbed Methane Pty Limited
ACN/ARBN	002 606 288
Registered street address	Suite 3 Level 2 66 Clarence Street SYDNEY NSW 2000
Postal address	<input checked="" type="checkbox"/> Same as above Enter here if different

Name	Santos QNT Pty Ltd
ACN/ARBN	083 077 196
Registered street address	Ground Floor Santos Centre 60 Flinders Street ADELAIDE SA 5000
Postal address	<input checked="" type="checkbox"/> Same as above Enter here if different

Name	
ACN/ARBN	
Registered street address	

FORM

ESF4 Application to conduct exploration activities
for assessable prospecting operations

Postal address

Same as above

Enter here if different

Additional authority holders

Provide the full name, ACN or ARBN (for foreign companies) registered street address and postal address details of additional authority holders

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3. Contact for the authority holder

Any correspondence relating to this application will be sent to this person

Contact name	
Position held	Team Leader - Environment
Company	Santos Limited
Postal address	GPO Box 1010 BRISBANE QLD 4001
Phone (including area code)	
Mobile	
Email	

Your preferred contact method

- Email (For companies – provide a generic company email address that is regularly monitored rather than an individual employee's email address.)
- Mail

4. Appointment of a 'mine operator'

The *Work Health and Safety (Mines and Petroleum Sites) Act 2013* and associated Regulation requires the authority holder to provide notification of the appointment of a 'mine operator', being the operator of a workplace where 'mining operations' are being carried out. 'Mining operations' includes exploring for minerals by mechanical means (refer Section 5 for clarification regarding 'mechanical means').

Appointment of a 'mine operator' and notification to the NSW Resources Regulator is required prior to the commencement of exploring by mechanical means.

4.1. Do you want to appoint a mine operator and give notice to the Regulator pursuant to clauses 6 and 7 of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014?

No. Go to Section 5

Yes. Complete the table below and the declaration in Section 4.2

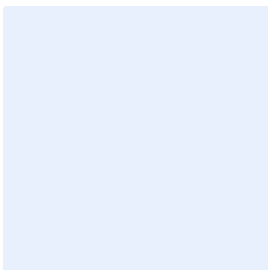
Name of mine operator	
ACN/ABN/ARBN	
Postal address	
Business address	
Phone (including area code)	
Mobile	
Email	
Date appointment takes effect	
Name of contact person	

4.2. Declaration by mine operator

I am the nominated mine operator listed in **Section 4.1** above and I declare that:

- I agree to be appointed as the mine operator for the mine(s) or petroleum site(s) listed in **Section 11**.
- I am / will be a person conducting a business or undertaking at the mine or petroleum site.
- I have been appointed to carry out mining operations at the mine, or petroleum operations at the petroleum site, on behalf of the mine holder or petroleum site holder
- I have the skills, knowledge, experience and resources to exercise the functions of the mine operator of the mine or petroleum site.

- I have been appointed by the mine or petroleum site holder to have management or control of the mine or petroleum site and to discharge the duties of the mine operator under the work health and safety laws.
- I have been given all the relevant information under the control of the mine or petroleum site holder that is required by the mine operator to discharge the duties imposed on the mine operator under the work health and safety laws.
- I authorise the contact person (identified in **Section 4.1** above) to receive any documents (including notices) on my behalf, for the purposes of the work health and safety laws.
- I consent to NSW Resources Regulator making enquiries and exchanging information with government agencies, in NSW and in other states or territories or the Commonwealth regarding any matter relevant to this form.
- The details of the mine operator specified in **Section 4.1** of this form are correct.

Mine operator's name	
Position/title	
Date	
Signature	

NOTE: Giving false or misleading information is a serious offence under section 268 of the *Work Health and Safety Act 2011* and Part 5A of the *Crimes Act 1900*.

NOTE: Clause 7(2) of the *Work Health and Safety (Mines and Petroleum Sites) Act 2013* requires an authority holder who is also a mine operator to notify the Regulator.

NOTE: A mine or petroleum site 'mine operator' must notify the regulator of any change to the contact person's details provided below. Penalties apply if changes are not notified as soon as practicable (and no later than 28 days) after any change. Notifications must be made by submitting the [Change of contact details of operator form](#) to the Regulator.

5. Notification of commencement of operations

The *Work Health and Safety (Mines and Petroleum Sites) Act 2013* and associated Regulation requires notification prior to the commencement of 'mining operations' - which includes exploring for minerals by mechanical means that disturb the ground (refer to clause 129 of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*)

Mechanical exploration that disturbs the ground must be notified before commencement.

Notification is **not required** for mining or petroleum operations that only involve exploration for minerals or petroleum **by non-mechanical means**. **Non-mechanical exploration** means exploring for minerals or petroleum (other than by mechanical means that disturb the ground) and includes the following:

- geological mapping
- sampling and coring using hand-held equipment
- geophysical surveying (but not seismic surveying) and borehole logging
- access by vehicle (but not if access requires the construction of an access way such as a track or road)
- shallow reconnaissance drilling involving no more than minimal site preparation (e.g. non-mechanical means such as a hand auger)
- minor excavations (but not costeaning or bulk sampling) (e.g. non-mechanical means such as using hand held equipment)

5.1. Do you want to notify the Regulator of the commencement of operations the subject of this application pursuant to clause 129 of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*?

No. Go to **Section 6**

Yes. Complete the table below and declaration in **Section 5.2**

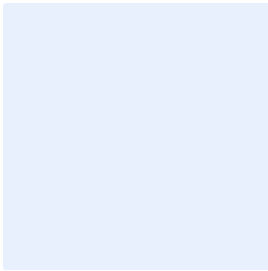
Name of mine operator	
ACN/ABN/ARBN	

Proposed date of commencing operations	(notification must be before commencement)
Date of intended conclusion of operations	
GPS co-ordinates of the area covered by the exploration site and in the case of a petroleum site, the coordinates of the location of any proposed wells.	cross reference can be made to the details provided in Section 11

5.2. Declaration of commencement of operations by the mine operator

I declare that:

- In giving this notice as the mine operator, I understand that I have satisfied the requirements under clause 129 of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 to notify the regulator of commencement of mining.

Mine operator's name	
Position/title	
Date	
Signature	

NOTE: Giving false or misleading information is a serious offence under section 268 of the *Work Health and Safety Act 2011* and Part 5A of the *Crimes Act 1900*.

6. Exempted areas

Exempted areas are defined in the *Mining Act 1992* and *Petroleum (Onshore) Act 1991* as lands set aside for public purposes, which includes travelling stock routes, road reserves, state forests, state conservation areas, public reserves/commons and land held under a lease for water supply. Exempted areas require Ministerial consent – **this application cannot be processed until Ministerial consent has been obtained.**

6.1. Will the activity include prospecting in an exempted area?

No. Go to **Section 7**

Yes. Continue to **Section 6.2**

6.2. Prospecting in exempted areas

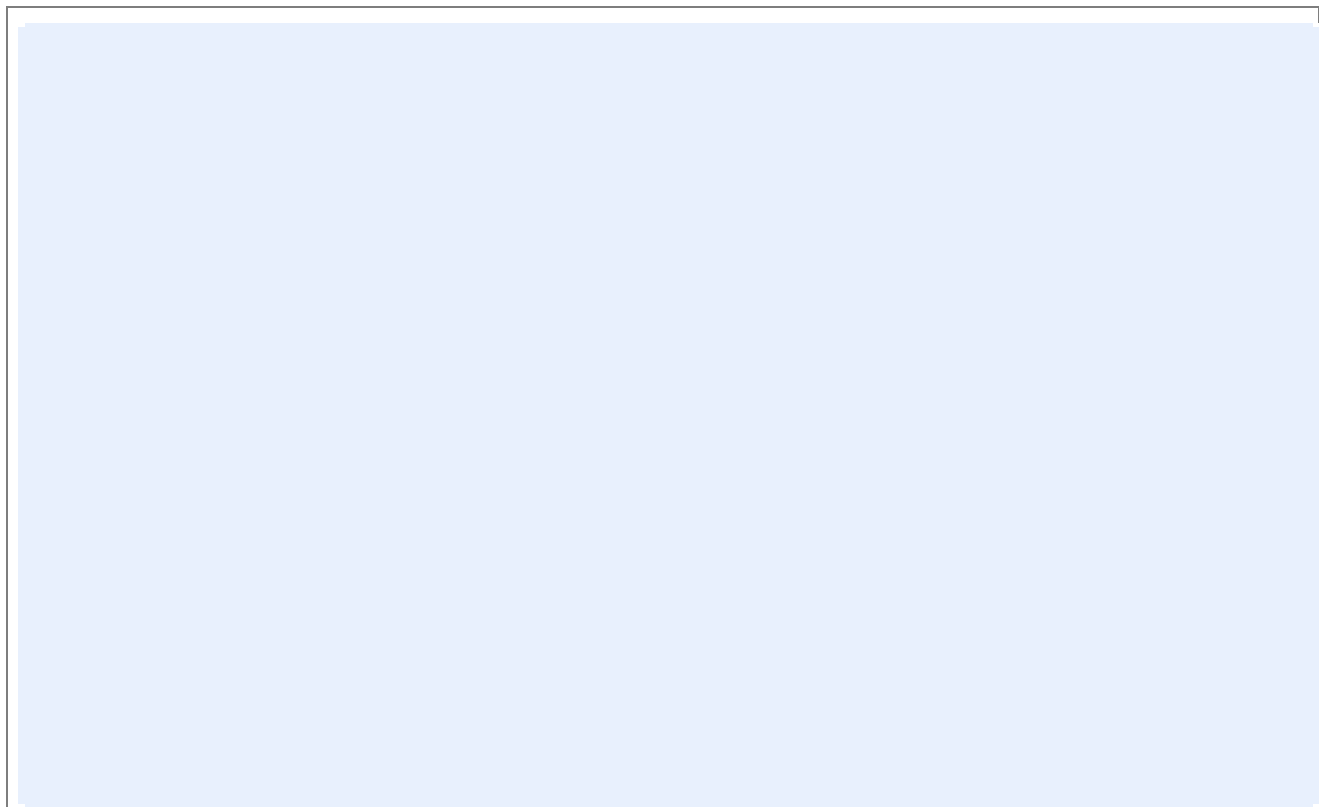
6.2.1. Minister's consent

Attach a copy of the Minister's consent to prospecting in exempted areas. To apply for approval to prospect in an exempted area, contact the Division of Resources and Geoscience – Resource Operations Unit by phone (02) 4063 6600 or email titles.services@planning.nsw.gov.au.

I have attached a copy of the Minister's consent to prospect in an exempted area.

6.2.2. Identify exempted areas

Identify the exempted areas where prospecting activities will take place:



Insert a map in the field above or enter your text here

7. State conservation areas

If you are applying to conduct prospecting activities in a State Conservation Area, **you must** obtain the approvals below (**Section 7.2**) before your application can be processed by the department. Requests for approval to prospect in a State Conservation Area are to be submitted to the relevant regional office of the National Parks and Wildlife Service.

7.1. Will the activity include prospecting in a State Conservation Area?

No. Go to **Section 8**

Yes. Complete **Sections 7.2, 8, 10, 18, 19 and 20** only.

7.2. Prospecting in a State Conservation Area

7.2.1. Minister's consent

If you are applying to carry out activities in a State Conservation Area, you must obtain approval from the Minister administering the *National Parks and Wildlife Act 1974* ([Section 47J\(7\)](#)).

I have attached a copy of the Minister's consent to prospect in a State Conservation Area.

7.2.2. Review of environmental factors

The Department of Planning, Industry and Environment (National Parks and Wildlife Service) manages State Conservation Areas under the *National Parks and Wildlife Act 1974*. If you are applying to conduct prospecting activities in a State Conservation Area, you must provide the department with a [Review of Environmental Factors](#) which has been approved by the National Parks and Wildlife Service.

I have attached a copy of the review of environmental factors approved by the National Parks and Wildlife Service.

7.2.3. Identify the State Conservation Area

Identify the State Conservation Area/s where prospecting activities will take place.

Insert a map in the field above or enter your text here

8. New application or modification of approved exploration activities

To modify an already approved exploration activity, the modification must be substantially the same as the existing approval and have environmental impacts consistent with those already assessed and approved. Otherwise, a new application for the entire activity must be made. Refer to explanatory notes on page 3 of this form for further clarification.

8.1. Is this a new application for approval or an application to modify an existing approved activity?

New application for approval. Complete the details below, then go to **Section 9**

Project name	PEL 1 Seismic
Project location	PEL 1 - Gunnedah Basin
Brief description	Approximately 63km of seismic survey

OR

Modification of an approved application. Complete the details below, then continue to **Sections 8.2, 11, 18, 19 and 20 only.**

Approved project or activity name	
Department reference and date of previous approval	
Reason for modification	

8.2. Modification of an approved application

Describe the modification to the approved application and the environmental impacts.

9. Application type and assessment requirements

Environmental assessment requirements vary depending on whether a proposed activity is a 'Complying Exploration Activity' or a 'Non-Complying Exploration Activity'. Refer to Section 4 of [ESG5 Assessment requirements for exploration activities](#) to determine whether a proposed activity is a Complying Exploration Activity or a Non-Complying Exploration Activity.

An activity can only be assessed under the Complying Exploration Activity pathway if all boxes in **Sections 14** and **15** have been ticked as 'No' and none of the impact thresholds and criteria in **Section 15** have been exceeded.

Petroleum exploration activities are not eligible to be assessed under the Complying Exploration Activity assessment pathway.

Select one application type and assessment pathway only.

Complying exploration activity (minerals or coal authorities only)

Complete all sections in this form, apart from **Sections 10, 12 and 17**.

Note: Information provided in this form regarding an activity which meets the Complying Exploration Activity criteria will be taken to be a Review of Environmental Factors for the purposes of any authority conditions which require the submission of a Review of Environmental Factors.

OR

Non-complying exploration activity (minerals or coal authorities only)

Select one of the options below

- Option 1: Complete all sections in this form to provide a targeted review of environmental factors.
- Option 2:
- Complete only **Sections 1-3, 6-11 and 18-20** of this form
 - Attach a Guideline Review of Environmental Factors prepared in accordance with [ESG2 Guideline for preparing a Review of Environmental Factors](#)

OR

- Petroleum exploration activity (petroleum authorities)**
- Complete only **Sections 1-3, 6-11 and 18-20** of this form
 - Attach a Guideline Review of Environmental Factors prepared in accordance with [ESG2 Guideline for preparing a Review of Environmental Factors](#)

10. Agricultural impact statement

Under the [NSW Strategic Regional Land Use Policy](#), certain **Non-Complying Exploration Activities** must be accompanied by either a Level 1 or Level 2 Agricultural Impact Statement. When preparing an Agricultural Impact Statement, you should refer to the [Guideline for Agricultural Impact Statements at the Exploration Stage](#). An Agricultural Impact Statement may be included as part of a Guideline Review of Environmental Factors.

10.1. Project area location

Is any part of the project area located on, or within, 2 km of [Strategic Agricultural Land](#) or directly on [Land and Soil Capability Classes 1, 2 or 3](#)?

- Yes. Attach a Level 2 Agricultural Impact Statement. Go to **Section 11**
- No. Continue to **Section 10.2**

10.2. Entire project area

10.2.1. Indicate where the entire project area is located

The entire project area is located (check one or multiple boxes)

- A. Within a [State Forest](#), [Nature Reserve](#) or [State Conservation Area](#) or
- B. on existing residential, village, business or industrial zoned land under a [Local Environment Plan](#) (LEP), or
- C. within an existing mining lease, or
- D. on Land and Soil Capability Classes 7 or 8
- E. **and** 500 metres or further inside the boundary of the areas listed above.

If you **checked** boxes A or B or C or D (**and** then E above), go to **Section 11**

If **not**, continue to **Section 10.2.2**

10.2.2. Agricultural Impact Statement

If you **did not** check the relevant boxes in **Section 10.2.1**, you will need to attach a Level 1 Agricultural Impact Statement.

- I have attached a Level 1 agricultural impact statement. Enter any additional comments below.

11. Site plan and location details

Attach site plans and/or maps at an appropriate scale showing the following (as relevant):

- boundaries of the authority
- lot/DP numbers and boundaries
- topographic contours
- location of the proposed activity (including location of key features of the activity using MGA94 co-ordinates **or** co-ordinates of the **area** specified for proposed activity)
- GPS co-ordinates of the **area** covered by the exploration site and in the case of a petroleum site, the coordinates of the location of any proposed wells (**Note: This is a requirement of Clause 129 of the Work Health and Safety (Mines and Petroleum Sites) Act 2013 when notification of commencement of operations is provided to the Regulator (see Section 5).**)

- layout of the proposed activity (using dimensions and alignments where appropriate)
- major regional features
- existing and proposed access tracks
- existing structures and infrastructure (including dimensions and alignments where relevant)
- nearby sensitive receptors (including residences, educational establishments, hospitals, places of worship, etc)
- location of Aboriginal and European heritage sites (including AHIMS search) (refer to **Section 12.11** and **12.10**, respectively)
- location of identified sensitive land (refer to **Section 14**)
- location of threatened species or ecological communities, or their habitats (refer to **Section 15.4**).

Note: The site plans and/or maps required here can be included in a Guideline review of environmental factors.

Where the exact location of exploration sites are unknown, the plan(s) and/or map(s) should show the area that the proposed exploration activities and associated disturbance will occur. As such, the scope of this application to conduct assessable prospecting operations will be applicable to the areas demarcated on the attached plan(s) and/or map(s). Assessable prospecting operations proposed to be undertaken outside of approved areas would need to be the subject of a new application (or modification of the approved activities as outlined in **Section 8**).

11.1. Identify the area

Identify the map sheet within which the activities are proposed (where relevant include block number/s and unit letter/s for mineral authorities and petroleum titles). These details are referenced on your authority conditions.

Name of map sheet	Block number	Unit letter/s
Refer to Attachment 2 - Plans		

Name of map sheet	Block number	Unit letter/s

11.2. Site plan/s and map/s

List the site plans and maps you have attached to this application, including relevant plan/map title, dates, reference numbers.

	Reference No.	Name/title	Date
1	GUN 418a	Location Map	09/06/2022
2	GUN 418b	Tenure Coordinates	21/06/2022
3	GUN 418c	Bando 2d Seismic	21/06/2022
4	GUN 418d	Seismic Lines	22/06/2022
5			
6			
7			
8			
9			
10			
Add additional references and notes here			

11.3. Photographs of all sites to be disturbed

Attach photographs of all sites to be disturbed. List all the photographs attached, including relevant photograph titles, site locations and dates. Include a plan illustrating where the photographs were taken from and their aspect.

	Photo number /reference	Photo name/description
1	Refer to Appendix B - PEL 1 Seismic Line Flora and Fauna Assessment of Attachment 3	
2		

	Photo number /reference	Photo name/description
3		
4		
5		
6		
7		
8		
9		
10		
Add additional references and notes here		

12. Site description and existing environment

For help answering this section, refer to Sections 1 and 2 of [esg2 guideline for preparing a review of environmental factors](#). Spatial information regarding the site and existing environment can be viewed at the [NSW SEED environmental data portal](#). Importantly, where the exact location of assessable prospecting operations is unknown at the time of the application, a description of the sites and existing environment needs to address the areas as demarcated on the plan(s) and/or map(s) provided in **Section 11** of the application.

12.1. Existing land uses

Provide details of existing land uses that may be affected by the proposed activity and any proposed changes (temporary or otherwise) to the current land use/s during the activity.

12.2. Sensitive receptor/s

Describe the location, type and distance to the nearest sensitive receptor/s (including residences, educational establishments, hospitals, places of worship).

12.3. Soil types and properties

Describe the soil types and properties (including susceptibility to compaction, erosion and dispersion; presence of acid sulfate soils and potential acid sulfate soils). Refer to [Strategic Agricultural Land Maps](#), [Land and Soil Capability Class Maps](#) and [Acid Sulfate Soils Maps](#).

12.4. Surface water sources

Provide details of the existing surface **water** sources in the area that are likely to be affected by the activity. Provide details of the nearest watercourse/s and the distance between the proposed disturbance area/s and the nearest watercourse/s.

12.5. Groundwater sources

Provide details of any existing groundwater sources that occur in the area that are likely to be affected by the activity.

12.6. Vegetation cover

Describe the vegetation cover type, density and condition.

12.7. Critical habitat/area of outstanding biodiversity value

Provide details of any critical habitat/area of outstanding biodiversity value that is likely to be affected by the activity including:

- declared areas of outstanding biodiversity value under the Biodiversity Conservation Act 2016 as listed in the [Register](#) maintained by the Department of Planning, Industry and Environment.
- areas declared as critical habitat under the *Fisheries Management Act 1994* as recorded in the Department of Primary Industries [register of critical habitat](#).

12.8. Threatened species record search (wildlife and vegetation)

Attach copies of any relevant threatened species records kept by the Department of Planning, Industry and Environment according to the *Biodiversity Conservation Act 2016*. Refer to <mailto:www.bionet.nsw.gov.au> for this information. Ensure searches are relevant to the proposed disturbance areas.

A copy of the NSW BioNet search is attached (refer to [NSW BioNet](#)).

12.9. Aquatic habitat species record search

Attach copies of any relevant [threatened and protected species records for aquatic habitats](#) kept by the Department of Primary Industries according to the *Fisheries Management Act 1994*.

A copy of the threatened and protected species records for aquatic habitats search is attached.

12.10. Historic cultural or natural heritage items

12.10.1. Record searches

Attach copies of record searches for any historic cultural or natural heritage items that may be impacted by the activity. As a minimum, identify if any of the following are impacted. For any of the items below, only attach copies of **relevant** heritage searches.

Items listed on the [World Heritage List](#)

Items listed on the [Commonwealth Heritage List](#)

Items listed on the [National Heritage List](#)

[State Heritage Register](#)

Items listed in the heritage schedule of an [environmental planning instrument](#), such as a local council's Local Environment Plan

12.10.2. Describe any items of historic cultural or natural heritage that may be impacted by the activity

12.11. Aboriginal heritage sites

12.11.1. Describe the nearest Aboriginal sites or any sites that may be affected

Describe the location, type and distance to the nearest Aboriginal heritage sites and any impact the proposed activity will have on Aboriginal heritage sites (Aboriginal objects and places).

12.11.2. AHIMS search

For exploration activities, the [National Parks and Wildlife Act 1974](#) requires you to exercise due diligence to check if Aboriginal sites will be harmed.

The Department of Premier and Cabinet (Heritage) maintains the [Aboriginal Heritage Information Management System](#) (AHIMS) which you can use to undertake due diligence. The AHIMS includes:

- information about Aboriginal objects that have been reported to the Secretary, Department of Premier and Cabinet
- information about Aboriginal Places which have been declared by the Minister for Energy and Environment to have special significance with respect to Aboriginal culture
- archaeological reports.

Attach your AHIMS search to support that you have undertaken due diligence for this application.

I have attached a copy of the AHIMS search.

13. Description of the exploration activity

For guidance answering this section, refer to Section 3 [ESG2 Guideline for preparing a Review of Environmental Factors](#).

13.1. Activity description

Describe all stages of the activity, including before, during and after exploration, including rehabilitation. For drilling activities include drilling type, number of drill holes, drill hole depths and size of drill pads.

13.2. Exploration methods

Describe the exploration methods, including machinery and equipment to be used (including what equipment will be operating at any one time).

13.3. Total surface disturbance

Provide the total surface disturbance (in sqm/ha) for the proposed exploration program.

13.4. Earthworks or vegetation clearing

Detail any earthworks or vegetation clearing, including the re-use and disposal of cleared material (including use of spoil-on-site).

13.5. Timing and phasing of the activity

Describe the timing and any phasing of the activity (including anticipated commencement dates and anticipated completion dates for all activities).

13.6. Proposed sealing/suspension of drill holes/wells

Describe the proposed sealing/suspension of drill holes/wells, including details of any well head suspension, security, maintenance and monitoring programs.

13.7. Venting, flaring or re-use of gases

Describe any proposed venting, flaring or re-use of gases, including details of the system design and venting/flaring/re-use processes.

13.8. Access to exploration activities

Describe the means of access to the various exploration activities. Describe any upgrading of existing access tracks and any construction of new access tracks.

13.9. Ancillary activities

Provide details of any activities which are ancillary to the proposed exploration activities including requirements for water storage, ancillary infrastructure, temporary accommodation.

Note: Certain ancillary works and activities (such as accommodation camps and environmental assessment activities) do not constitute an 'exploration' or 'prospecting' activity under the *Mining Act 1992* or the *Petroleum (Onshore) Act 1991* and therefore cannot be approved by the department. The authority holder should obtain their own advice, and/or make their own enquiries with the relevant local council, Crown Lands controlling authority or the landholder regarding separate consent or approvals required under the *Environmental Planning and Assessment Act 1979* and/or *Local Government Act 1993*.

13.10. Proposed hours of operation

Provide details of the proposed hours of operation.

13.11. On-site employee or contractor numbers

Provide an estimate of on-site employee or contractor numbers.

13.12. Surface water management

Describe how surface water will be managed (including water sources, water usage, water storage and water disposal/reuse).

Note: for guidance answering this section, refer to Section 3.5 of ESG2 Guideline for preparing a Review of Environmental Factors.

13.13. Groundwater management

Describe how groundwater will be managed (including water produced, stored and disposed of/reused during exploration).

Note: for guidance answering this section, refer to Section 3.5 of ESG2 Guideline for preparing a Review of Environmental Factors.

13.14. Waste and excess material management

Describe the type, quantities and management of any waste and excess materials (including drill cuttings, waste water, solid wastes, radioactive material, hazardous wastes, restricted wastes or special wastes).

Note: for guidance refer to Section 3.5 of ESG2 Guideline for preparing a Review of Environmental Factors.

13.15. Chemical management

Detail the handling, use, storage and transportation of any chemicals and hydrocarbons.

Note: for guidance refer to Section 3.5 of ESG2: Guideline for preparing a Review of Environmental Factors.

13.16. Noise management

Describe how noise will be managed to minimise impacts on any nearby sensitive receivers.

Note: for guidance refer to Section 3.5 of ESG2: Guideline for preparing a Review of Environmental Factors.

13.17. Air quality management

Describe how air quality will be managed, including measures to minimise impacts resulting from any dust generation, venting, flaring and fugitive emissions.

Note: for guidance refer to Section 3.5 of ESG2: Guideline for preparing a Review of Environmental Factors.

14. Sensitivity of land to be disturbed

Advise whether the activity will occur on any of the types of land listed below (use the [SEED mapping portal](#) to view map layers). All sections must be completed. Explanatory notes are provided in Section 7.1 of [ESG5: Assessment Requirements for Exploration Activities](#) to assist authority holders in identifying land to which these location restrictions apply.

An activity can only be assessed under the Complying Exploration Activity assessment pathway if all boxes have been ticked as 'No'. Some of these areas are also 'exempted areas' under the *Mining Act 1992* and *Petroleum (Onshore) Act 1991* (refer to **Section 6**).

If you answer 'yes' to any of the sections below, provide an assessment of impacts by completing **Section 17**.

14.1. Conservation areas

Land	Yes	No
Land reserved under the <i>National Parks and Wildlife Act 1974</i>	<input type="checkbox"/>	<input type="checkbox"/>
Land acquired by the Minister for Energy and Environment under Part 11 of the <i>National Parks and Wildlife Act 1974</i>	<input type="checkbox"/>	<input type="checkbox"/>

Land	Yes	No
Land subject to a 'conservation agreement' under the <i>National Parks and Wildlife Act 1974</i>	<input type="checkbox"/>	<input type="checkbox"/>
Land declared as an aquatic reserve under the <i>Marine Estate Management Act 2014</i>	<input type="checkbox"/>	<input type="checkbox"/>
Land declared as a marine park under the <i>Marine Estate Management Act 2014</i>	<input type="checkbox"/>	<input type="checkbox"/>
Land within State Forests set aside under <i>the Forestry Act 2012</i> for conservation values, including Flora Reserves or Special Management (and other) Zones	<input type="checkbox"/>	<input type="checkbox"/>
Land reserved or dedicated under the <i>Crown Lands Act 1989 / Crown Lands Management Act 2016</i> (as applicable) for the preservation of flora, fauna, geological formations or other environmental protection purposes	<input type="checkbox"/>	<input type="checkbox"/>
Land identified as wilderness or declared a wilderness area under the <i>Wilderness Act 1987</i>	<input type="checkbox"/>	<input type="checkbox"/>
Land subject to a Biodiversity Banking and Offsets Scheme under the <i>Biodiversity Conservation Act 2016</i>	<input type="checkbox"/>	<input type="checkbox"/>

14.2. Drinking water catchment protection areas

Land	Yes	No
Land declared to be a 'controlled area' or a 'special area' under the <i>Water NSW Act 2014</i>	<input type="checkbox"/>	<input type="checkbox"/>
Land declared to be a 'special area' under the <i>Water Management Act 2000</i> or <i>Hunter Water Act 1991</i>	<input type="checkbox"/>	<input type="checkbox"/>

14.3. Sensitive areas

Note: The upgrade or use of existing access tracks on waterfront land can still be assessed as a Complying Exploration Activity, refer to Sections 7.1 and 7.2 of ESG5 Assessment Requirements for Exploration Activities

Land	Yes	No
Land declared as area of outstanding biodiversity value under the <i>Biodiversity Conservation Act 2016</i> or critical habitat under Part 7A of the <i>Fisheries Management Act 1994</i>	<input type="checkbox"/>	<input type="checkbox"/>
Wetlands of international significance listed under the Ramsar Wetlands Convention	<input type="checkbox"/>	<input type="checkbox"/>
Land designated as a nationally important wetland in the Directory of Important Wetlands	<input type="checkbox"/>	<input type="checkbox"/>
Coastal wetlands mapped under <i>State Environmental Planning Policy (Coastal Management) 2018</i>	<input type="checkbox"/>	<input type="checkbox"/>
Littoral rainforests mapped under <i>State Environmental Planning Policy (Coastal Management) 2018</i>	<input type="checkbox"/>	<input type="checkbox"/>
Coastal zone as defined in the <i>Coastal Management Act 2016</i>	<input type="checkbox"/>	<input type="checkbox"/>
Land identified in an environmental planning instrument as being of biodiversity significance or zoned for environmental conservation	<input type="checkbox"/>	<input type="checkbox"/>
Waterfront land defined under the <i>Water Management Act 2000</i>	<input type="checkbox"/>	<input type="checkbox"/>
Land with a slope greater than 18 degrees measured from the horizontal	<input type="checkbox"/>	<input type="checkbox"/>

14.4. Land with potential for soil and water contamination

Land	Yes	No
Land mapped as Actual Acid Sulfate Soils (AASS) or Potential Acid Sulfate Soils (PASS) on the Acid Sulfate Soils Risk Maps for NSW	<input type="checkbox"/>	<input type="checkbox"/>

14.5. Heritage protection areas (Aboriginal and European)

Land	Yes	No
Land declared as an Aboriginal place under the <i>National Parks and Wildlife Act 1974</i>	<input type="checkbox"/>	<input type="checkbox"/>
Land listed on the World Heritage List, National Heritage List or Commonwealth Heritage List	<input type="checkbox"/>	<input type="checkbox"/>
Land, places, buildings or structures listed on the NSW State Heritage Register	<input type="checkbox"/>	<input type="checkbox"/>
Land identified in an environmental planning instrument (such as a State Environmental Planning Policy, Regional Environment Plan or Local Environment Plan) as being of Aboriginal or European heritage significance	<input type="checkbox"/>	<input type="checkbox"/>

14.6. Critical industry clusters

Land	Yes	No
Land identified as Critical Industry Cluster under <i>State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007</i>	<input type="checkbox"/>	<input type="checkbox"/>

14.7. Community land

Land	Yes	No
Public land classified as community land under the <i>Local Government Act 1993</i>	<input type="checkbox"/>	<input type="checkbox"/>

14.8. Other areas

Land	Yes	No
Land identified on the authority as environmentally sensitive land	<input type="checkbox"/>	<input type="checkbox"/>

15. Impact thresholds and criteria

Provide details relating to the impact thresholds and criteria outlined below. These include cumulative impact thresholds from existing approved activities that have not yet been undertaken/rehabilitated to the satisfaction of the department. Explanatory notes are provided in Section 7.2 of [ESG5 Assessment Requirements for Exploration Activities](#) to assist authority holders in completing these details.

Note: An activity can only be assessed under the Complying Exploration Activity assessment pathway if all boxes have been ticked as 'no' and none of the impact thresholds and criteria have been exceeded. A previously approved/undertaken activity must be counted unless the department has acknowledged in writing that the area has been satisfactorily rehabilitated.

All sections, tick boxes and values must be completed – even if the value is zero

15.1. Vegetation clearing

15.1.1. Will cumulative vegetation clearing and/or removal of tree canopy exceed more than 1,000 square metres in any single hectare?

Note: Use a grid overlay of 1ha cells over the authority area for this calculation

- Yes. Provide assessment of impacts by completing Section 17.
- No

A = Clearing proposed	<i>example text</i> Drill hole a - 400sqm per ha Drill hole b - 400sqm per ha	m ²
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B = Clearing previously approved or undertaken	Within 1ha around drill hole a - 300sqm Within 1ha around drill hole b - 200sqm	m ²
C = Clearing in B that has now been rehabilitated <u>AND</u> approved in writing by the Department (include Departmental Ref. No.)	Within 1ha around drill hole a - 100sqm Within 1ha around drill hole b - 100sqm	m ²
Total Clearing = A + B - C	Within 1ha around drill hole a - 600sqm Within 1ha around drill hole b - 500sqm	m ²

15.1.2. Will cumulative vegetation clearing and/or removal of tree canopy exceed more than 1 hectare in any single unit of the authority (or every 250 hectares in the case of authorities which do not have units or do not align to unit boundaries)?

- Yes. Provide assessment of impacts by completing Section 17.
- No

A = Clearing proposed	example text 0.08 ha	ha
B = Clearing previously approved or undertaken	0.05 ha	ha
C = Clearing in B that has now been rehabilitated <u>AND</u> approved in writing by the department (include department Ref. No.)	0.02 ha	ha
Total Clearing = A + B - C	0.11 ha	ha

15.1.3. Will cumulative vegetation clearing and/or removal of tree canopy exceed more than 5 hectares in any single authority?

- Yes. Provide assessment of impacts by completing Section 17.
- No

A = Clearing proposed	example text 0.08 ha	ha
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B = Clearing previously approved or undertaken	<input type="text" value="0.05 ha"/>	ha
C = Clearing in B that has now been rehabilitated <u>AND</u> approved in writing by the department (include department Ref. No.)	<input type="text" value="0.02 ha"/>	ha
Total Clearing = A + B - C	<input type="text" value="0.11 ha"/>	ha

15.2. Surface disturbance and excavations

15.2.1. Will cumulative surface disturbances exceed a total of 1 hectare within any single unit of an authority (or every 250 hectares in the case of authorities which do not have units or do not align to unit boundaries)?

Yes. Provide assessment of impacts by completing Section 17.

No

A = Disturbance proposed	<input type="text"/>	ha
B = Disturbance previously approved or undertaken	<input type="text"/>	ha
C = Disturbance in B that has now been rehabilitated <u>AND</u> approved in writing by the department (include department Ref. No.)	<input type="text"/>	ha
Total disturbance = A + B - C	<input type="text"/>	ha

15.2.2. Will cumulative surface disturbance exceed a total of 5 hectares within any single authority?

Yes. Provide assessment of impacts by completing **Section 17**.

No

A = Disturbance proposed	<input type="text"/>	ha
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B = Disturbance previously approved or undertaken	<input type="text"/>	ha
C = Disturbance in B that has now been rehabilitated <u>AND</u> approved in writing by the department (include departmentRef. No.)	<input type="text"/>	ha
Total disturbance = A + B - C	<input type="text"/>	ha

15.2.3. Will cumulative excavations exceed 200 cubic metres within any single unit of an authority (or every 250 hectares in the case of authorities which do not have units or do not align to unit boundaries)?

- Yes. Provide assessment of impacts by completing **Section 17**.
- No

A = Excavations proposed	<input type="text"/>	m ³
B = Excavations previously approved or undertaken	<input type="text"/>	m ³
C = Excavations in B that has now been rehabilitated <u>AND</u> approved in writing by the Department (include Departmental Ref. No.)	<input type="text"/>	ha
Total excavations = A + B - C	<input type="text"/>	m ³

15.2.4. Will cumulative excavations exceed 1,000 cubic metres within any single authority?

- Yes. Provide assessment of impacts by completing **Section 17**.
- No

A = Excavations proposed	<input type="text"/>	m ³
B = Excavations previously approved or undertaken	<input type="text"/>	m ³

C = Excavations in B that has now been rehabilitated <u>AND</u> approved in writing by the Department (include Departmental Ref. No.)	<input type="text"/>	ha
Total excavations = A = B - C	<input type="text"/>	m ³

15.3. Extraction of groundwater (produced water)

15.3.1. Will cumulative extraction of groundwater from all exploration activities within the authority exceed 3 megalitres (ML) per year?

- Yes. Provide assessment of impacts by completing **Section 17**.
- No

A = Extraction proposed	<input type="text"/>	ML per year
B = Extraction previously approved or undertaken	<input type="text"/>	ML per year
C = Extraction in B that has now ceased	<input type="text"/>	ML per year
Total extraction = A + B - C	<input type="text"/>	ML per year

15.4. Ecology

15.4.1. Will the activity have a significant effect on threatened species or their habitats?

- No. Continue to **Section 15.4.2**
- Yes. Provide assessment impacts by completing **Section 17** and any relevant details below (and attach copies as relevant) of any supporting documentation e.g. test of significance undertaken in accordance with the criteria set out in [Section 7.3](#) of the *Biodiversity Conservation Act 2016*.

15.4.2. Will the activity have a significant effect on threatened ecological communities or their habitats?

- No. Continue to **Section 15.4.3**

- Yes. Provide assessment impacts by completing **Section 17** and any relevant details below (and attach copies as relevant) of any supporting documentation e.g. test of significance undertaken in accordance with the criteria set out in [Section 7.3](#) of the *Biodiversity Conservation Act 2016*.

15.4.3. Will vegetation be removed as part of access track upgrade works in waterfront land?

- No. Go to **Section 15.5**
- Yes. Provide assessment impacts by completing **Section 17** and relevant details of vegetation removal.

15.5. Aboriginal heritage

15.5.1. Will the activity harm Aboriginal objects?

- No. Go to **Section 15.6**
- Yes. Provide assessment impacts by completing **Section 17** and any relevant details below (and attach copies as relevant) of any supporting documentation (e.g. any Aboriginal archaeological due diligence assessments undertaken in accordance with the [NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects](#) (NSW Minerals Council Ltd, 2010).

15.6. European heritage

15.6.1. Will the activity damage heritage items?

- No. Go to **Section 16**
- Yes. Provide assessment impacts by completing **Section 17** and any relevant details below (and attach copies as relevant) of any supporting documentation.

16. Compliance with exploration codes of practice

[Exploration codes of practice](#) have been prepared by the department. The codes of practice are **only** applied to prospecting authorities granted, renewed or transferred in respect of applications received **after 1 July 2015**. Exploration activities undertaken pursuant to these titles must comply with the relevant exploration codes of practice to be assessed under the complying exploration activity pathway.

The codes of practice provide authority holders with information about the minimum performance requirements to ensure that exploration is undertaken to manage and minimise risks to the environment.

16.1. Does the authority include references to Category 1, Category 2 and Category 3 prospecting operations?

Yes. Do not complete remainder of Section 16. (Note: Compliance with the exploration codes of practice is not required as the existing conditions of the authority will apply as the management controls).

No. Complete **Section 16.2**, to confirm that the proposed prospecting operations will comply with the relevant exploration codes of practice.

16.2. Compliance requirements

Check the boxes to indicate that the proposed prospecting operations will comply with the relevant code.

Environmental management

Yes, the activity will be undertaken in accordance with the [Exploration code of practice: Environmental management](#).

Rehabilitation

Yes, the activity will be undertaken in accordance with the [Exploration code of practice: Rehabilitation](#).

Produced water management, storage and transfer

Yes, the activity will be undertaken in accordance with the [Exploration code of practice: Produced water management, storage and transfer](#). [This code is only relevant to prospecting operations where produced water will need to be stored on

<input type="checkbox"/>	site (excluding the management of incidental groundwater mixed with drilling fluids that can be temporarily contained in drilling sumps or above ground tanks)].
<input type="checkbox"/>	Not applicable.

16.3. Further details

Provide any further details relating to the above management controls and codes of practice as required.

17. Targeted review of environmental factors for non-complying exploration activities

Complete **Section 17** below to provide a Targeted Review of Environmental Factors (REF). This information should focus on the potential environmental impacts associated with the departure(s) from the relevant Complying Exploration Activities location restriction, impact threshold/criteria or management control. This would generally be appropriate for activities that do not significantly depart from the Complying Exploration Activities criteria.

17.1. Physical and pollution impacts

For guidance refer to Section 4.1 of [ESG2 Guideline for preparing a review of environmental factors](#).

17.1.1. Air impacts

Is the activity likely to impact on air quality? Consider air quality impacts:

- such as dust, smoke, odours, fumes, fugitive emissions, toxic or radioactive gaseous emissions with economic, health, ecosystem or amenity considerations
- through generation of greenhouse gas emissions or release of chemicals
- on nearby sensitive receptors

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.1.2. Water impacts

Is the activity likely to impact on water quality and/or water quantity? Consider impacts from:

- the use of surface or groundwater
- the storage of water
- changes to natural waterbodies, wetlands or runoff patterns
- aquifer interference including changes to inter-aquifer connectivity
- changes to flooding or tidal regimes
- changes in surface and groundwater quality and quantity

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.1.3. Soil and stability impacts

Is the activity likely to impact on soil quality or land stability? Consider any:

- degradation of soil quality including contamination, salinisation or acidification
- loss of soil from wind or water erosion
- increased land instability with high risks from landslides or subsidence

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.1.4. Noise and vibration impacts

Is the activity likely to have noise or vibration impacts on nearby sensitive receptors?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.1.5. Coastal processes and hazards

Is the activity likely to affect coastal processes and hazards including those under projected climate change conditions?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.1.6. Hazardous substances and chemicals

Is the activity likely to result in impacts associated with the use, generation, storage or transport of hazardous substances or chemicals?

Consider any:

- use, storage or transport of hazardous substances
- use or generation of chemicals which may build up residues in the environment
- chemicals or radioactive material that will be reacted, returned to the surface or left in a drill hole or target formation.

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.1.7. Wastes and emissions

Is the activity likely to result in any impacts to the environment resulting from the generation or disposal of gaseous, liquid or solid wastes or emissions?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.2. Biological impacts

For guidance refer to Section 4.2 of [ESG2: Guideline for preparing a review of environmental factors](#).

Fauna and flora (including impact on Threatened Species, or Ecological Communities or their Habitats) – for the purposes of Section 7.3 of the Biodiversity Conservation Act 2016, and in the administration of Sections 5.5 and 5.7 of the Environmental Planning and Assessment Act 1979, the matters below must be taken into account in deciding whether there is likely to be a significant effect on threatened species, or ecological communities or their habitats.

This assessment of significance must be undertaken pursuant to the assessment guidelines issued and in force under the Biodiversity Conservation Act 2016 or the Fisheries Management Act 1994. This assessment of the significance is the first step in considering potential impacts. When a significant effect is likely, a Species Impact Statement (SIS) prepared in accordance with the Biodiversity Conservation Act 2016 or the Fisheries Management Act 1994 may be required.

17.2.1. Vegetation

Is any vegetation to be cleared or modified (including vegetation of conservation significance)?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.2.2. Threatened species

Is the activity likely to have an adverse effect on the life-cycle of a threatened species such that a viable local population of the species is likely to be placed at risk of extinction?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.2.3. Area of outstanding biodiversity value (AOBV)/Critical habitat

Is the activity likely to have an adverse effect on AOBV / critical habitat (either directly or indirectly)? (Refer to **Section 12.7**)

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.2.4. Endangered ecological community or critically endangered ecological community

Select as relevant:

- The activity is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction.
- The activity is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.2.5. Habitat of a threatened species or ecological community

Select as relevant:

- The extent to which the habitat is likely to be removed or modified as a result of the activity will be significant.
- The area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the activity.
- The habitat to be removed, modified, fragmented or isolated is important to the long-term survival of the species, population or ecological community in the locality.

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.2.6. Recovery plan or threat abatement plan

Is the activity consistent with the objectives or actions of any relevant plan?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.2.7. Declared area of outstanding biodiversity value

Is the activity likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.2.8. Key threatening process

Will the activity constitute or form part of a [key threatening process](#) or is likely to result in the operation of, or increase the impact of, a key threatening process?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.2.9. Barriers to movement

Does the activity have the potential to endanger, displace or disturb fauna or create a barrier to their movement?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.2.10. Ecological and biosecurity impacts

Select as relevant:

- The activity is likely to cause a threat to the biological diversity or ecological integrity of an ecological community.
- The activity is likely to create a biosecurity risk or introduce modified organisms into an area.
- The activity is likely to cause a bushfire risk.

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.3. Resource use impacts

For guidance refer to Section 4.3 of [ESG2 Guideline for preparing a review of environmental factors](#).

17.3.1. Community resources

Is the activity likely to degrade or significantly increase the demand for services and infrastructure resources?

Note: Infrastructure includes roads, power, water, drainage, waste management, educational, medical or social services.

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Is the activity likely to require any significant resource recycling or reuse schemes to reduce resource usage?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Is the activity likely to result in any diversion of resources to the detriment of other communities or natural systems?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.3.2. Natural resources

Is the activity likely to disrupt, deplete or destroy natural resources?

Note: Natural resources include land and soil, water, air and minerals.

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Is the activity likely to disrupt existing activities (or reduce options for future activities)?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Is the activity likely to result in the degradation of any area reserved for conservation purposes?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.4. Community impacts

For guidance refer to Section 4.4 of [ESG2 Guideline for preparing a review of environmental factors](#).

17.4.1. Social impacts

Is the activity likely to result in a change to the demographic structure of the community, including changes to workforce or industry structure of the area/region?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Is the activity 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?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Is the activity likely to result in some individuals or communities being significantly disadvantaged?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Is the activity likely to result in any impacts on the health, safety, privacy or welfare of individuals or communities because of factors such as air pollution, odour, noise, vibration and lighting?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.4.2. Economic impacts

Is the activity likely to have significant economic impacts? Consider any impacts that may:

- affect economic activity (positive or negative), particularly impacts which result in a decrease to net economic welfare
- result in a decrease in the economic stability of the community
- result in a change to the public sector revenue or expenditure base.

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.4.3. Heritage impacts

Is the activity likely to cause impacts on localities, places, landscapes, buildings or archaeological relics of heritage significance?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.4.4. Aesthetic impacts

Is the activity likely to cause impacts on the visual or scenic landscape, including any venting or flaring of gas?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.4.5. Cultural impacts

Will the activity disturb the ground surface or any culturally modified trees?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Will the activity affect known Aboriginal objects or Aboriginal places?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Is the activity located in areas where landscape features indicate the presence of Aboriginal objects?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Can harm to Aboriginal objects or disturbance of landscape features be avoided?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Will the activity affect areas subject to native title claims, indigenous land use agreements or joint management agreement?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.4.6. Land use impacts

Is the activity likely to result in major changes to land use, including any curtailment of other beneficial land uses?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Is the activity likely to result in any significant property value impacts with land use implications?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.4.7. Transportation impacts

Is the activity likely to result in any significant impacts on transportation? Consider any:

- substantial impacts on existing transportation systems (such as road, rail, pedestrian) which alter present patterns of circulation or movement
- impacts associated with direct or indirect additional traffic.

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

17.4.8. Matters of national environmental significance

For guidance refer to Section 4.5 of [ESG2 Guideline for preparing a review of environmental factors](#).

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
- Listed threatened species and communities
- Listed migratory species
- Ramsar wetlands of international importance
- Commonwealth marine environment
- World heritage properties
- National heritage places
- Great Barrier Reef Marine Park
- Nuclear actions
- A water resource, in relation to coal seam gas development and large coal mining development

Provide further details relating to any impacts on matters of national environmental significance.

18. Rehabilitation cost estimate

All authority holders are required to lodge a security deposit with the department to cover the government's full costs in undertaking rehabilitation in the event of default by the authority holder. The Rehabilitation cost estimate is used by the department to help determine the amount of the security. Refer to [ESG1 Rehabilitation cost estimate guidelines](#) and [Rehabilitation cost estimation tool](#) for more information.

The scope of the Rehabilitation cost estimate must include the cost of fulfilling any rehabilitation liabilities or other obligations associated with on-going previously approved exploration activities on the authority, as well as proposed exploration activities subject to this application.

18.1. Is your application for a complying exploration activity?

Yes. Go to **Section 18.2.**

No. Go to **Section 18.3.**

18.2. Will the cost of fulfilling any rehabilitation liabilities associated with the proposed complying exploration activity, as well as any previously approved exploration activities on the authority, exceed \$10,000?

Yes. Go to **Section 18.3.**

No. Go to **Section 19.** No rehabilitation cost estimate needs to be lodged.

18.3. Have you already lodged an RCE related to this application?

Yes. Provide the rehabilitation cost estimate lodgement date and further details in text box below and **go to Section 19.**

No. Attach a rehabilitation cost estimate which evidences how the estimate is derived and complete the fields below.

Select one of the options below to confirm the methodology

FORM

ESF4 Application to conduct exploration activities
for assessable prospecting operations

Department's rehabilitation cost schedule	<input type="checkbox"/>	Other <input checked="" type="checkbox"/>
Current security held by the department		
<input type="text"/>		
Total of this rehabilitation cost estimate		
<input type="text"/>		

19. Checklist of items included with this application (as applicable)

Item		Reference
Minister's consent to prospect in exempted areas	<input type="checkbox"/>	Section 6
Minister's consent to prospect in a State Conservation Area	<input type="checkbox"/>	Section 7
A Guideline Review of Environmental Factors	<input checked="" type="checkbox"/>	Sections 9 and 17
Agricultural Impact Statement	<input checked="" type="checkbox"/>	Section 10
Site plan/maps showing location of activities and proposed site layout	<input checked="" type="checkbox"/>	Section 11
Site photographs of the site/s prior to disturbance	<input checked="" type="checkbox"/>	Section 11
Copy of the NSW BioNet System search	<input type="checkbox"/>	Section 12.8
Threatened species assessment of significance	<input type="checkbox"/>	Sections 12.8 and 15.4
Copy of threatened and protected species records for aquatic habitats	<input type="checkbox"/>	Section 12.9
Heritage database searches	<input type="checkbox"/>	Sections 11, 12.10, 15.5 and 15.6
AHIMS search	<input type="checkbox"/>	Sections 11 and 12.11

FORM

ESF4 Application to conduct exploration activities
for assessable prospecting operations

Aboriginal heritage due diligence assessment	<input type="checkbox"/>	Sections 12.11 and 15.5
Rehabilitation Cost Estimate	<input checked="" type="checkbox"/>	Section 18
For agents only – evidence of appointment as agent by the authority holder/s	<input checked="" type="checkbox"/>	Section 20
Other (list below)	<input type="checkbox"/>	

19.1. Have you lodged all the required information with this form?

Yes

No. I will provide outstanding information within 10 business days of lodging this application. **Note:** failure to supply the required information may result in the refusal of the application.

Describe the additional information to be provided.

20. Declaration by authority holder/s or authorised agent

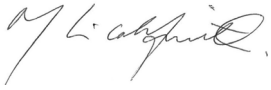
This form must be signed by the authority holder/s or an agent authorised to act on behalf of the authority holder/s.

I/We certify that the information provided in this application is true and correct. I/We understand that under Part 5A of the *Crimes Act 1900*, that knowingly giving false or misleading information is a serious offence; and under Section 378C of the *Mining Act 1992* or Section 135 of the *Petroleum (Onshore) Act 1991*, any person who provides information that the person knows to be false or misleading is guilty of an offence, for which they may be subject to prosecution.

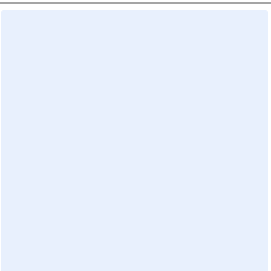
FORM

ESF4 Application to conduct exploration activities
for assessable prospecting operations

Declaration

Authority holder name	Australian Coalbed Methane Pty Limited		
Position/title	CEO		
Signature		Date	10/08/2022

Authority holder name	Santos QNT Pty Ltd		
Position/title	Company Secretary		
Signature		Date	22 August 2022

Authority holder name			
Position/title			
Signature		Date	

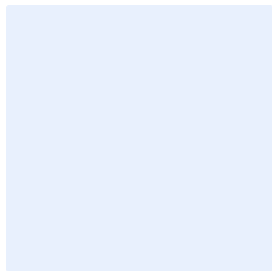
Or

Declaration by agent authorised to act for this authority holder

Provide evidence of appointment by the authority holder.

FORM

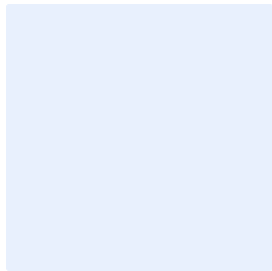
ESF4 Application to conduct exploration activities
for assessable prospecting operations

Authority holder name			
Position/title			
Signature		Date	

Office use only

Application received	
Time:	
Date:	

Received under delegation from the Secretary

Name:	
Signature	

Document control

Authorised by Director Compliance DOC19/936714

Amendment schedule		
Date	Version #	Amendment
01 March 2016	2.0	New template
06 March 2016	2.1	Hyperlinks updated, minor edits
19 July 2016	2.2	Repeated note from Page 2 "Requests for approval to prospect in a SCA" at Q5
12 September 2016	2.3	Updated links to legislation; updated Q7 & Q8 clarifying that an AIS is not required for CEAs; clarifying Q15 for non-CEAs; amending Q16 so that an RCE is not required for CEAs where rehabilitation liability is less than \$10,000.
29 September 2017	2.4	Updated Department name; Updated hyperlinks and reference to new <i>Biodiversity Conservation Act 2016</i> ; changed "Common Exploration Activity" references to "Complying Exploration Activity"; Q10.8 – referenced new NSW BioNet search; Q11.1 – included explanatory note re. drilling hole details; Q13.1 – added explanatory note and example text to assist with calculations; Q14.2 – added explanatory note to explain when Produced Water Code applies; Q17 – updated checklist to reflect changes to NSW BioNet search; Q18 – "Company Name" added to Agent declaration.
28 May 2018	2.5	Updated hyperlinks to SEED environmental mapping portal; update to legislative changes being: <i>Environmental Planning and Assessment Act, 1979</i> ; <i>State Environmental Planning Policy (Coastal Management) 2018</i> , <i>Coastal Management Act 2016</i> and <i>Biodiversity Conservation Act 2016</i> .
4 November 2019	2.6	Amended to include notification of mine operator details and notifiable activities at the mine or petroleum site under the <i>Work Health and Safety (Mines and Petroleum Sites) Act 2013</i> . Additional guidance note regarding modifications of approved exploration activities.

FORM

ESF4 Application to conduct exploration activities for assessable prospecting operations

		Updated names of departments and Ministers. Updated section numbers.
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DOC19/936714

ATTACHMENT 1A - ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure



FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

February 2020

Mining Act 1992, Petroleum (Onshore) Act 1991 and Work Health and Safety (Mines and Petroleum Sites) Act 2013

When to use this form

This form is to be used by holders of authorisations issued under the *Mining Act 1992* or titles issued under the *Petroleum (Onshore) Act 1991* and/or operators of mines or petroleum sites under the *Work Health and Safety (Mines and Petroleum Sites) Act 2013*. In this form, an authorisation or title is referred to collectively as an authority.

This form is to be used by **authority holders** to:

- **Seek formal confirmation from the department that rehabilitation has been successful** (i.e. complies with the authority conditions; has met the rehabilitation objectives and completion criteria; and that the landholder is satisfied with the standard of rehabilitation). This can include partial/progressive rehabilitation or the completion of all rehabilitation activities (regardless of whether a change to the associated security deposit is also sought).
- **Seek a review of the security deposit which is required to be provided and maintained to secure funding for the fulfilment of obligations under the authority, including obligations under the authority that may arise in the future.** This can include any increase or decrease in security (e.g. where rehabilitation has been partially or fully completed and a partial or full return of the security deposit is sought). (Note: A security deposit is required to be provided and maintained to secure funding for the fulfilment of obligations under the authority, including obligations under the authority that may arise in the future. For further information refer to the department's [Rehabilitation cost estimate guidelines](#)).

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

This form may also be used by mine or petroleum site operators to:

- **Notify the department of the closure or the mine or petroleum site (which includes an exploration site utilising mechanical means)** (refer to Question 8 of this form for additional information).

The information requested in this form may not be specifically referenced in the *Mining Act 1992*, *Mining Regulation 2016*, *Petroleum (Onshore) Act 1991*, *Petroleum (Onshore) Regulation 2016*, *Work Health and Safety (Mines and Petroleum Sites) Act 2013* and *Workplace Health and Safety (Mines and Petroleum Sites) Regulation 2014*, however its inclusion in the approved form validates the authority of the NSW Department of Planning, Industry and Environment, NSW Resources Regulator (the department) to request it.

If there is insufficient room in the fields please provide the information as an attachment.

When not to use this form

This form **must not** be used by authority holders to:

- **Seek a review of security that is associated with an application for the renewal/part renewal or transfer/part transfer of an authority.** In such case the review of security will be sought in the Rehabilitation cost estimate section of the relevant application form. However, this form (Question 6) can be used where rehabilitation associated with an authority has been partially/fully completed and/or a partial/full return of the security deposit is sought.
- **Seek a review of security that is associated with a new Exploration Activity.** In such cases the review of security will be sought in the Rehabilitation Cost Estimate section of [ESF4: Application to conduct exploration activities](#). However, this form (**Question 6**) can be used where rehabilitation associated with an exploration activity has been partially/fully completed and/or a partial/full return of the security deposit is sought.

Further information regarding rehabilitation objectives and completion criteria

Further information regarding rehabilitation objectives and completion criteria for exploration is available in the [Exploration code of practice: Rehabilitation](#).

Further information regarding rehabilitation objectives and completion criteria for mining is available in [ESG3: Mining operations plan \(MOP\) guidelines](#).

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

Important notes

Any information or template that is required to accompany this application should be lodged within **10 business days of the lodgement date**.

If this application is lodged by any party other than the authority holder (i.e. an agent), the department may seek confirmation of that authority and any limits of that authority given to that other party by the authority holder (*Mining Act 1992* section 163F and section 97F of the *Petroleum (Onshore) Act 1991*). The agent will need to complete the declaration at the end of this form and supply evidence of their appointment, if not already supplied to the department.

How to submit this form

- **By email:** Send an electronic copy of the form including any attachments to:
<mailto:nswresourcesregulator@service-now.com>
- **By mail:** Mail your form and attachments to: NSW Resources Regulator, Mining Act Inspectorate, PO Box 344, Hunter Region Mail Centre NSW 2310.
- **In person:** Submit your application in person at Department of Planning, Industry and Environment, NSW Resources Regulator, 516 High Street, Maitland, NSW. Office hours are 9.30am to 4.30pm.

How this application will be processed

Once your application has been registered and checked, it will be assessed by the department.

The department will use the information provided in this form to (as relevant):

- Determine whether rehabilitation is to the satisfaction of the department, and that it complies with your authority conditions; and/or
- Determine whether the associated security deposit is adequate, including whether the security deposit (or part thereof) can be returned (where relevant). This process may occur following the completion of progressive rehabilitation or at the completion of rehabilitation activities; and/or
- Receive notifications regarding the closure of mining operations (other than non-mechanical exploration) in accordance with the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014.

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

1. Authority details

Authority type and number (e.g. ML123, EL123)	Petroleum Exploration Licence 1
Act authority granted under	Petroleum (Onshore) Act 1991
Expiry date	12 April 2028

Additional authority details

If there is more than one authority, then provide the authority type and number; Act authority was granted under and expiry date of the additional authorities.

--

2. Authority holder details

Provide the full name of authority holder/s and if applicable, the ACN or ARBN (for foreign companies). Authority holders may wish to attach a separate table where there are multiple authorities.

Name	Australian Coalbed Methane Pty Limited
ACN/ABN/ARBN	002 606 288
Registered street address	Suite 3 Level 2 66 Clarence Street SYDNEY NSW 2000
Postal address	<input checked="" type="checkbox"/> Same as above Enter here if different

Name	Santos QNT Pty Ltd
ACN/ABN/ARBN	083 077 196
Registered street address	Ground Floor Santos Centre 60 Flinders Street ADELAIDE SA 5000
Postal address	<input checked="" type="checkbox"/> Same as above

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

	Enter here if different
--	-------------------------

Additional authority holders

--

3. Mine operator details

Only complete this section if the operator of a mine or petroleum site (which includes an exploration site utilising mechanical means) is providing notification of closure of the mine or petroleum site in accordance with clause 129(1)(f) of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 - see [Question 8](#)

Name of mine operator	
ACN/ABN/ARBN	
Name of mine site	
Registered street address	
Postal address	<input type="checkbox"/> Same as above Enter here if different

4. Contact for this application

Any correspondence in relation to this application will be sent to this person. Correspondence may also be issued to the authority holder as well as the authorised agent.

Contact name	
Position held	Team Leader - Environment
Company	Santos Limited
Postal address	GPO Box 1010 BRISBANE QLD 4001

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

Phone (including area code)	
Mobile	
Email	

Your preferred contact method

- Email (For companies – provide a generic company email address that is regularly monitored rather than an individual employee’s email address.)
- Mail

5. What is the reason for submission?

All relevant boxes must be ticked

- Application for a review of the security deposit where there is an increase or no change to the security deposit held by the department (complete **Questions 7, 9 and 10**)
- Application for a review of the security deposit where there is a decrease or full return of the security deposit **and** where surface disturbance activities have been undertaken (complete **Questions 6, 7, 9 and 10**)
- Application for a review of the security deposit where there is a decrease or full return of the security deposit **and** where no surface disturbance activities have been undertaken (complete **Questions 7.2, 7.3, 9 and 10**)
- Application for confirmation that rehabilitation (including partial/progressive rehabilitation or the completion of all rehabilitation) has been successfully completed to the satisfaction of the department / Secretary / Minister (complete Questions 6, 9 and 10)
- Notification of the closure of the mine or petroleum site (including an exploration site utilising mechanical means) in accordance with Clause 129(1)(f) of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 (complete **Questions 8 and 11**)

6. Completion of rehabilitation

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

Only complete this question to seek formal confirmation from the department that rehabilitation has been successfully completed to the satisfaction of the department (i.e. complied with authority conditions; has met the rehabilitation objectives and completion criteria; and that the landholder is satisfied with the standard of rehabilitation). This can include partial/progressive rehabilitation or the completion of all rehabilitation activities on the authority (regardless of whether or not a change to the associated security deposit is also sought).

6.1 What approvals/plans is the completed rehabilitation associated with?

Exploration activity approval

Exploration activity approval details (include dates/reference numbers/project name)

Indicate the type of rehabilitation

Partial/progressive rehabilitation

Completion of rehabilitation

Age of rehabilitation completed

Total area of disturbance of activity approval

Total area of completed rehabilitation

Mining operations plan/Petroleum operations plan/Rehabilitation management plan

Planning approval/development consent details (include dates/reference numbers/project name)

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

Mining/petroleum operations/rehabilitation management plan details (include dates/reference numbers/project name)

Indicate the type of rehabilitation

Partial/progressive rehabilitation

Completion of rehabilitation

Age of rehabilitation completed

Total area of disturbance of plan

Total area of completed rehabilitation

6.2 Provide plans

Plans/maps must be provided showing location of rehabilitation activities and areas rehabilitated. As a minimum plans/maps should include authority boundaries; landholder boundaries; land use and location of each rehabilitation area.

Reference No.	Name/Title of plan	Date

6.3 Provide photographs

Photographs of all rehabilitation sites must be provided, including a plan illustrating where the photograph was taken from and its aspect. Photographs should show evidence of: condition of the receiving environment prior to disturbance; rehabilitation activities performed; and progress/completion of rehabilitation.

Plan reference No.	Name of plan illustrating where photos were taken	Date

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

Photo reference No.	Name/title of photo and aspect	Date

6.4 What rehabilitation has been undertaken?

6.4.1 Rehabilitation of surface disturbance activity

Provide below or attach a written statement outlining the rehabilitation activities undertaken for each surface disturbing activity (for example, revegetation; sealing of boreholes; management of access tracks; water and waste management and disposal; reshaping works and soil management; weed control; erosion management; ongoing maintenance and monitoring).

6.4.2 Evidence of meeting rehabilitation objectives and completion criteria

Provide evidence describing how the rehabilitation has met each of the rehabilitation objectives and completion criteria# of the relevant exploration/mining/petroleum approvals and the rehabilitation conditions of the authority (Rehabilitation Objectives and Completion Criteria and associated verification* should be attached).

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

Further information regarding rehabilitation objectives and completion criteria for exploration is available in the [Exploration code of practice: Rehabilitation](#). Further information regarding rehabilitation objectives and completion criteria for mining is available in [ESG3: Mining operations plan \(MOP\) guidelines](#).

* Verification may require the attachment of specialist reports/advice confirming that specific aspects of the completion criteria have been met. Examples may include ecological, geotechnical and site remediation reports.

6.5 Has borehole/petroleum well sealing and/or backfilling been undertaken?

- Not applicable. Proceed to **Question 6.6**.
- No. Provide justification/further details below (append separate documents/reports as required).

- Yes. Complete details below and attach reports as relevant.

Provide details of contractors engaged to seal/backfill boreholes/petroleum wells.

Contractor name	
Address	
Telephone	

Provide details of sealing and/or backfilling works undertaken (append separate documents/reports as required)

6.6 Is the landholder/s satisfied with the rehabilitation?

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

While not mandatory, landholder satisfaction with completed rehabilitation may assist the department's assessment. The landholder rehabilitation statement provided in Appendix A can be used for this purpose. Notwithstanding, rehabilitation obligations, completion and performance must also be to the satisfaction of the department and in accordance with the conditions of the authority.

Yes

No

Provide any further details below:

Indicate in a landholder rehabilitation statement (refer to Appendix A) is attached:

Property details	Landholder/contact	Telephone	Attached?
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>

7 Rehabilitation cost estimate

Only complete this question to seek a review of the security deposit.

Do not complete Question 7 of this form in the following circumstances:

- 1. If you are seeking formal confirmation from the department that rehabilitation has been successful and no change to the security deposit is being sought.*
- 2. If you are seeking a review of security that is associated with a renewal/part renewal or transfer/part transfer of an authority. In such cases the review of security will be sought in the rehabilitation cost estimate section of the relevant application form.*
- 3. If you are seeking a review of security that is associated with a new exploration activity. In such cases the review of security will be sought in the rehabilitation cost estimate section of [ESF4: Application to conduct exploration activities](#).*

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

All authority holders must provide an estimate of rehabilitation costs. This estimate will be considered by the department when determining the [security deposit](#) amount.

Before answering this question, read the [Rehabilitation cost estimate guidelines](#) and note the following:

7.1 What is the total rehabilitation cost estimate?

The estimate should cover the rehabilitation for all exploration/mining/petroleum production operations.

Total rehabilitation cost estimate	
------------------------------------	--

7.1.1 What method have you used to calculate the rehabilitation cost estimate? Attach your cost calculation to this application.

- Department's rehabilitation cost calculation tool.
- Other – use the field below to describe the tool or cost guide you have used.

Third party developed cost calculation tool

7.1.2 What approvals/plans have you based the rehabilitation cost estimate on?

(Provide date of approval letter(s) and reference where possible)

Note that multiple boxes may be ticked

- Exploration activity approvals

--

- Mining project approval/development consent

--

- Mining/petroleum operations plan/Rehabilitation management plan

--

7.1.3 What period is covered by the estimate?

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

Current disturbance at date of application; or

August 2022

Period covered by the estimation

August 2022 to August 2023

7.2 What security is currently held by the department?

Current security held by the department

7.3 Does this rehabilitation cost estimate propose a reduced rehabilitation liability for the authority?

If the rehabilitation liability has been reduced, you may claim for a reduction in the security deposit amount.

Yes. Rehabilitation liability has been reduced due to completion of rehabilitation. Ensure you have completed **Question 6**.

Yes. Rehabilitation liability has been reduced due to other reasons (e.g. expiry of authority where no surface disturbance activities have occurred). Provide further details below.

No

8 Notification of closure

Note: Complete this section only if the operator of a mine or petroleum site (including an exploration site utilising mechanical means) is making a notification of the closure of the mine or petroleum site in accordance with clause 129(1)(f) of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014. Notification must be given by the mine operator not later than one month before closure.

Notification under this part is **not required** for operations that only involve **exploration** for minerals or petroleum **by non-mechanical means**.

Non-mechanical exploration means exploring for minerals or petroleum (other than by mechanical means that disturb the ground) and includes the following:

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

- geological mapping
- sampling and coring using hand-held equipment
- geophysical surveying (but not seismic surveying) and borehole logging
- access by vehicle (but not if access requires the construction of an access way such as a track or road)
- shallow reconnaissance drilling involving no more than minimal site preparation (e.g. non-mechanical means such as a hand auger)
- minor excavations (but not costeaning or bulk sampling) (e.g. non-mechanical means such as using hand held equipment).

8.1 Do you want to notify the Regulator of the closure of a mine or petroleum site (including an exploration site utilising mechanical means) in accordance with the clause 129(1)(f) of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014?

No. Go to **Question 9**

Yes. What date will closure of the site take place?

Notification must be given by the mine operator not later than one month before closure.

9 Checklist of items to be included with this application

List any supporting documentation attached to this application in the table below:

Item	Reference
Evidence of rehabilitation completion as per list below:	Question 6

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

<p>Plans/maps showing location of rehabilitation activities and areas rehabilitated. Plans/maps to include:</p> <ul style="list-style-type: none"> • authority boundaries • landholder boundaries • land use • location of each rehabilitation area 	<input type="checkbox"/>	Question 6
<p>Photographs of all rehabilitation sites to evidence:</p> <ul style="list-style-type: none"> • condition of the receiving environment prior to disturbance • rehabilitation activities performed • progress/completion of rehabilitation 	<input type="checkbox"/>	Question 6
<p>A written statement outlining the rehabilitation activities undertaken for each surface disturbance (for example, sealing of boreholes; management of access tracks; water and waste management and disposal; reshaping works and soil management; weed control; erosion management; ongoing maintenance and monitoring).</p>	<input type="checkbox"/>	Question 6
<p>en evidence as to how the rehabilitation has met each of the rehabilitation objectives and completion criteria of the relevant exploration/mining/production approvals and the rehabilitation conditions of authority (This may require the attachment of specialist reports/advice confirming that specific aspects of the completion criteria have been met. Examples may include ecological, geotechnical and site remediation reports).</p>	<input type="checkbox"/>	Question 6
<p>Landholder rehabilitation statement (where applicable)</p>	<input type="checkbox"/>	Question 6 and Appendix A
<p>Rehabilitation cost estimate documentation (Calculations to evidence how the rehabilitation cost estimate is derived)</p>	<input checked="" type="checkbox"/>	Question 7
<p>For agents only – evidence of appointment as agent by the authority holder/s</p>	<input type="checkbox"/>	Question 10
<p>Additional information such as specialist verification reports (provide list below)</p>	<input type="checkbox"/>	
<input type="text"/>	<input type="checkbox"/>	
<input type="text"/>	<input type="checkbox"/>	
<input type="text"/>	<input type="checkbox"/>	

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

	<input type="checkbox"/>	
	<input type="checkbox"/>	
	<input type="checkbox"/>	
	<input type="checkbox"/>	

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate
and/or notification of mine or petroleum site closure

10 Declaration by the authority holder/s or authorised agent

Name	
Position/title	CEO
Company name	Australian Coalbed Methane Pty Limited
Date	19 August 2022
Signature	

Name	
Position/title	Company Secretary
Company name	Santos QNT Pty Ltd
Date	
Signature	

Name	
Position/title	
Company name	
Date	

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

10 Declaration by the authority holder/s or authorised agent

Name	
Position/title	CEO
Company name	Australian Coalbed Methane Pty Limited
Date	
Signature	

Name	
Position/title	Company Secretary
Company name	Santos QNT Pty Ltd
Date	22 August 2022
Signature	 

Name	
Position/title	
Company name	
Date	

FORM

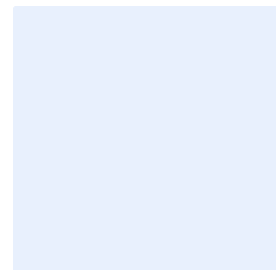
ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

Signature	
-----------	--

OR

Agent authorised to act for this authority holder/s

Evidence of appointment is required if this has not been previously supplied to the department.

Name	
Position/title	
Company name	
Date	
Signature	

11 Declaration by the mine operator

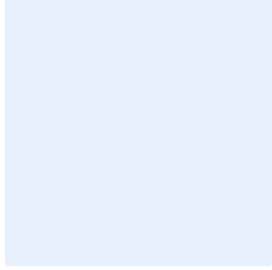
Only complete this section if the operator of a mine or petroleum site (which includes an exploration site using mechanical means) is providing notification of closure of the mine or petroleum site in accordance with Clause 129(1)(f) of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014.

I/We certify that the information provided in this application is true and correct. I/We understand that giving false or misleading information is a serious offence under section 268 of the *Work Health and Safety Act 2011* and Part 5A of the *Crimes Act 1900*.

Mine operator's name	
Position/title	

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

Company name	
Date	
Signature	

FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

Document control

Authorised by: Director Compliance

Amendment schedule		
Date	Version #	Amendment
1 December 2016	1.0	This new form merges two previous forms know as <i>Form ESF2: Rehabilitation Cost Estimate Submission</i> and <i>Form EDG13: Exploration Rehabilitation and Relinquishment Report</i> . Deletion of separate Statutory Declaration from Form EDG13.
February 2017	1.1	Changes to Questions 4 and 6.3 to enable applicants to select an option for the return of security deposit where no surface disturbance activities have been undertaken (e.g. upon expiry of an authority).
March 2017	1.2	Changes to the Introduction and Question 6 to confirm that Form ESF2 may be used to provide Rehabilitation Completion information, and/or, a RCE (as required) to accompany an Application for Cancellation or Part-Cancellation.
October 2017	1.3	Changes to Question 4 to clarify the reasons for submitting the form and the required section/s to be completed. Update to Question 8 – Declaration, to require Company Name.
September 2019	2.0	Update form to include notification of matters under the <i>Work Health and Safety (Mines and Petroleum Sites) Act 2013</i> ; update Department name; update division; update hyperlinks.

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DOC19/975497

Appendix A: Landholder rehabilitation statement

When signed, this statement confirms that land disturbed during the course of exploration/mining/petroleum production activities has been rehabilitated to the satisfaction of the affected landholder/occupier.

Provided that the authority holder has rehabilitated the exploration/mining/petroleum production disturbance on your property to your satisfaction, sign and return this form to the authority holder. The authority holder will attach it to the submission form required by the Department. The information will be used by the department, along with other relevant information, to determine the authority holder's compliance with the obligations of the exploration/mining/petroleum production authority.

If rehabilitation is **not** to your satisfaction, **do not** sign this form, and discuss outstanding issues with the authority holder. If you cannot reach agreement or you have any queries, contact the department.

1. For authority holder to complete

Authority details	
Authority number (e.g. EL01, ML02, PEL03)	
Name of authority holder	<p>List all holders of the authority in full - organisation name and ACN/ABN.</p> <p>List all holders of the authority in full - individual details: Title, Given Name/s and Family Name</p>
ACN/ABN/ARBN	
Contact name	
Registered street address	
Postal address	
Site name	Insert Site Name of the exploration / mining / production area
Affected property name:	Insert affected property name(s)

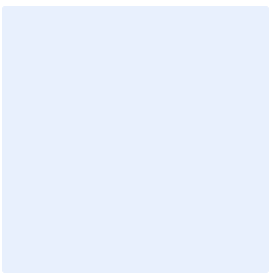
FORM

ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure

Affected property Address/description:	Insert property address/Lot and DP Numbers
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2. For landholder to complete

I am satisfied with the state in which the authority holder has left my property and the standard of rehabilitation which has been achieved.

Additional comments:			
Landholder/occupier name:			
Property name:	Insert affected property name(s)		
Property address/description	Insert property address/Lot and DP Numbers		
Telephone:		Email:	
Signed:			
Date:			

ATTACHMENT 1B – REHABILITATION COST ESTIMATE

REHABILITATION COST ESTIMATE

Prepared for:



Prepared by:



REHABILITATION COSTS FOR PEL 1

2022/23 Project Cost Estimate

DATE: 4-Aug-22



REHABILITATION COSTS FOR PEL 1
2022/23 Project Cost Estimate

Table 1: Reasonably Possible (August 2022 to August 2023)

Activity category/Disturbance type	Unit Rehabilitation Cost (GST Excluded) (from site-specific)	Unit of Measure	Existing Significant Disturbance at commencement of this Work Program/Development Plan	Maximum Additional Significant Disturbance Proposed During Term of Work Program or Development Plan	Rehabilitation of Significant Disturbances Proposed During Term of Program/Plan	Maximum Rehabilitation Cost	Assumptions and Comments
	(A)		(B)	(C)	(D)	(B+C-D) x (A)	
WELLS							
Operational Well Pad (Single)							
Decommissioning and removal of aboveground infrastructure	\$	well	8	0	0	\$	See Well Schedule for status. The unit rate includes time and cost for mechanical and electrical labour to disconnect and remove above ground infrastructure; hire of cutting equipment; hire of truck with on-board crane for lifting heavy equipment; hire of toilets and a portable office; and mobilisation / demobilisation of personnel and equipment. A 10% contingency and 10% task management allowance are included. Rates are standard unit rates for electricians, pipe fitters; labourers; and equipment.
Grading and Rehabilitation	\$	well	8	0	0	\$	See the Well Schedule for status. The unit rate includes hire of earthmoving equipment for ripping, grading and stabilising of the well pad; professional supervisor to oversee earthworks; maintenance of silt fence; hire of truck with a laser level for finished ground level; and mobilisation and demobilisation of personnel and equipment. A 10% contingency (which includes costs for re-seeding of areas that have not taken) and 10% task management allowance are included. All drilling muds managed on-site. Fallen trees and detritus will be harvested from adjacent areas and spread over the graded area to facilitate natural re-vegetation.
Rehabilitated not certified inspection	\$	well	0	0	0	\$	Monitoring fee for fully rehabilitated sites where vegetation has not re-established to the point where sign-off can be completed. Costs include inspector with vehicle and allows for travel, inspect and reporting of two wells per day.
Development Well Pad (Single)							
Removal and disposal of liquids	\$	well	0	0	0	\$	Drilling is pitless and tanks will be moved from drilling location to location. Fluids will be removed after each location and only two rigs are in operation at one time. Therefore only two liquids removal efforts need to be accounted for. Unit rate assumes 200 tonne of drilling fluid produced per well. Liquids are extracted by a vacuum tanker of capacity 18,000 litres and transported to Narrabri for disposal at 8 cents per litre. No costs allowed for this Year since no new wells are planned.
Decommissioning and removal of aboveground infrastructure	\$	well	0	0	0	\$	Unit rate includes time and cost for mechanical labour; hire of cutting equipment; hire of truck with on-board crane for lifting heavy equipment; hire of toilets and a portable office; and mobilisation / demobilisation of personnel and equipment. A 10% contingency and 10% task management allowance are included. Rates are standard unit rates for pipe fitters; labourers; and equipment. No costs allowed for this Year since no new wells are planned.
Decommissioning and removal of aboveground infrastructure (cellar and conductor casing only)	\$	well	0	0	0	\$	

REHABILITATION COSTS FOR PEL 1
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Grading and rehabilitation (Large)	\$	well	0	0	0	\$	See the Well Schedule for status. The unit rate includes hire of earthmoving equipment for ripping, grading and stabilising of the well pad; professional supervisor to oversee earthworks; maintenance of silt fence; hire of truck with a laser level for finished ground level; and mobilisation and demobilisation of personnel and equipment. A 10% contingency (which includes costs for re-seeding of areas that have not taken) and 10% task management allowance are included. All drilling muds managed on-site. Fallen trees and detritus will be harvested from adjacent areas and spread over the graded area to facilitate natural re-vegetation.
Grading and rehabilitation (New Wells and / or Coreholes)	\$	well	0	4	0	\$	See the Well Schedule for status. The unit rate includes hire of earthmoving equipment for ripping, grading and stabilising of the well pad; professional supervisor to oversee earthworks; maintenance of silt fence; hire of truck with a laser level for finished ground level; and mobilisation and demobilisation of personnel and equipment. A 10% contingency (which includes costs for re-seeding of areas that have not taken) and 10% task management allowance are included. All drilling muds managed on-site. Fallen trees and detritus will be harvested from adjacent areas and spread over the graded area to facilitate natural re-vegetation.
Downhole costs							
Formal plugging and decommissioning	\$	well	8	0	0	\$	Plug and decommissioning (P&D) unit cost is based on a campaign approach and are averaged across the field (with vertical wells expected to average \$125,000 to P&A and deviated/horizontal wells expected to average \$150,000 to P&D). Steps are generally identical for vertical, deviated and horizontal wells and include: - Pulling existing completion string (example: rods, pumps, packer, tubing). - Filling well from total depth to surface with cement. Cement to be placed in the well in (maximum) 200m plugs, which are tagged and verified prior to moving to the next cement plug. Cement plug placement to be designed to ensure zonal isolation of separate formations. No cement plugs to be placed specifically in horizontal laterals as there is no zonal isolation requirement in-seam but plugs across casing exits and tagged. - Removing wellhead and cutting casing 1.5m below ground level and install wellhead marker plate. These unit costs assume that wells were drilled generally in compliance with the NSW Code of Practice for Coal Seam Gas: Well Integrity. These unit costs can be applied for a range of CSG or conventional wells from approximately 600m to 1000m total vertical depth. Costs cover 3-5 days of operating a workover rig and placement of 5-7 cement plugs. Well cost breakdown includes rig rental (~60%), cementing services (~25%), supervision and miscellaneous costs (~15%) and includes standard amounts of contingency. Cost includes contingency for cement bond logs to verify annular cement tops for 1 in 10 wells.
LOW POINT DRAINS/HIGH POINT VENTS AND RISERS							
LPD Removal and Disposal of Aboveground Infrastructure	\$	drain	0	2	0	\$	Number of low point drains from Santos register. Unit rate includes time and cost for excavator to access cut-off point below surface; truck with on-board crane to support the structure during cutting; labour and hire of cutting equipment to cut the pipe and disconnect and remove infrastructure; hire of toilets and a portable office; and mobilisation / demobilisation of personnel and equipment. Excess steel is disposed as scrap. A 10% contingency and 10% task management allowance are included. Rates are standard unit rates for pipe fitters; labourers; and equipment.

REHABILITATION COSTS FOR PEL 1
2022/23 Project Cost Estimate

Table 1: Reasonably Possible (August 2022 to August 2023)

Activity category/Disturbance type	Unit Rehabilitation Cost (GST Excluded)	Unit of Measure	Existing Significant Disturbance at commencement of this Work Program/ Development Plan	Maximum Additional Significant Disturbance Proposed During Term of Work Program or Development Plan	Rehabilitation of Significant Disturbances Proposed During Term of Program/Plan	Maximum Rehabilitation Cost	Assumptions and Comments
HPV Removal and Disposal of Aboveground Infrastructure	\$	vent	0	2	0	\$	Number of high point vents from Santos register. Unit rate includes time and cost for excavator to access cut-off point below surface; truck with on-board crane to support the structure during cutting; labour and hire of cutting equipment to cut the pipe and disconnect and remove infrastructure; hire of toilets and a portable office; and mobilisation / demobilisation of personnel and equipment. Excess steel is disposed as scrap. A 10% contingency and 10% task management allowance are included. Rates are standard unit rates for pipe fitters; labourers; and equipment.
Riser Removal and Disposal of Infrastructure	\$	riser	0	0	0	\$	Number of risers from Santos register. Unit rate includes time and cost for excavator to access cut-off point below surface; truck with on-board crane to support the structure during cutting; labour and hire of cutting equipment to cut the pipe and disconnect and remove infrastructure; and mobilisation / demobilisation of personnel and equipment. Excess steel is disposed as scrap. A 10% contingency and 10% task management allowance are included. Rates are standard unit rates for pipe fitters; labourers; and equipment.
Grading and Rehabilitation	\$	element	0	4	0	\$	Assumes an area of 4 square metres per low point drain (including tank) is required to be rehabilitated. Costs for ripping and grading of the area using standard equipment rates. Fallen trees and detritus will be harvested from adjacent areas and spread over the graded area to facilitate natural re-vegetation. Unit rate includes hire of earthmoving equipment for grading of the area; professional supervisor to oversee earthworks; maintenance of silt fence; hire of truck with a laser level for finished ground level; and mobilisation and demobilisation of personnel and equipment. A 10% contingency (including costs for potential re-seeding) and 10% task management allowance are included.
ROADS (Grading and Rehab)							
Forestry Road Restoration	\$	km	0	0	0	\$	State owned roads.
Pasture access track	\$	km	4.1	4.3	0	\$	These are associated with the gas and water gathering lines (see below).
Tracks and other Easements	\$	km	0	0	0	\$	Unit rate includes hire of earthmoving equipment for ripping and grading of the area; professional supervisor to oversee earthworks; maintenance of silt fence; hire of truck with a laser level for finished ground level; hire of toilets and mobile office for duration of work and mobilisation and demobilisation of personnel and equipment. A 10% contingency (for potential re-seeding) and 10% task management allowance are included. Fallen trees and detritus will be harvested from adjacent areas and spread over the graded area to facilitate natural re-vegetation.
SEISMIC LINES							
Rehabilitation activities (within forested areas - No seeding)	\$	km	0	0	0	\$	Conservatively assumes 2 hectares per day can be rehabilitated and kilometre rate takes into account width of seismic easement (3 m). Unit rate includes hire of earthmoving equipment for recontouring; professional supervisor to oversee earthworks; hire of truck with a laser level for finished ground level; hire of toilets and mobile office for duration of work and mobilisation and demobilisation of personnel and equipment. A 10% contingency (for potential re-seeding) and 10% task management allowance are included.No seeding is required for areas within existing forested areas.

REHABILITATION COSTS FOR PEL 1
2022/23 Project Cost Estimate

Table 1: Reasonably Possible (August 2022 to August 2023)

Activity category/Disturbance type	Unit Rehabilitation Cost (GST Excluded)	Unit of Measure	Existing Significant Disturbance at commencement of this Work Program/Development Plan	Maximum Additional Significant Disturbance Proposed During Term of Work Program or Development Plan	Rehabilitation of Significant Disturbances Proposed During Term of Program/Plan	Maximum Rehabilitation Cost	Assumptions and Comments
Rehabilitation activities (outside forested areas - Seeding)	\$	km	0	65	0	\$	Conservatively assumes 2 hectares per day can be rehabilitated and kilometre rate takes into account width of seismic easement (3 m). Unit rate includes hire of earthmoving equipment for recontouring; professional supervisor to oversee earthworks; hire of truck with a laser level for finished ground level; hire of toilets and mobile office for duration of work and mobilisation and demobilisation of personnel and equipment. A 10% contingency (for potential re-seeding) and 10% task management allowance are included. Seeding activities are included.
Rehabilitation inspection	\$	km	0	0	0	\$	Final rehabilitation inspection for areas that have been rehabilitated (either through natural process or physical rehabilitation activities). Costs include inspector with vehicle and allows for travel and inspection.
WATER AND GAS GATHERING AND TRANSFER PIPELINES (20 m easement with collocated gas and water gathering lines and track).							
Grading of Pipeline Tracks and Easement (20 m easement)	\$	km	0.2	2.0	0	\$	Conservatively assumes 2 hectares per day can be rehabilitated and kilometre rate takes into account width of easement (wider easements results in lower kilometres per day). Unit rate includes hire of earthmoving equipment for ripping and grading of the area; professional supervisor to oversee earthworks; maintenance of silt fence; hire of truck with a laser level for finished ground level; hire of toilets and mobile office for duration of work and mobilisation and demobilisation of personnel and equipment. A 10% contingency (for potential re-seeding) and 10% task management allowance are included.
Gas Pipeline Purging	\$	km	0.0	2.0	0	\$	Unit rate (per kilometre) includes purging of gas gathering lines with nitrogen. The per kilometre rate is based on a midstream (overland pipeline) cost estimate provided by Santos. Following purging, gas pipelines will be abandoned in-situ in accordance with the Australian Standards which includes capping. Water gathering lines will be abandoned in place.
Contractor Mobilisation and Setup	\$	project	1	0	0	\$	Standard contractor setup costs for establishment of purging and monitoring equipment. Conservative one-off allowance considering small job.
WATER STORAGE							
Removal and Rehabilitation							

REHABILITATION COSTS FOR PEL 1
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Activity category/Disturbance type	Unit Rehabilitation Cost (GST Excluded)	Unit of Measure	Existing Significant Disturbance at commencement of this Work Program/ Development Plan	Maximum Additional Significant Disturbance Proposed During Term of Work Program or Development Plan	Rehabilitation of Significant Disturbances Proposed During Term of Program/Plan	Maximum Rehabilitation Cost	Assumptions and Comments
Ponds	\$	ha	0.00	0		\$	No ponds Unit rate (per hectare and based on pond dimensions from drawings) includes hire of earthmoving equipment (excavators and dozer) for excavating and spreading soil from pond walls; professional supervisor to oversee earthworks; one time set up cost for construction of access ramps to facilitate sludge and liner removal; disposal of liner to local landfill; hire of toilets and mobile office for duration of work and mobilisation and demobilisation of personnel and equipment. A 10% and 10% task management allowance are included.
Produced Water Storage Tank (Panel Tank)	\$	per tank (SML)	2.00	0		\$	Includes rates for removal of 2 X SML panel tanks. Unit rate (per hectare and based on pond dimensions from drawings) includes hire of earthmoving equipment (excavators and dozer) for excavating and spreading soil from pond walls; professional supervisor to oversee earthworks; one time set up cost for construction of access ramps to facilitate sludge and liner removal; disposal of liner to local landfill; hire of toilets and mobile office for duration of work and mobilisation and demobilisation of personnel and equipment. A 10% contingency and 10% task management allowance are included.
Grading and Rehab - Ponds	\$	ha	0.0	0	0	\$	No ponds. Area assumed for grading is assumed to be 20% greater than the combined ponds footprint. Unit rate includes hire of earthmoving equipment for ripping and grading of the area; professional supervisor to oversee earthworks; maintenance of silt fence; hire of truck with a laser level for finished ground level; hire of toilets, mobile office and generator for duration of work; purchase of fuel at \$2/L for generator and mobilisation and demobilisation of personnel and equipment. A 15% contingency (including mobe of specialised equipment) and 10% task management allowance are included. Fallen trees and detritus will be harvested from adjacent areas and spread over the graded area to facilitate natural re-vegetation.
Grading and Rehab - Panel Tanks	\$	ha	0.7	0	0	\$	Rates for grading and rehabilitation of ponds used for panel tanks with a reduction in time as a result of smaller surface distrubance areas and lower volumes of soil requiring movement. Unit rate includes hire of earthmoving equipment for ripping and grading of the area; professional supervisor to oversee earthworks; maintenance of silt fence; hire of truck with a laser level for finished ground level; hire of toilets, mobile office and generator for duration of work; purchase of fuel at \$2/L for generator and mobilisation and demobilisation of personnel and equipment. A 15% contingency (including mobe of specialised equipment) and 10% task management allowance are included. Fallen trees and detritus will be harvested from adjacent areas and spread over the graded area to facilitate natural re-vegetation.

REHABILITATION COSTS FOR PEL 1
2022/23 Project Cost Estimate

Table 1: Reasonably Possible (August 2022 to August 2023)

Activity category/Disturbance type	Unit Rehabilitation Cost (GST Excluded)	Unit of Measure	Existing Significant Disturbance at commencement of this Work Program/Development Plan	Maximum Additional Significant Disturbance Proposed During Term of Work Program or Development Plan	Rehabilitation of Significant Disturbances Proposed During Term of Program/Plan	Maximum Rehabilitation Cost	Assumptions and Comments
Seeding Level Areas	\$	ha	0.0	0	0	\$	Area assumed for grading is assumed to be 20% greater than the combined ponds footprint. Direct seeding costs from Table 13 of "The Cost of revegetation", Jacki Schirmer and John Field, ANU Forestry and FORTECH, Natural Heritage Trust; dated 2000 and costs inflated to this period. A 15% contingency (including potential re-seeding) and 10% task management allowance are included.
Seeding Slopes	\$	ha	0	0	0	\$	No sloped areas
Fencing removal	\$	lump	1	0	0	\$	Allowance
Water Management and Treatment							
Fixed Reverse Osmosis Plant	\$	ML	Existing produced water and brine to be processed 1ML	Water produced during period = 2.9ML	Water and brine processed during period = 0ML	\$	The water production rate is shown on the Water Treatment Summary along with month by month volumes. Produced water would be treated in the Leewood WBTP. Water treatment costs supplied by a vendor are for the Leewood WBTP and include all OPEX for electrical, labour and water treatment chemicals. The Leewood WBTP is designed to process water at 1.5 ML/day. Permeate from the Leewood WBTP will be beneficially re-used for irrigation, dust suppression or other lawful use.
Pilot Brine Concentrator	\$	ML	0.0	1.4	0	\$	For the purpose of this RCE, brine would be sent to a brine concentrator (BC) (e.g. falling film evaporator) to increase the salinity of the brine and provide the feed for a thermal crystallisation (TC) unit. Brine Concentrator recovery efficiency of 64% used (vendor information). Costs are based on contractor third party estimates for modular units under construction.
Crystallizer	\$	ML	0.0	0.5	0	\$	The brine produced from the Brine Concentrator would be passed through a Thermal Crystallisation Unit (TC) to produce solid salt. Based on information from vendors a thermal crystalliser (TC) will produce solid salt. Costs include CAPEX associated with this plant which are provided in third party cost estimates for modular units under construction.

REHABILITATION COSTS FOR PEL 1
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Activity category/Disturbance type	Unit Rehabilitation Cost (GST Excluded)	Unit of Measure	Existing Significant Disturbance at commencement of this Work Program/ Development Plan	Maximum Additional Significant Disturbance Proposed During Term of Work Program or Development Plan	Rehabilitation of Significant Disturbances Proposed During Term of Program/Plan	Maximum Rehabilitation Cost	Assumptions and Comments
Operation and maintenance - Brine Concentrator	\$	ML	0.0	1.4	0	\$	Cost to operate and maintain including supply of energy for a BC.
Operation and maintenance - Thermal Crystalliser	\$	ML	0.0	0.5	0	\$	Cost to operate and maintain including supply of energy for steam production in the TC. Likely will use gas that is available at site in a gas fired boiler to produce steam.
Loading and transport of salt	\$	tonne	24	74	0	\$	Solid salt is produced by the TC with the month by month mass shown in the <i>Water Treatment Summary</i> . Assumes a loader with 1 tonne bucket capacity loads a 24 tonne capacity truck in 0.8 hours. The truck roundtrip consists of loading at the facility, travelling 510 km to a landfill in Sydney (worst case distance used), unloading at the waste disposal facility and returning to Narrabri. This takes approximately 16 hours travelling at an average speed of 75km/h. In reality a fleet of loaders and trucks would be utilised however, whilst this decrease the overall time to complete the project, the rates remain the same since the loading rate and cost rate both increase. This cost is similar to a rate obtained from Veolia for transport.
Disposal fee for salt at waste facility including levy	\$	tonne	24	74	0	\$	Disposal at Landfill. Gate price as at 30 September 2013, with allowance for price increase to current year, includes cost per tonne of \$75 (conservative) plus \$143 landfill levy (2019). This is a conservative approach since it is likely that a beneficial use or alternate and lower cost disposal option would be available for salt.
Investigation and Assessment of Ponds and / or Tanks							
Investigation and Reporting (fixed costs)	\$	per area	1	0	0	\$	Costs for environmental investigations of soils under the liners of the Ponds and / or Tanks. Soil sampling will be conducted on a grid pattern to assess leakage and potential impacts on soil. Unit rate includes time and costs to prepare health and safety plans, prepare a work plan, supervise a drilling rig, collect and submit 6 soil and 1 groundwater samples and write a report; hire of Geoprobe drilling rig; analysis of soil and groundwater samples by a laboratory; consumables including personal protective equipment; hire of sampling equipment' mobilisation and demobilisation of personnel and equipment.
Investigation and Reporting (per unit)	\$	per hectare	0.6	0	0	\$	
WATER TRANSFER AND FLARE FACILITY							

REHABILITATION COSTS FOR PEL 1
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Decommissioning and Disposal of Equipment and Offices	\$	total cost	1	1	0	\$	1 existing flare and gas conditioning skid, 1 pump skid. 1 proposed flare. Unit rate is for the combined facility and includes time and cost for mechanical and electrical labour to disconnect and remove pumps and equipment, tank connections and associated equipment; hire of cutting equipment; hire of truck with on-board crane for lifting heavy equipment; hire of excavator and trucks to demolish tanks and office and transport to Narrabri landfill, remove gravel surface and transport for re-use on nearby tracks; hire of toilets and a portable office; and mobilisation / demobilisation of labour and equipment. A 10% contingency and 10% task management allowance are included. Rates are standard unit rates for electricians, pipe fitters; labourers; and equipment.	
Regrading (earthmoving)	\$	ha	0.03	0.25	0	\$	Cost for removal of gravel and ripping and grading of soils to facilitate revegetation. Vegetative debris from adjacent areas will be placed on property to provide seed bank.	
Seeding Level Areas	\$	ha	1	0	0	\$	Direct seeding costs from Table 13 of "The Cost of revegetation", Jacki Schirmer and John Field, ANU Forestry and FORTECH, Natural Heritage Trust; dated 2000. Cost are inflated to this period.	
Seeding Slopes	\$	ha	0	0	0	\$	No sloped areas	
Fencing removal	\$	lump	0	0	0	\$	Allowance	
Facility Investigation	\$	total cost	1	0	0	\$	Costs for environmental investigations of areas where fuel, chemicals or waste stored. Unit rate includes time and costs to prepare health and safety plans, prepare a work plan, supervise a drilling rig, collect and submit 6 soil and 1 groundwater samples and write a report; hire of Geoprobe drilling rig; analysis of soil and groundwater samples by a laboratory; consumables including personal protective equipment; hire of sampling equipment' mobilisation and demobilisation of personnel and equipment.	
Total rehabilitation liability for the term of the work program or development plan							\$	
Maintenance and monitoring costs						\$	5% as per Industry and Investment "Rehabilitation Cost Estimate" Guidelines.	
Management costs (10%)						\$	10% of total rehabilitation costs and monitoring. per Industry and Investment "Rehabilitation Cost Estimate" Guidelines. Contingency costs (10% and 15%) are included throughout unit rates.	
Subtotal							\$	
CPI (compounded, 1.9% of total rehabilitation costs x number of years covered by work program/development plan)							\$	Compounded by 1.9% for year 2 of the forward work program
Financial assurance							TOTAL (Ex. GST)	\$

REHABILITATION COSTS FOR PEL 1
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SCHEDULE

WELLS	Existing	2022/23	Notes
Operational Well Pads Single			See Well schedule
Development Well Pads Single			See Well schedule
LOW POINT DRAINS/ TANKS	Existing	2022/23	
Low Point Drains/Tanks	0	2	Assumed based on proposed water gathering line (1 LPD/km)
HPV	0	2	Assumed based on proposed gas gathering line (1 HPV/km)
Risers	0	0	
ROADS	Existing	2022/23	
Forestry Road Restoration (km)	0	0	
Road outside of State Forest (km)	4.1	8.4	New tracks associated with access to coreholes
Tracks and other Easements (km)	0	0	
PIPELINES	Existing	2022/23	
Water Gathering Lines (km)	0.2	2.2	Existing water transfer line and proposed new water gathering
Gas Gathering Lines (km)	0.0	2.0	Proposed gas flowlines
Water Transfer Line (km)	0	0	
SEISMIC LINES	Existing	2022/23	
Seismic line within forested area (km)	0	0	
Seismic line outside forested area (km)	0	65	
Seismic line requiring rehabilitation inspection only (km)	0	0	
STORAGE PONDS AND TANKS	Existing	2022/23	
	0.00	0.00	
Produced Water Storage Tanks	2.00	2.00	5 ML panel tanks
WATER TRANSFER AND FLARE	Existing	2022/23	
Water transfer and Flare	1	1	

REHABILITATION COSTS FOR PEL 1
2022/23 Project Cost Estimate

WELL SCHEDULE

EXISTING WELLS										NEW WELLS ON EXISTING PADS		
#	Site Name	Single/ Pilot	Status as at August 2023	Full Surface Rehab Complete	Partial Surface Rehab (lease decrease or full rehabilitation in progress)	Infrastructure remaining or to be installed	Downhole P&D required	Large restoration required (dev g&s rate)	Small restoration only required (op g&s rate)	Monitoring of rehabilitation progress required (no further restoration)	New single wells	Comments
1	BARNEYS SPRING 1		ABDH	1								Well has been plugged and abandoned, no surface facilities
2	BARNEYS SPRING 1A		ABDH	1								Well has been plugged and abandoned, no surface facilities
3	CALALA 1		ABDH	1								Well has been plugged and abandoned, no surface facilities
4	CANA 1		ABGS	1								Well has been plugged and abandoned, no surface facilities
5	COLLYGRA 1		ABDH	1								Well has been plugged and abandoned, no surface facilities
6	GEORGES ISLAND 1		SUG			1	1		1			Suspended, surface and down hole rehabilitation required
7	GEORGES ISLAND 2		ABDH	1								Well has been plugged and abandoned, no surface facilities
8	GEORGES ISLAND 2A		SUG			1	1		1			Suspended, surface and down hole rehabilitation required
9	GEORGES ISLAND 3		SUG			1	1		1			Suspended, surface and down hole rehabilitation required
10	GLASSERTON 1		ABJ	1								Well has been plugged and abandoned, no surface facilities
11	GLASSERTON 1A		ABGS	1								Well has been plugged and abandoned, no surface facilities
12	GLASSERTON 2		LO									Proposed location which is not part of the proposed work program. No existing or proposed disturbance.
13	GOODGERWIRRI 1		ABDH	1								Well has been plugged and abandoned, no surface facilities
14	KAHLUA 1		ABDH	1								Well has been plugged and abandoned, no surface facilities
15	KAHLUA 2		SCG			1	1		1			Reactivated (2022) suspended well
16	KAHLUA 3		SCG			1	1		1			Reactivated (2022) suspended well
17	KAHLUA 4		SCG			1	1		1			Reactivated (2022) suspended well
18	KAHLUA 5		SCG			1	1		1			Reactivated (2022) suspended well
19	LAKE GORAN 1		ABDH	1								Well has been plugged and abandoned, no surface facilities
20	PINE RIDGE (NSW) 1		ABDH	1								Well has been plugged and abandoned, no surface facilities
21	SLACKSMITH 1		ABDH	1								Well has been plugged and abandoned, no surface facilities
22	STONE CREEK 1		ABDH	1								Well has been plugged and abandoned, no surface facilities
23	WEST QUIRINDI 1		ABDH	1								Well has been plugged and abandoned, no surface facilities
24	YANNERGEE 1		SUG			1	1		1			Suspended, surface and down hole rehabilitation required
24	sites		TOTALS - EXISTING WELLS	15	0	8	8	0	8	0	0	
NEW WELLS												
Site Name	Area	Current Status			Infrastructure remaining or to be installed	Downhole P&D required	large restoration required	small restoration only required	Monitoring of rehabilitation progress required (no further restoration)	Approved single wells	Comments	
1	BA6836-02-1 corehole	planned						1			Corehole, no downhole equipment or associatd infrastructure	
2	BA6810-05-1 corehole	planned						1			Corehole, no downhole equipment or associatd infrastructure	
3	BA6835-01-1 corehole	planned						1			Corehole, no downhole equipment or associatd infrastructure	
4	BA6835-02-1 corehole	planned						1			Corehole, no downhole equipment or associatd infrastructure	
4	wells		TOTALS - NEW WELLS		0	0	0	4	0	0		
TOTAL NEW AND EXISTING (YEAR 2)						8	8	0	12	0	8	All multi-wells are treated as single well since the well head infrastructure is one at the surface

**REHABILITATION COSTS FOR PEL 1
2022/23 Project Cost Estimate**

Water Treatment Summary

Month	Days	Produced Volume (ML/period)	RO Processing (ML/period)	Nett to/from Storage (ML)	Liquids Stored at date (ML)	Brine Volume to BC at date (ML)	Volume to TC at date (ML)	Salt Mass at date (tonnes)
Existing		1.0			1.0	0.3	0.1	24
Aug-22	31	0.3	0	0.3	1.2	0.4	0.2	31
Sep-22	30	0.3	0	0.3	1.5	0.5	0.2	37
Oct-22	31	0.3	0	0.3	1.7	0.6	0.2	44
Nov-22	30	0.3	0	0.3	2.0	0.7	0.3	50
Dec-22	31	0.3	0	0.3	2.3	0.8	0.3	57
Jan-23	31	0.3	0	0.3	2.5	0.9	0.3	63
Feb-23	30	0.2	0	0.2	2.7	1.0	0.4	69
Mar-23	31	0.2	0	0.2	3.0	1.1	0.4	75
Apr-23	30	0.2	0	0.2	3.2	1.2	0.4	81
May-23	31	0.2	0	0.2	3.5	1.2	0.4	87
Jun-23	31	0.2	0	0.2	3.7	1.3	0.5	93
Jul-23	28	0.2	0	0.2	3.9	1.4	0.5	98

Assumptions

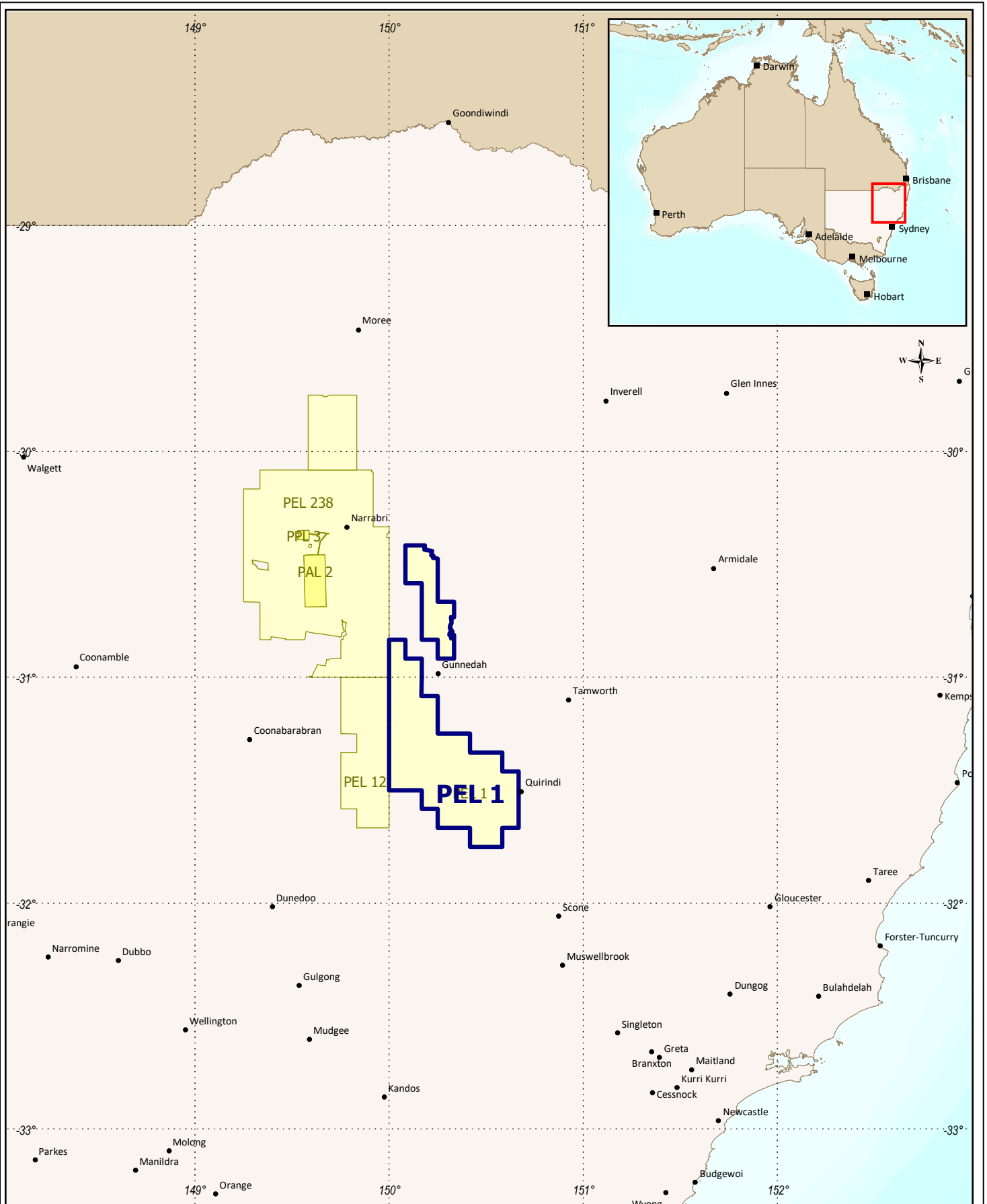
At the start of the period there is less than 1 ML of produced water stored in the ponds. The TDS concentration is conservatively assumed to be 4040 mg/L (based on priorfield measurements). This water would be processed at the Leewood WBTP. The water production rate is 0.0089 ML/day reducing 17% over the course of the year

REHABILITATION COSTS FOR PEL 1
2022/23 Project Cost Estimate

Assumptions

- 1 Santos contractor and internal schedules have been used to develop "RCE Schedule" within workbook.
- 2 Areas and linear metres for roads, ponds and pipelines are obtained from Santos drawings and aerial photographs.
- 3 Rehabilitation requirements for land are defined by the agreement with Forests (if applicable) and will comprise grading and ripping of soil and placement of salvaged vegetative debris logs etc on areas to facilitate natural revegetation.
- 4 The treatment of water contained in ponds will be conducted using a ROP, brine concentrator and crystallizer. This option has been scoped by Santos and Veolia has provided cost estimates to lease and operate a small pilot plant. These costs (scaled for a larger plant) have been used to determine water treatment costs during decommissioning and rehabilitation of the facility. The assumed concentration of salt is shown in the Water Treatment Summary. A moisture content of 10% is assumed to remain in the salt.
- 5 Following treatment of all water the pond liners and sludges will be removed and the pond structures pulled down. All soil removed from the pond embankments will be used to grade and rehabilitate the area under and adjacent to the ponds.
- 6 Gathering pipelines will be abandoned in-situ with only the gas lines purged prior to decommissioning. High point vents (in the water lines), low point drains (in the gas gathering lines) and risers will be removed to below grade and the areas rehabilitated.
- 7 All demolition rubble and salt will be transported off-site for disposal. Veolia as part of the brine trials has provided disposal cost estimates (including waste levy charges)
- 8 Project Management charges for the contractors have been included in the detailed cost estimates and a separate 10% project management cost has been included for contractor management and oversight of all contractors.
- 9 Equipment and accommodation will be sourced from nearby towns. Santos does have some separate accommodation facilities in the area that could be utilised.
- 10 Monitoring will be conducted for a period of 5 years following rehabilitation. Monitoring costs are 5% of the total cost as per the New South Wales Industry and Investment Guidelines for Rehabilitation Costs Estimates.
- 11 Underground powerlines are assumed to be left on-situ and made safe at either end.

ATTACHMENT 2 – Plans



Legend

- Capital City
- ◆ Town
- PEL 1 Tenement
- Production Licence
- Exploration Permit
- New South Wales
- Australian State/Territory

Santos

New South Wales

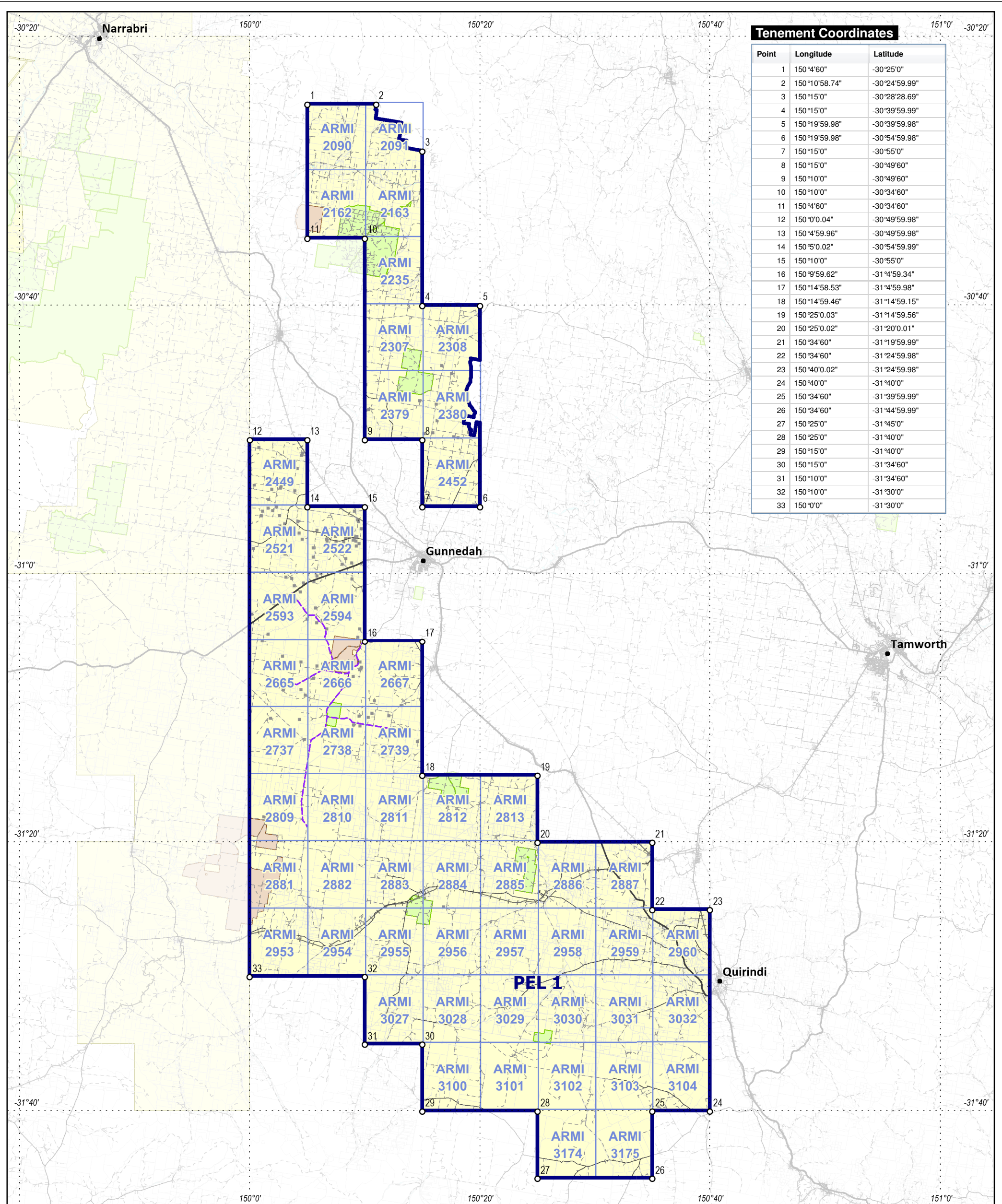
PEL 1

Location Map

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kilometers

Rev 1
Date: 9/06/2022
File No. GUN 418a.WOR

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Tenement Coordinates		
Point	Longitude	Latitude
1	150°4'60"	-30°25'0"
2	150°10'58.74"	-30°24'59.99"
3	150°15'0"	-30°28'28.69"
4	150°15'0"	-30°39'59.99"
5	150°19'59.98"	-30°39'59.98"
6	150°19'59.98"	-30°54'59.98"
7	150°15'0"	-30°55'0"
8	150°15'0"	-30°49'60"
9	150°10'0"	-30°49'60"
10	150°10'0"	-30°34'60"
11	150°4'60"	-30°34'60"
12	150°0'0.04"	-30°49'59.98"
13	150°4'59.96"	-30°49'59.98"
14	150°5'0.02"	-30°54'59.99"
15	150°10'0"	-30°55'0"
16	150°9'59.62"	-31°4'59.34"
17	150°14'58.53"	-31°4'59.98"
18	150°14'59.46"	-31°14'59.15"
19	150°25'0.03"	-31°14'59.56"
20	150°25'0.02"	-31°20'0.01"
21	150°34'60"	-31°19'59.99"
22	150°34'60"	-31°24'59.98"
23	150°40'0.02"	-31°24'59.98"
24	150°40'0"	-31°40'0"
25	150°34'60"	-31°39'59.99"
26	150°34'60"	-31°44'59.99"
27	150°25'0"	-31°45'0"
28	150°25'0"	-31°40'0"
29	150°15'0"	-31°40'0"
30	150°15'0"	-31°34'60"
31	150°10'0"	-31°34'60"
32	150°10'0"	-31°30'0"
33	150°0'0"	-31°30'0"

- Legend**
- Town
 - Tenement coordinate
 - Building
 - - - 2D Seismic line
- Transport**
- Highway
 - Sealed Road
 - - - Unsealed Road
 - +—+ Railway

- Tenements and Tenure**
- ▭ PEL 1 Tenement
 - ▭ Production Licence
 - ▭ Exploration Permit
 - ▭ CCA Zone 3 State Conservation Area
 - ▭ State Forest
 - ▭ Cadastral Parcel
- Graticular Blocks**
- ▭ Graticular Block

Santos

New South Wales

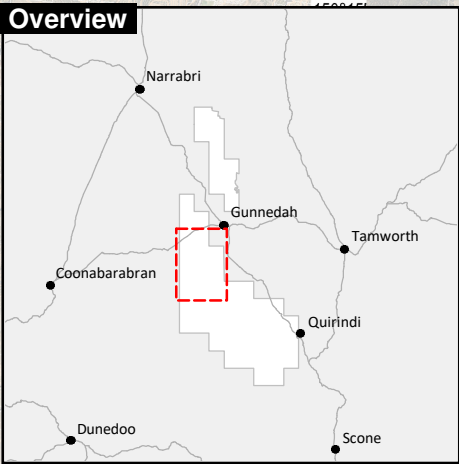
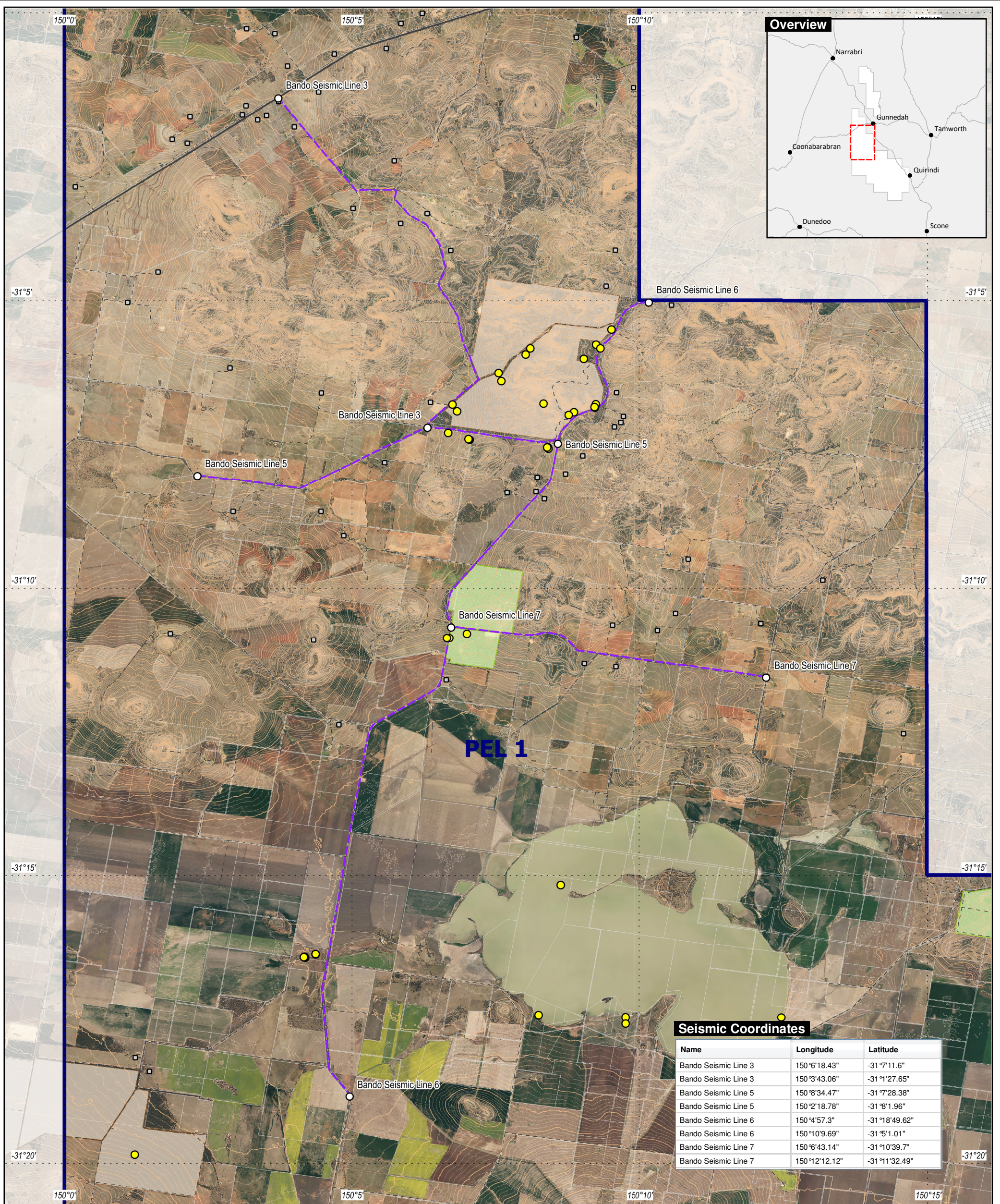
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Tenure Coordinates

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kilometers

Rev 1 Date: 21/06/2022 File No. GUN 418b.WOR

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Seismic Coordinates		
Name	Longitude	Latitude
Bando Seismic Line 3	150°6'18.43"	-31°7'11.6"
Bando Seismic Line 3	150°3'43.06"	-31°1'27.65"
Bando Seismic Line 5	150°8'34.47"	-31°7'28.38"
Bando Seismic Line 5	150°2'18.78"	-31°8'1.96"
Bando Seismic Line 6	150°4'57.3"	-31°18'49.62"
Bando Seismic Line 6	150°10'9.69"	-31°5'1.01"
Bando Seismic Line 7	150°6'43.14"	-31°10'39.7"
Bando Seismic Line 7	150°12'12.12"	-31°11'32.49"

- Legend**
- Town
 - Building
 - Cultural Heritage site
 - 2D Seismic line
 - Contour

- Transport**
- Highway
 - Sealed Road
 - - - - Unsealed Road
 - ⊢⊢⊢⊢ Railway

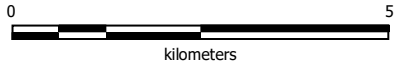
- Tenements and Tenure**
- ▭ PEL 1 Tenement
 - ▭ CCA Zone 3 State Conservation Area
 - ▭ State Forest
 - ▭ Cadastral Parcel

Santos

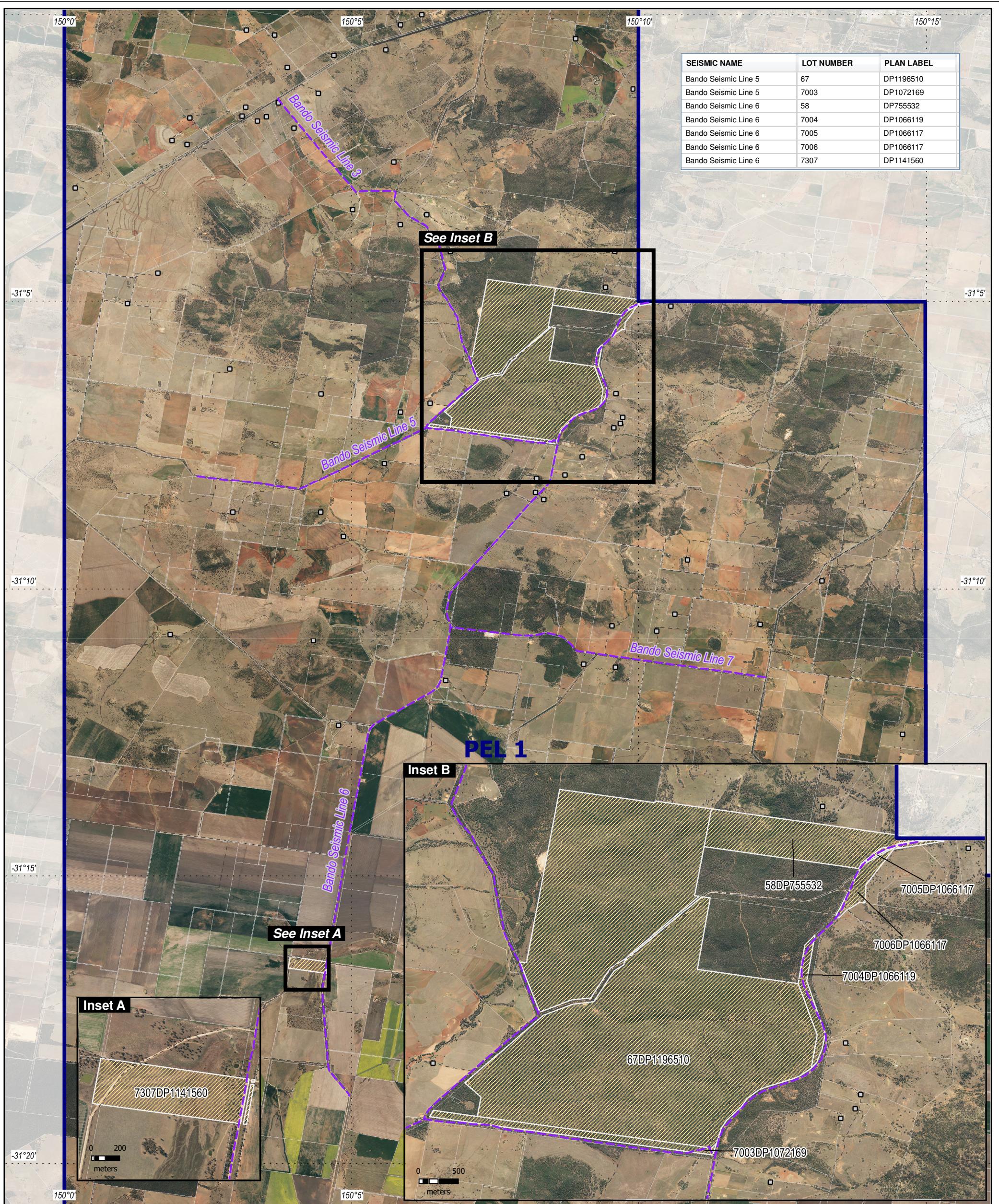
New South Wales

PEL 1

Bando 2d Seismic



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- Legend**
- Town
 - Building
 - 2D Seismic line
- Tenements and Tenure**
- ▭ PEL 1 Tenement
 - ▭ Cadastral Parcel

- Transport**
- Highway
 - Sealed Road
 - - - Unsealed Road
 - + + + Railway

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Santos

New South Wales

PEL 1

Seismic Lines

kilometers

Rev 1 Date: 22/06/2022 File No. GUN 418d.WOR

ATTACHMENT 3 – Guideline Review of Environmental Factors

Review of Environmental Factors

Seismic Surveys - Petroleum Exploration Licence 1

01-Sept-2022

Review of Environmental Factors

Seismic Surveys - Petroleum Exploration Licence 1

Client: Santos Limited

ABN: 80007550923

Prepared by

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12-September-2022

Job No.: 60626642

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Executive Summary

Santos QNT Pty Ltd (Santos), for and on behalf of Petroleum Exploration Lease (PEL) 1 (held by Australian Coalbed Methane Pty Limited), is proposing to undertake seismic surveys over approximately 63 kilometres within the Gunnedah Basin (the Site). The surveys are being undertaken as part of coal seam gas (petroleum) exploration activities. They would be carried out along and within three metres of existing roads but would not occur outside of the allotments of the respective roads (the road corridor).

The Site is located in north-western NSW, and spans the suburbs of Gunnedah, Milroy, Curlewis and Tambar Springs. The Site is located approximately 16 kilometres to the south-west of the centre of the Gunnedah township at its nearest point. The entirety of the Site is located within the Gunnedah Shire local government area.

The Site includes all of the roads where seismic surveys would be undertaken and an area of three metres on both sides of those roads confined within the respective lot boundaries of the road (the road corridor). Those roads are:

- Beeson Road between the Oxley Highway and Milroy Road
- Milroy Road between the northwest corner of Lot 49 DP 755532 and to Beeson Road
- Wandobah Road between the northeast corner of Lot 31 DP811348 and Lot 2 DP591594
- Voca Road between Wandobah Road and Casey Road
- Casey Road between Voca Road and Calala Road
- Goscomb Road between Wandobah Road and Milroy Road.

The activity involves:

- Seismic surveying along the road and road corridor of Beeson Road, Wandobah Road, Milroy Road, Voca Road, Casey Road, Goscomb Road
- Vegetation slashing up to three metres from the road where required.

The activity is expected to take approximately four weeks and would require a peak workforce of 30 crew members. The following equipment would be used:

- Two to three vibroseis trucks (vibrator trucks)
- Four light trucks
- 10 light vehicles (likely to be 4WD)
- One slasher unit (tractor mounted).

An environmental assessment of the activity was completed in line with the *ESG2: Guideline for Preparing a Review of Environmental Factors* (DPE, 2015). Following a broad scoping exercise, the following environmental aspects were considered in this Review of Environmental Factors (REF):

- Air quality
- Water
- Soil and land stability
- Noise
- Flora and Fauna
- Bushfire
- Community resources
- Natural resources
- Social impacts
- Economic impacts

- Non-Aboriginal heritage
- Aboriginal heritage
- Aesthetic impacts
- Land use impacts
- Transportation
- Cumulative impacts

Following an assessment of the potential impact of the activity against each of these aspects it was concluded that, provided a number of mitigation and management measures were implemented, significant impacts on the environment would be unlikely.

The activity is likely to result in an overall negligible effect on the local environment and community given:

- The small scale, localised nature and short timescale of the activity works
- The activity would primarily be undertaken along the road or within the road corridor
- Access is readily available to the Site
- The range of reliable management and mitigation measures which would be implemented to mitigate potential impacts.

The potential impact of the activity on Matters of National Environmental Significance (as defined by the *Environment Protection and Biodiversity Conservation Act 1999*) was also considered. The assessment concluded that no Matters of National Environmental Significance are likely to be impacted by the activity (refer to Section 6.5).

Overall, the ranking of the activity as a whole in line with the ESG2 Guidance was considered negligible.

1.0 Introduction

1.1 Overview

Santos QNT Pty Ltd (Santos), for and on behalf of Petroleum Exploration Lease (PEL) 1 (held by Australian Coalbed Methane Pty Limited), is proposing to undertake seismic surveys over approximately 63 kilometre corridor within the Gunnedah Basin (the Site). The surveys are being undertaken as part of coal seam gas (petroleum) exploration activities. They would be carried out along and within three metres of existing roads but would not occur outside of the allotments of the respective roads (the road corridor).

AECOM Australia Pty Ltd (AECOM) was commissioned to prepare this Review of Environmental Factors (REF) to assess the potential environmental impacts of the activity. The REF addresses the requirements of Section 5.5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), Section 171 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) and the *ESG2: Guideline for Preparing a Review of Environmental Factors* (DPE, 2015). It also addressed *Developments adjacent to National Parks and Wildlife Service lands: Guidelines for consent and planning authorities* (DPE, 2020) (**Appendix A**).

The activity is required to inform structural mapping and seismic attribute analysis mapping to determine the future exploration locations for core holes for areas with Permian coal seam gas potential. Without this information, existing subsurface imaging would not be sufficient for informing future core hole locations, and the farm-in obligations of PEL 1 would not be fulfilled.

The activity is permissible without development consent and requires assessment and determination under Part 5 of the EP&A Act. The NSW Resources Regulator is the determining and approval authority for the activity. This REF has been produced in order to document the environment assessment required by Part 5 of the EP&A Act.

1.2 The proponent and project team

The proponent for the activity is Santos QNT Pty Ltd, 32 Turbot Street, Brisbane QLD 4000.

This REF has been prepared by AECOM Australia Pty Ltd, Level 21, 420 George Street, Sydney NSW 2000.

1.2.1 The Proponent Background in the Gunnedah Basin

Santos is one of Australia's largest domestic gas suppliers and has been working to provide energy to homes and businesses across Australia and Asia for more than 65 years. Santos has been supplying natural gas to NSW since 1976.

Santos entered the Gunnedah Basin in 2008 to undertake exploration for coal seam gas, and by 2011 the proponent had acquired a 65% equity interest in Australian Coalbed Methane (ACM) assets (PELs 1 & 12). In addition, Santos acquired Eastern Star Gas in 2011 which further expanded operations within the region including the Narrabri Gas Project.

1.3 Document structure

This REF has been prepared having consideration to the *ESG2: Guideline for Preparing a Review of Environmental Factors* (DPE, 2015). The REF comprises the following:

- **Chapter 1** – Introduction
- **Chapter 2** – The site
- **Chapter 3** – The existing environment
- **Chapter 4** – The activity
- **Chapter 5** – Legislation and planning policy
- **Chapter 6** – Impact assessment

- **Chapter 7** – Summary of impacts
- **Chapter 8** – Conclusions
- **Chapter 9** – Statement of commitments
- **Chapter 10** – References
- **Appendices**

2.0 The site

2.1 Site description

The Site is located in north-western NSW, and spans the suburbs of Gunnedah, Milroy, Curlewis and Tambar Springs. The Site is located approximately 16 kilometres to the south-west of the centre of the Gunnedah township at its nearest point. The entirety of the Site is located within the Gunnedah Shire local government area (LGA) and is within the following land use zones under the *Gunnedah Local Environmental Plan 2012 (LEP 2012)*:

- RU1 – Primary Production
- C1 – Nature Parks and Nature Reserves
- C3 – Environmental Management.

The Site includes all of the following existing roads within their respective lot boundaries:

- Beeson Road between the Oxley Highway and Milroy Road
- Milroy Road between the northwest corner of Lot 49 DP 755532 to Beeson Road intersection
- Wandobah Road between the northeast corner of Lot 31 DP811348 and Lot 2 DP591594
- Voca Road between Wandobah Road and Casey Road
- Casey Road between Voca Road and Calala Road
- Goscomb Road between Wandobah Road and Milroy Road.

The Site is located adjacent to Wondoba State Conservation Area and the Goran State Forest with no disturbance to these areas expected. The Wondoba State Conservation Area has been identified as suitable for 'conservation, recreation and mineral extraction' and is also vested in the Minister for Environment and Heritage (i.e. the Minister administering the *National Parks and Wildlife Act 1974*) under the *Brigalow and Nandewar Community Conservation Area Act 2005 (BNCCA Act)*. Similarly, the Goran State Forest has been identified as suitable for 'forestry, recreation and mineral extraction' under the BNCCA Act.

Existing environmental aspects are identified and described in more detail as outlined in **Table 2-1**.

Table 2-1 Location of Key Features

Feature	Further discussion
Location of sensitive land	Section 1.1
Location of nearby sensitive receivers	Section 3.3 and Figure 3-5
Location of any coal seam gas exclusion zones	Section 3.4 and Figure 3-6
Location of threatened species or ecological communities, or their habitats	Section 1.1, Figure 3-8, Figure 3-9, Figure 3-10
Location of Aboriginal heritage sites and historic cultural heritage sites	Section 3.7, Appendix D, and Section 3.8, Figure 3-11.

The location and regional context of the Site is shown in **Figure 2-1**, while the Site is shown in more detail in **Figure 2-2**.

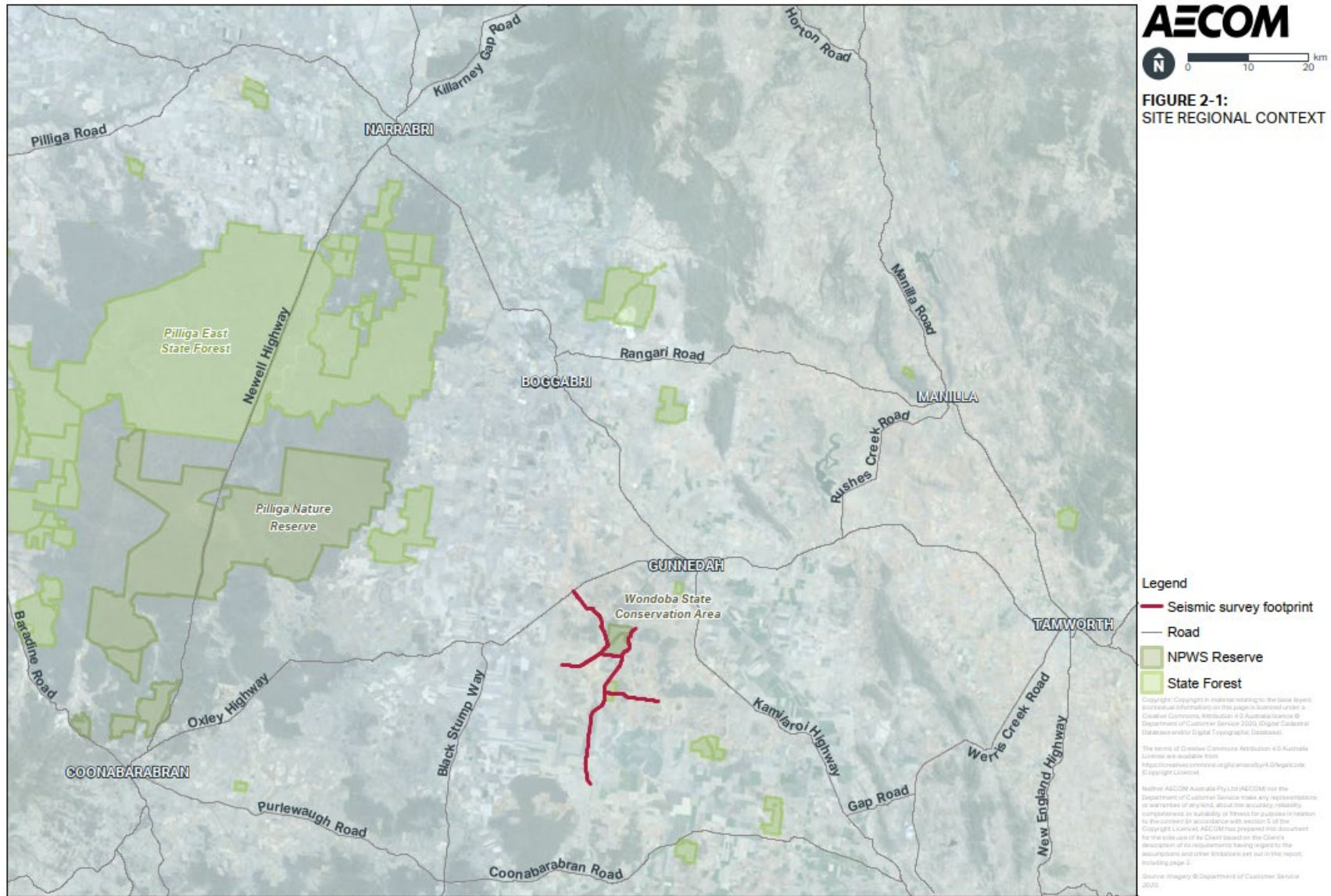


Figure 2-1 Site regional context

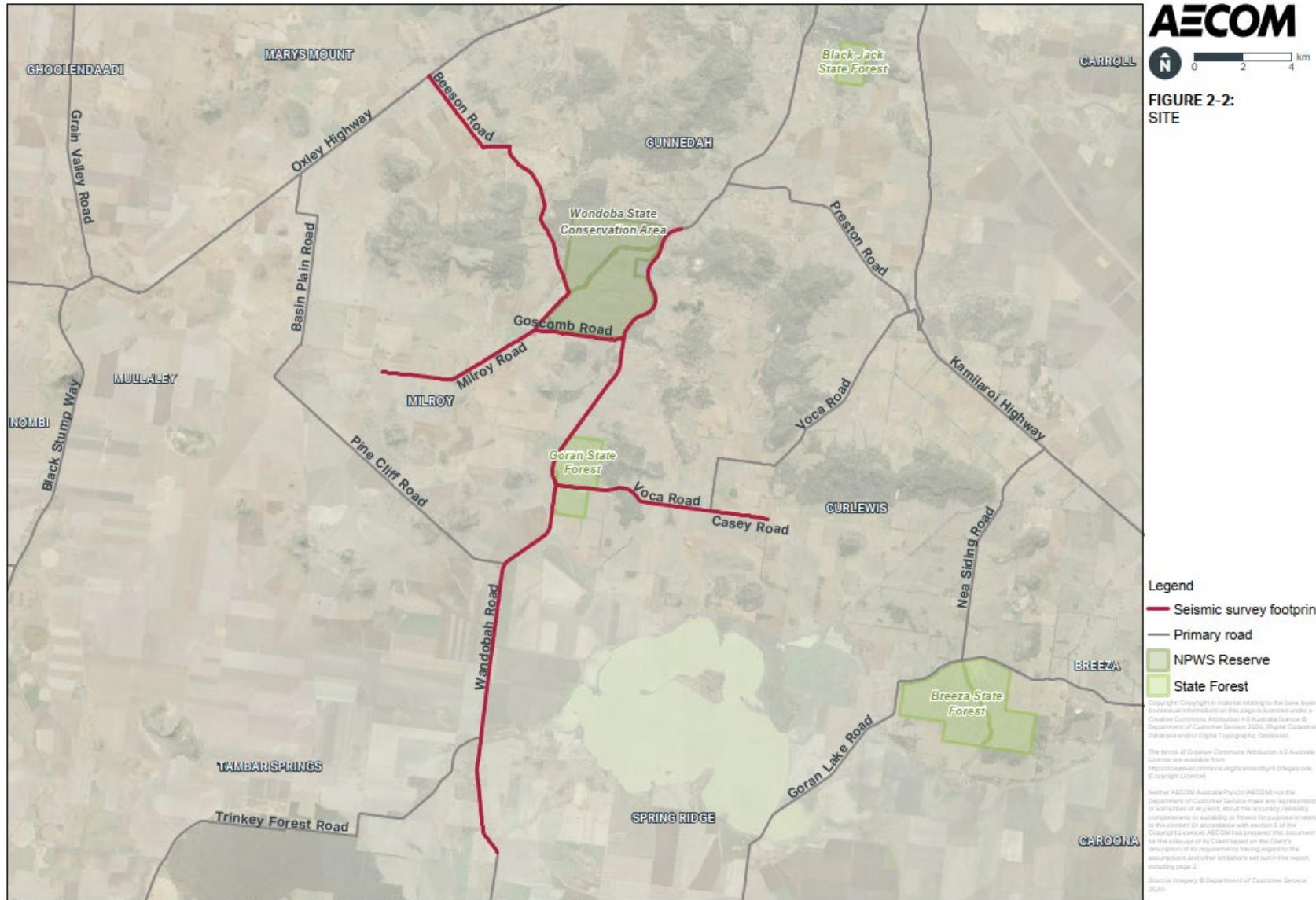


Figure 2-2 Site

3.0 The existing environment

This chapter of the REF provides appropriate context of the existing environmental aspects, sensitive receivers and land which may be impacted by the activity. Each aspect is addressed following the *ESG2: Guideline for Preparing a Review of Environmental Factors* (DPE, 2015) with a general description of its characteristics within the local area and how the activity would interact with it.

3.1 General description

3.1.1 Geology, soils and topography

3.1.1.1 Geology

The Site is located in the Gunnedah Basin. The Gunnedah Basin covers an area of more than 15,000 square kilometres and is defined in structural terms as being bounded to the east by the Hunter Mooki Thrust Fault System and the New England Fold Belt, and to the west by the Lachlan Fold Belt onto which the Gunnedah Basin sediments gradually overlap.

According to the *Gunnedah Coalfield (South) Regional 1:100 000 Geology Map* (Pratt, 1996), the activity would traverse the following lithology types:

- Undifferentiated quaternary sediments
- Jurassic alkali dolerite and micro-syenodolerite (Glenrowan Intrusives)
- Jurassic alkali olivine basalt, alkali basalt, hawaiiite, basanite and mugearite (Garrawilla Volcanics)
- Triassic siltstone/sandstone laminite overlain by quartzose sandstone (Napperby Formation)
- Triassic orthoconglomerate overlain by quartz-lithic and then quartzose sandstone (Digby Formation).

3.1.1.2 Soils

A review of the soil landscapes dataset available on the NSW Department of Planning and Environment (DPE) eSPADE geospatial database identified that the activity would traverse the soil landscapes indicated in **Table 3-1**.

Table 3-1 Soil profiles relevant to the proposed action

Soil landscape	Description	Limitations
Booloocooro	Very deep red-brown earths, red earths, red podzolic soils, black duplex soils and brown clays	<ul style="list-style-type: none"> • Seasonal waterlogging with some areas of high flood hazard • Localised permanently high watertables and water erosion hazard • Localised areas of high shrink-swell hazard • Localised hardsetting soils, and localised dryland salinity hazard • Saline aquifer recharge zone.
Fullwoods Road	Mostly degraded red-brown earths with red earths commonly encountered on upper footslopes	<ul style="list-style-type: none"> • Water erosion hazard • High run-on • High structural decline hazard • Hardsetting surfaces • Highly erodible topsoils • Dryland salinity hazard on lower footslopes • Saline aquifer recharge zone.

Soil landscape	Description	Limitations
Ponderosa	Predominantly moderately deep euzozems on upper mid footslopes with deep black earths on mid and lower footslopes	<ul style="list-style-type: none"> • Water erosion hazard • High run-on • High shrink-swell hazard • High erosion hazard on black earths • High dryland salinity hazard on lower footslopes • Saline aquifer recharge zone.
Carinya	Shallow, stony earths and lithosols, deep euzozems on sideslopes with moderately deep black earths on benches and in fans along drainage lines and on lower sideslopes.	<ul style="list-style-type: none"> • Localised shallow soils and areas of rock outcrop • Stony soils and soils with shrink-swell hazard occur sporadically across the landscape • High run-on (sideslopes) • Saline aquifer recharge zone.
Goscomb Road	Predominantly deep yellow solodic soils, red-brown earths, earthy sands and deep alluvial soils.	<ul style="list-style-type: none"> • Localised flood hazard • High run-on • Episodic waterlogging • Water erosion hazard • Localised dryland salinity • Soil profile drainage is generally poor.
Stafford Gap	Highly variable soils. Soils can include, shallow to moderately deep red earths and earthy sands, yellow podzolic soils on crests and upper sideslopes, shallow to moderately deep red-brown earths, yellow podzolic soils and yellow solodic soils on lower sideslopes and along drainage lines.	<ul style="list-style-type: none"> • Water erosion hazard • Wind erosion hazard • Shallow soils • Rock outcrop • Structural decline hazard • Localised dryland salinity hazard • Soils have localised high erodibility, stoniness, hardsetting surfaces and are generally of low fertility • Saline aquifer recharge zone.
Battery Hill	Very shallow lithosols on crests with shallow stony soils, black earths, brown clays and red clays on side slopes	<ul style="list-style-type: none"> • Steep slopes • Water erosion hazard • Shallow soils • Rock outcrop • Stoniness • Shrink-swell hazard • Saline aquifer recharge zone.

Soil landscape	Description	Limitations
Leslies Road	Predominantly grey clays with black earths and brown clays	<ul style="list-style-type: none"> • Shallow flood hazard • High run-on • Water erosion hazard • Localised wind erosion hazard • Localised permanently high watertables • Localised periodic waterlogging and salinity hazard • Soils have low wet bearing strength and high shrink-swell hazard • Saline aquifer recharge zone.
Quirindi Creek	Very deep red-brown earths, hardsetting red and brown clays and chernozem	<ul style="list-style-type: none"> • High flood hazard • Localised seasonal waterlogging • Water erosion hazard • Localised dryland salinity hazard • Soils generally have low wet bearing strength • Localised high shrink-swell hazard • High erodibility • Localised hardsetting surfaces • Low permeability • Topsoils are subject to structural decline • Saline aquifer recharge zone.

A search of the NSW Environment Protection Authority (EPA) contaminated land record of notices, for sites within the Gunnedah LGA identified 10 contaminated sites. Each of those sites are located within the township of Gunnedah and would not be encountered while the activity is being undertaken.

3.1.1.3 Topography

As the Site traverses a large area, the topography varies. Along each road, the gradient is as follows:

- Beeson Road between the Oxley Highway and Milroy Road:
 - The topography along this road is relatively flat with a slight up-gradient of about 1.5 % from the intersection of Beeson Road and the Oxley Highway until around Lot 94, DP755532 to the intersection of Beeson Road and Milroy Road, where the road slopes down at a gradient of about 1.5%.
- Milroy Road between the northwest corner of Lot 49 DP 755532 and Beeson Road:
 - The topography along Milroy Road is relatively flat with a slight upgradient of around 0.7% until the road reaches the intersection with Besson Road.
- Wandobah Road between the northeast corner of Lot 31 DP811348 and Lot 2 DP591594:
 - Wandobah Road slopes up at a gradient of about 2% from the corner of Lot 31 DP811348 until approximately 400 metres south of the S E Firetrail entrance on the western side of Wandobah Road.
 - From that location until Lot 2 DP591594, Wandobah Road slopes down at a gradient of about 0.5%, indicating that it is relatively flat.

- Voca Road between Wandobah Road and Casey Road:
 - From Wandobah Road, Voca Road slopes up at a gradient of about 1.4% for a distance of about 2.75 kilometres. From that point, until Casey Road, Voca Road is relatively flat, albeit with a very slight downgradient.
- Casey Road between Voca Road and Calala Road
 - This section of Casey Road is relatively flat, albeit with a very slight downgradient.
- Goscomb Road between Wandobah Road and Milroy Road
 - Goscomb Road is relatively flat for the whole road, with a light downgradient from Wandobah Road to Milroy Road.

3.1.2 Climate

The Bureau of Meteorology (BoM) weather station considered to be most representative of the local area is Gunnedah Airport. The local climate is temperate with higher rainfall during the summer months. The average daily maximum temperature is 26.3°C, while the average daily minimum temperature is around 10.2°C (BoM, 2020). Annual average rainfall is 527.3 millimetres between 2001 and 2020. As shown in **Table 3-2**, based on mean temperature records the warmest month is January and the coolest month is July. December receives the highest level of rainfall and April the least.

Table 3-2 Mean climate data from 2001 to December 2020

Data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Max Temp (°C)	34.8	33.1	30.3	26.5	21.7	18.0	17.4	19.4	23.5	27.6	30.7	32.6
Mean Min Temp (°C)	18.7	18.1	15.4	10.8	5.5	3.9	1.9	2.3	5.8	10.0	14.1	16.5
Mean Rainfall (mm)	49.4	65.7	48.0	21.7	26.4	40.9	29.1	29.9	39.1	46.2	61.6	74.5

3.1.3 Landuse and agriculture

The *New England North-West Strategic Regional Land Use Plan (2012)* includes Strategic Agricultural Land (SAL) mapping. SAL is highly productive land that has both unique natural resource characteristics as well as socio-economic value. Biophysical SAL is a particular category of SAL which is defined as land with the best quality landforms, soil and water resources which are naturally capable of sustaining high levels of productivity with minimal management practices. The following sections of the road corridor where the activity would be undertaken are located within mapped biophysical SAL land (refer to **Figure 3-1**):

- Wondoba Road from slightly south of Goran State Forest until Lot 2 DP1157912 (approximately 9.8 kilometres)
- Beeson Road, adjacent to the Wondoba State Conservation Area (approximately 2.5 kilometres)
- Beeson Road, near the intersections of Beeson Road/Waterhouse Way and Beeson Road/Hennessey Road for approximately 1.9 kilometres
- Wondoba Road from the intersection of Wondoba Road/Milroy Road until the northeast corner of Lot 31 DP811348 (approximately 1.8 kilometres)
- Goscomb road for approximately 2.6 kilometres from the northeast corner of Lot 21 DP1078275 to northwest Lot 2 DP755532.

In addition, at the above locations on the above roads and road corridors, the activity would be undertaken on land mapped as Class 3 – Moderate limitations under the land and soil capability mapping for NSW. According to the *Guideline for Agricultural Impact Statements at the Exploration Stage* (Department of Trade and Investment, Regional Infrastructure and Services, 2015) a Level 1 Exploration Agricultural Impact Statement (AIS) is required as parts of the activity are located on SAL and directly on Land and Soil Capability Class 3 mapped land (refer to **Figure 3-2**). That agricultural impact statement is shown in **Table 3-3**.

Table 3-3 Issues to be addressed in a Level 1 Exploration AIS

	Issue	Response
1	Describe the nature, location, intensity and duration of the proposed exploration activity and include a map of the Site.	The activity involves seismic surveys over approximately 63 kilometres in the Gunnedah Basin, as part of coal seam gas exploration activities (Section 1.1). Gunnedah Basin is located in north-western NSW, located within the Gunnedah Shire LGA and includes all of the road corridors where seismic surveys would be undertaken as described in Section 2.1 . The Site is also shown on Figure 2-2 . The exploration activities are estimated to take approximately four weeks, and would occur between daylight hours 7 days a week (Section 4.1 and Section 4.2.4).
2	Describe the nature and location of agricultural resources or industries with the potential to be impacted by the proposed exploration activity.	<p>The activity would traverse various soil types which are described in Table 3-1 in Section 3.1.1. The Site would be undertaken on land mapped as Class 3 for soil capability, which has moderate limitations (Section 3.1.3).</p> <p>The Site is located within the Mook sub-catchment (3,870 square kilometres) of the Namoi River catchment, (42,000 square kilometres) (Section 3.5.1). Main watercourses and waterbodies near the Site are shown on Figure 3-7. Sections of the road corridor, outlined in Section 3.1.3 are located in SAL, meaning that the soils in these areas are naturally capable of sustaining high levels of productivity (highly fertile) with minimal management practices.</p> <p>According to the Growing Regions information website, the Site is located in a region that has a high diversity of crop production, including: wheat, barley, sorghum, maize, oilseeds and tropical and winter-growing pulses (Grains Research and Development Corporation, 2022). Mapping from the Farm Transparency Project and the Meat and Livestock Australia websites indicated that sheep and cattle farming is also highly likely around the Site (Farm Transparency , 2019; Meat and Livestock Australia, 2021).</p>
3	Identify and describe the nature, duration and consequence of any potential impacts on agricultural resources or industries.	The activity has the potential to impact on agricultural resources and enterprises in several ways, including: dust impacts and vehicle emissions (Section 6.1.1), noise impacts (Section 6.1.4), increased risk of bushfire (Section 6.2.2), increase in traffic (Section 6.4.7), social impacts, especially with regards to traffic safety (Section 6.4.1), spread of weeds (Sections 6.3.2 and 6.4.6) and temporary positive economic impacts (Section 6.4.2). Management and mitigation measures have been outlined in Sections 4.5 and 6.0 to manage the potential impacts to agricultural resources and enterprises.
4	Outline how and when any disturbance resulting from the exploration activity will be rehabilitated.	The activity would be within the road corridor, and therefore potential impacts to native vegetation would be temporary and negligible(Section 6.2.1). Furthermore, most of the vegetation communities within the Site are highly modified. Therefore, rehabilitation is not considered necessary as a result of the proposed activities (Section 6.2.1).
Additional considerations:		
5	Location of the project to sensitive agricultural activities. Sensitive agricultural activities may include:	The activities would be undertaken adjacent to an Environmentally Sensitive Areas of State Significance and Sensitive Land (Section 3.2). In particular, areas of biophysical SAL and critical industry clusters. Sensitive

	Issue	Response
	<ul style="list-style-type: none"> - Intensive plant agriculture such as orchards and vineyards - Intensive livestock agriculture located within 1 kilometre of exploration activities - Breeding paddocks (e.g. lambing paddocks) located within 300 metres of exploration activities. 	<p>areas where the activities would take place are described in Table 3-4 in Section 3.2. The impacts that activities would have include minor vegetation clearance within the road corridor (Section 6.3.2). Management and mitigation measures are outlined in Sections 6.3.2 and 6.4.6 to ensure that the activities would have no significant impacts on sensitive agricultural activities and resources.</p>
6	<p>Agricultural biosecurity. Exploration activities should consider enterprise specific industry biosecurity plans (e.g. viticulture, cotton, equine, grains, feedlots, poultry industries).</p>	<p>Given that the activities would be limited to existing roads and road corridors, it is not anticipated that they would pose any significant biosecurity risks to nearby agricultural industries. Management and mitigation measures have been outlined in Sections 4.5.1 and 6.2.1 to inhibit the spread of noxious weeds.</p>
7	<p>Accounting for the use of water. If more than 3 ML of water will be taken per year (as a result of cumulative exploration activities within the exploration authority/title area).</p>	<p>The activities would not (Section 6.1.2):</p> <ul style="list-style-type: none"> • Take place near perennial streams or natural water bodies • Require the discharge of stormwater onto NSW National Parks and Wildlife Service (NPWS) lands • Involve excavation or sediment/spoil stockpiling • Interact with groundwater • Increase or decrease in groundwater levels • Alter the storage capacity or behaviour of flood waters • Produce waste water • Reuse, collect, treat, dispose or discharge, produce or store water. <p>The activities may result in spills or leaks of petroleum and/or lubricants from machinery (Section 6.1.2).</p> <p>Overall, it is unlikely that water users within the Site would be affected by the activities. Potential spills or leaks may impact water quality, however, with the implementation of management and mitigation measures described in Section 6.1.2, it is anticipated that the activity would have negligible impacts on water quality.</p>



Figure 3-1 SAL map relevant to the activity

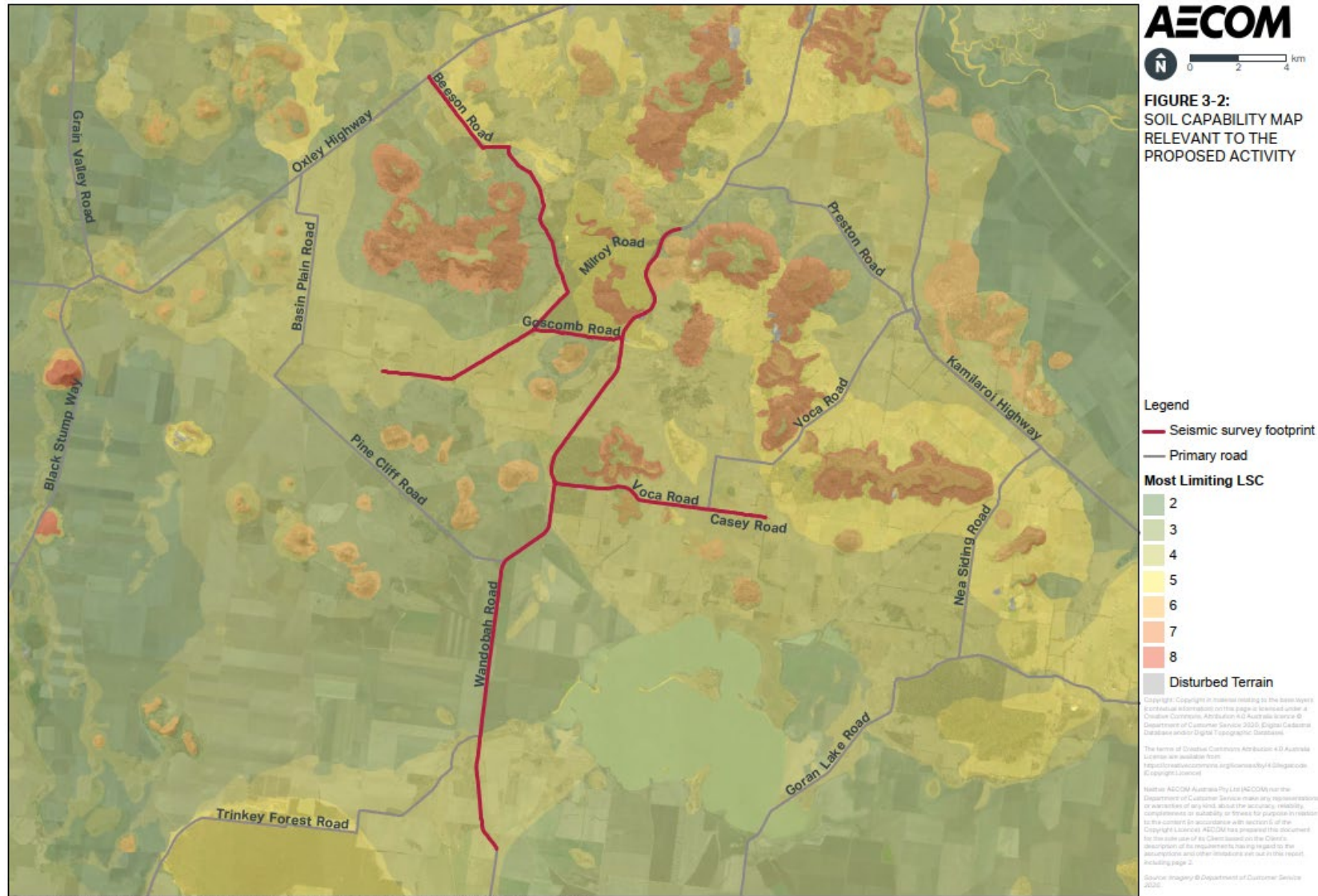


Figure 3-2 Soil capability map relevant to the activity

3.1.4 Traffic and access

The activity would be undertaken on Beeson Road, Wandobah Road, Goscomb Road, Milroy Road, Voca Road and Casey Road. The primary access to those roads is likely to be gained via the Oxley Highway at the intersection of Oxley Highway/Beeson Road (Refer to **Figure 3-3**). Alternative access roads nearby include View Street at the intersection of View Street/Wandobah Road (View Street is accessible via the Oxley Highway) and Preston Road at the intersection of Preston Road/Wandobah Road. The alternative routes are not as direct as Oxley Highway/Beeson Road and would require vehicles to travel on local roads within the main townships of Gunnedah and Curlewis respectively.

The Oxley Highway (B56) is a classified State Road connecting Port Macquarie to the east and Coonabarabran to the west. At the location of the intersection of Oxley Highway/Beeson Road, it is a two-lane (one lane in each direction), sealed and line-marked road.

Beeson Road, Wandobah Road, Milroy Road, Voca Road, Casey Road, Goscomb are all unclassified local roads. With the exception of Wandobah Road, each road is unsealed.

For context, a review of the traffic volume data for the Oxley Highway (Station ID 6167 – 1.45 kilometres east of Wilkinson Road, Gunnedah) was undertaken. This monitoring location is situated approximately 25 kilometres east of the Oxley Highway/Beeson Road intersection. Data from this monitoring location is therefore indicative only and may not reflect traffic diverting to or coming from the Kamilaroi Highway.

In 2020, the average total weekday volume of vehicles is recorded as 1,747 and 1,735 eastbound and westbound respectively. During the AM peak, the Oxley Highway at this location experiences 445 and 466 vehicles in the eastbound and westbound directions respectively, while in the PM peak 510 and 488 vehicles travel in the eastbound and westbound directions respectively.



Figure 3-3 Access roads

3.1.5 Air quality

The air quality in the vicinity of the Site is influenced by the common land use practices in the area, including agricultural production and forestry operations and is therefore representative of a rural environment. Dust and exhaust emissions from vehicles and machinery, particularly on dirt roads, and smoke from bushfires influence the local air quality.

3.1.6 Noise

The acoustic environment around the Site is characterised by the rural environment. The dominant noise sources are likely to include:

- Vehicles – predominantly light vehicles, with heavy vehicles near the Oxley Highway
- Agricultural plant/equipment
- Domestic animal calls
- Wild animal calls.

The sensitive receivers close to the Site are residential receivers (refer to **Figure 3-5**). The nearest residential receivers along each road are:

- Beeson Road: dwelling house located approximately 35 metres from the road
- Milroy Road: dwelling house located approximately 400 metres from the road
- Wandobah Road: dwelling house located approximately 100 metres from the road
- Avoca Road: dwelling house located approximately 310 metres from the road
- Casey Road: dwelling house located approximately 930 metres from the road.

3.1.7 Utilities

The location and type of all existing services would be confirmed and marked out in the interests of safety and protection of existing services prior to the activity being undertaken.

From available datasets, there are no gas lines or water pipelines nearby the Site, however as seen in **Figure 3-4** there is an array of electrical transmission lines intersecting and adjacent to Site. This would be avoided for the duration of the activity.



Figure 3-4 Location of Nearby Utilities

3.2 Description of sensitive land

The activity would be undertaken adjacent to an Environmentally Sensitive Area of State Significance (ESA), Wondoba State Conservation Area, as defined under the *State Environmental Planning Policy (Resources and Energy) 2021* (Resources and Energy SEPP).

In addition, the activity would be undertaken on Sensitive Land as defined by *ESG2: Guideline for Preparing a Review of Environmental Factors* (DPE, 2015). The presence of ESAs and Sensitive Land was determined through a range of searches. **Table 3-4** provides an overview of the presence of sensitive land, including ESAs, within the Site.

Table 3-4 Sensitive Areas and Land

Land	Applies?	Description
Conservation Areas		
Land reserved under the <i>National Parks and Wildlife Act 1974</i>	No	-
Land acquired by the Minister for the Environment under the <i>National Parks and Wildlife Act 1974</i>	No	-
Land subject to a 'conservation agreement' under the <i>National Parks and Wildlife Act 1974</i>	No	-
Land declared as an aquatic marine reserve under the <i>Marine Estate Management Act 2014</i>	No	-
Land declared as a marine park under the <i>Marine Estate Management Act 2014</i>	No	-
Land within a State Forest set aside under the <i>Forestry Act 2012</i> for conservation values	Yes	Goran State Forest – mapped as "Zone 4 – General Management Zone"
Land reserved or dedicated under the <i>Crown Lands Act 1989</i> for environmental protection purposes	No	-
Land identified as wilderness or declared a wilderness area under the <i>Wilderness Act 1987</i>	No	-
Land subject to a 'biobanking agreement' under the <i>Threatened Species Conservation Act 1995</i>	No	-
Drinking Water Catchment Protection Areas		
Land declared to be a 'controlled area' or a 'special area' under the <i>Water NSW Act 2014</i> or a 'special area' under the <i>Water Management Act 2000</i> or <i>Hunter Water Act 1991</i>	No	-
Environmentally Sensitive Areas		
Land identified as critical habitat under the <i>Threatened Species Conservation Act 1995</i> or Part 7A of the <i>Fisheries Management Act 1994</i> .	No	-
Land designated as a wetland of international significance under the Ramsar Convention on Wetlands	No	-
Land designated as a nationally important wetland in the Directory of Important Wetlands of Australia	No	-
Coastal Wetlands to which <i>State Environmental Planning Policy (Resilience and Hazards) 2021</i> applies	No	-
Littoral Rainforests to which <i>State Environmental Planning Policy (Resilience and Hazards) 2021</i> applies	No	-
Coastal Zone as defined in the <i>Coastal Management Act 2016</i>	No	-
Land identified in an environmental planning instrument as being of biodiversity significance or zoned for environmental conservation	No	-
Waterfront land as defined under the <i>Water Management Act 2000</i>	No	-
Land with a slope greater than 18 degrees measured from the horizontal	No	-

Land	Applies?	Description
Land with Potential for Soil and Water Contamination		
Potential Acid Sulfate Soils or Actual Acid Sulfate Soils	No	-
Aboriginal Heritage Protection Areas		
Land declared as an Aboriginal place under the <i>National Parks and Wildlife Act 1974</i>	No	-
Land identified in an environmental planning instrument as being of Aboriginal cultural significance	No	-
Historic or Natural Heritage Protection Areas		
Land identified on the World Heritage List, National Heritage List or Commonwealth Heritage List	No	-
Land, places, buildings or structures listed on the State Heritage Register	No	-
Land identified in an environmental planning instrument as being of heritage significance	No	-
Biophysical Strategic Agricultural Land and Critical Industry Clusters		
Land identified as biophysical strategic agricultural land under <i>State Environmental Planning Policy (Resources and Energy) 2021</i>	Yes	The following sections of the roads and road corridor where the activity would be undertaken are located within mapped biophysical SAL land: <ul style="list-style-type: none"> • Wondoba Road from slightly south of Goran State Forest until Lot 2 DP1157912 (approximately 9.8 kilometres) • Beeson Road, adjacent to the Wondoba State Conservation Area (approximately 2.5 kilometres) • Beeson Road, near the intersections of Beeson Road/Waterhouse Way and Beeson Road/Hennessey Road for approximately 1.9 kilometres • Wondoba Road from the intersection of Wondoba Road/Milroy Road until the northeast corner of Lot 31 DP811348 (approximately 1.8 kilometres) • Goscomb road for approximately 2.6 kilometres from the northeast corner of Lot 21 DP1078275 to northwest Lot 2 DP755532.
Land identified as Critical Industry Cluster Land under <i>State Environmental Planning Policy (Resources and Energy) 2021</i>	No	-
Community Land		
Public land classified as community land under the <i>Local Government Act 1993</i>	No	-

Potential impacts to sensitive areas are assessed in **Section 6.0** of this REF.

3.3 Description of sensitive receivers

Sensitive receivers applicable to the activity would be residential receivers along Beeson Road, Wandobah Road, Milroy Road, Voca Road, Casey Road and Goscomb Road. Based on aerial imagery via Google Maps, there appears to be 37 dwelling houses that have the potential to be affected by the activity along those roads (refer to **Figure 3-5**). The nearest receivers along those roads are detailed in **Section 3.1.6**.



Figure 3-5 Locations of sensitive receivers

3.4 Description of coal seam gas exclusion zones

Part 2.2, Section 2.12 of the Resources and Energy SEPP prohibits development on or under the following land:

- land within a coal seam gas exclusion zone; or
- land within a 2 km buffer of a residential zone, future residential growth area or additional rural village land.

The activity would not be undertaken within or near any land designated as a coal seam gas exclusion zone or within an applicable buffer zone, as seen in **Figure 3-6** below.

Schedule 1 of the Resources and Energy SEPP lists the LGA's which prohibits development for the purpose of petroleum exploration, production or related works. Within additional mapping under this Schedule, Gunnedah is listed (and mapped) within an area which allows for this type of development.

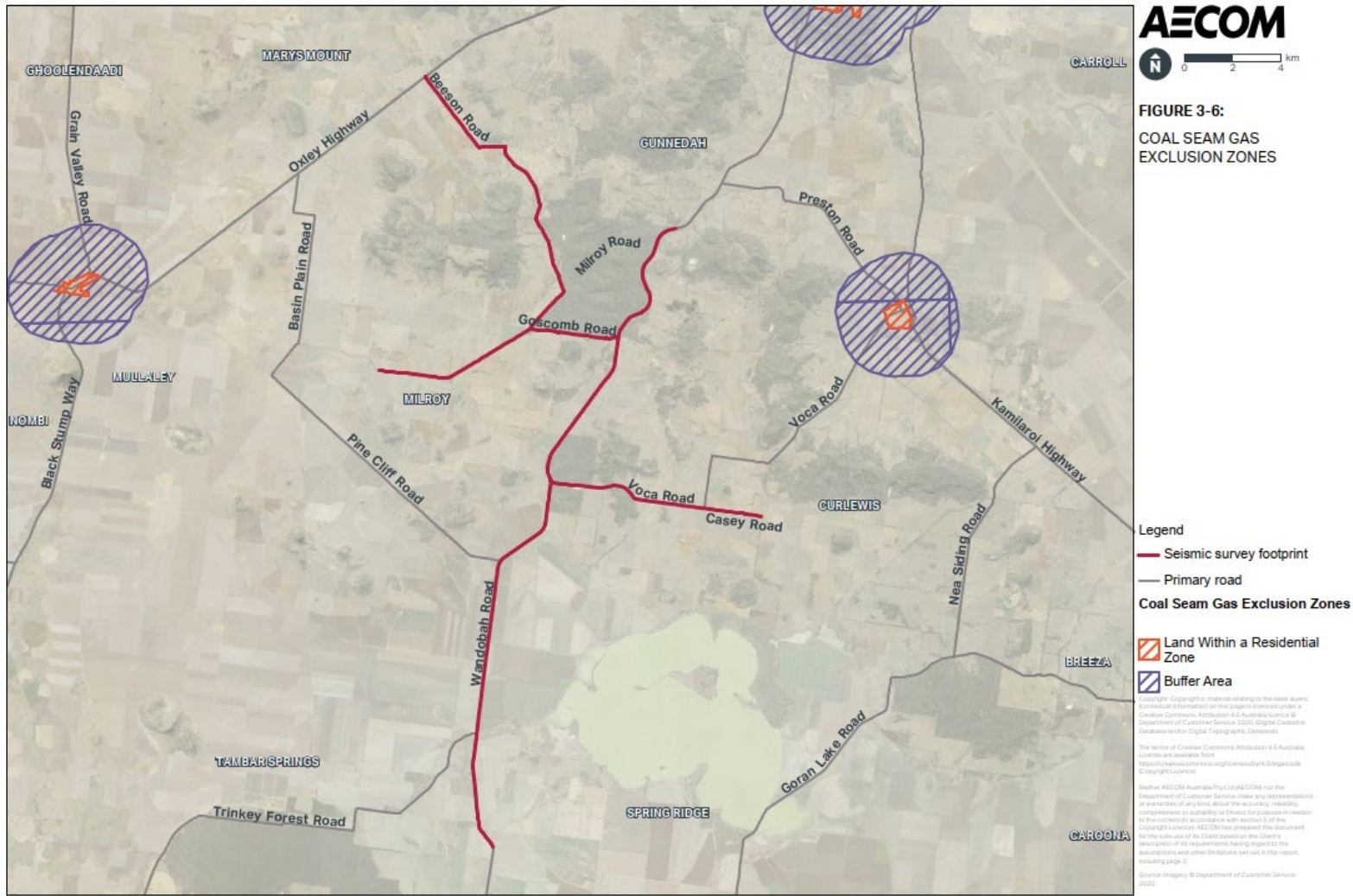


Figure 3-6 Coal Seam Gas Exclusion Zones

3.5 Description of surface water

3.5.1 Surface water

The activity would be located within the Namoi River catchment, which covers an area of approximately 42,000 square kilometres stretching from Woolbrook in the east to Walgett in the west. The catchment is bounded by the Great Dividing Range in the east, the Liverpool Ranges and Warrumbungle Ranges in the south and the Nandewar Ranges and Mount Kaputar to the north. Major tributaries of the Namoi River include Coxs Creek and the Mooki, Peel, Cockburn, Manilla and Macdonald rivers, all of which join the Namoi River upstream of Boggabri (Namoi Catchment Management Authority (NCMA), 2014).

The activity would be undertaken within the Mooki sub-catchment of the Namoi River catchment. The Mooki sub-catchment covers an area of approximately 3870 square kilometres in the south-east of the Namoi catchment. Its major tributaries are the Phillips, Warrah and Quirindi creeks. Lake Goran, the largest natural water body in the Namoi subregion, occupies 82 square kilometres when full and is located in the Mooki sub-catchment (NCMA, 2014). Surface water quality within the catchment is likely to be influenced by agricultural runoff, spray drift, and vapour transport.

The main watercourses and waterbodies located near the extent of the activity can be seen in **Figure 3-7**. Red Bobs Creek is an ephemeral watercourse that drains into Lake Goran. It crosses Wandobah Road within the extent of the activity. Collygra Creek is another watercourse which crosses under Beeson Road, a section of the activity footprint.

The activity would not impact on the quality and flow of these watercourses following the implementation of mitigation measures outlined in **Section 6.1**, as the activities are minor in scale and temporary in nature.



Figure 3-7 Nearby Surface Water

3.6 Description of threatened species and ecological communities

3.6.1 Literature and data review

Eco Logical Australia Pty Ltd (ELA) was engaged by Santos Limited to undertake a Flora and Fauna Assessment at the Site. A summary of the existing ecological environment is provided below. Further detail is provided in the Flora and Fauna Assessment (refer to **Appendix B**).

A review of relevant databases and literature identified 11 endangered ecological communities (EEC) / critically endangered ecological communities (CEEC), 54 threatened fauna species, and nine threatened flora species with the potential to occur within a 10 kilometre radius of the Site. Each of these were assessed for likelihood of occurrence, incorporating the results of the field survey and assessment of potential habitat within the Site. During a field survey, the list was refined to 37 threatened species or communities that are likely or with the potential to occur within the Site (refer to **Figure 3-8** and **Figure 3-9**).

Section 6.2 provides an assessment of the potential impacts of the activity on biodiversity values and the mitigation measures proposed for the activity.

3.6.2 Vegetation communities

Nine plant community types (PCT) were recorded within the Site:

- PCT 27 – Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion
- PCT 81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion
- PCT 101 – Poplar Box – Yellow Box – Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion
- PCT 102 – Liverpool Plains grassland mainly on basaltic black earth soils, Brigalow Belt South Bioregion
- PCT 281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion
- PCT 433 – White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool plains sub-region, BBS Bioregion
- PCT 435 – White Box – White Cypress Pine shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion
- PCT 459 – Narrow-leaved Ironbark – Black Cypress Pine – White Box shrubby woodland in sedimentary hills of the Gunnedah region, Brigalow Belt South Bioregion
- PCT 599 - Narrow-leaved Ironbark – Black Cypress pine - White Box shrubby open forest in the Brigalow Belt South Bioregion and Nandewar Bioregion
- Cleared / exotic.

Six out of the nine PCT conform to the relevant criteria for threatened ecological communities (TEC) listed under the *Biodiversity and Conservation Act 2016* (BC Act) and *Environmental Protection of Biodiversity and Conservation Act 1999* (EPBC Act). A summary of each TEC, associated PCT and listing is provided as follows:

- *NSW Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penplain, Nandewar and Brigalow Belt South Bioregions EEC* listed as endangered under the BC Act (PCT 81)
- *NSW Native Vegetation on Cracking Clay Soils of the Liverpool Plains EEC* listed as endangered under the BC Act (PCT 102).

- NSW *White Box-Yellow Box-Blakely's Red Gum Woodland EEC* listed as endangered under the BC Act (PCT 281, PCT 433 and PCT 435, PCT 599)
- *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* listed as critically endangered under the EPBC Act (PCT 281, PCT 433, PCT 435 and PCT 599).

Details of how each PCT conforms to the relevant TEC is provided in Section 3.2 of the Flora and Fauna Assessment (refer to **Appendix B**). The extent and distribution of each PCT within the Site is shown on Figures 5 – 12 of the Flora and Fauna Assessment (refer to **Appendix B**).

3.6.3 Threatened flora

There were no threatened flora species identified within the survey area during the field survey. It is noted that the survey period was outside that recommended for *Digitaria porrecta* and *Swainsona murrayana*. The survey was undertaken during the period recommended for *Dichanthium setosum* and *Tylophora linearis*, however, targeted surveys were unable to be undertaken for these species.

3.6.4 Threatened fauna

One threatened fauna species, *Phascolarctos cinereus* (Koala), which is listed as vulnerable under the BC Act and endangered under the EPBC Act, was identified within the Study Area during the field survey (refer to **Figure 3-10**). Of the 54 species identified from the data audit, the likelihood of occurrence assessment concluded that 30 threatened fauna species are considered likely to occur in the Site. This included 21 species listed as threatened under the BC Act, one species listed as threatened under the EPBC Act, and eight species listed as threatened under both the BC Act and EPBC Act (refer to **Figure 3-8**).

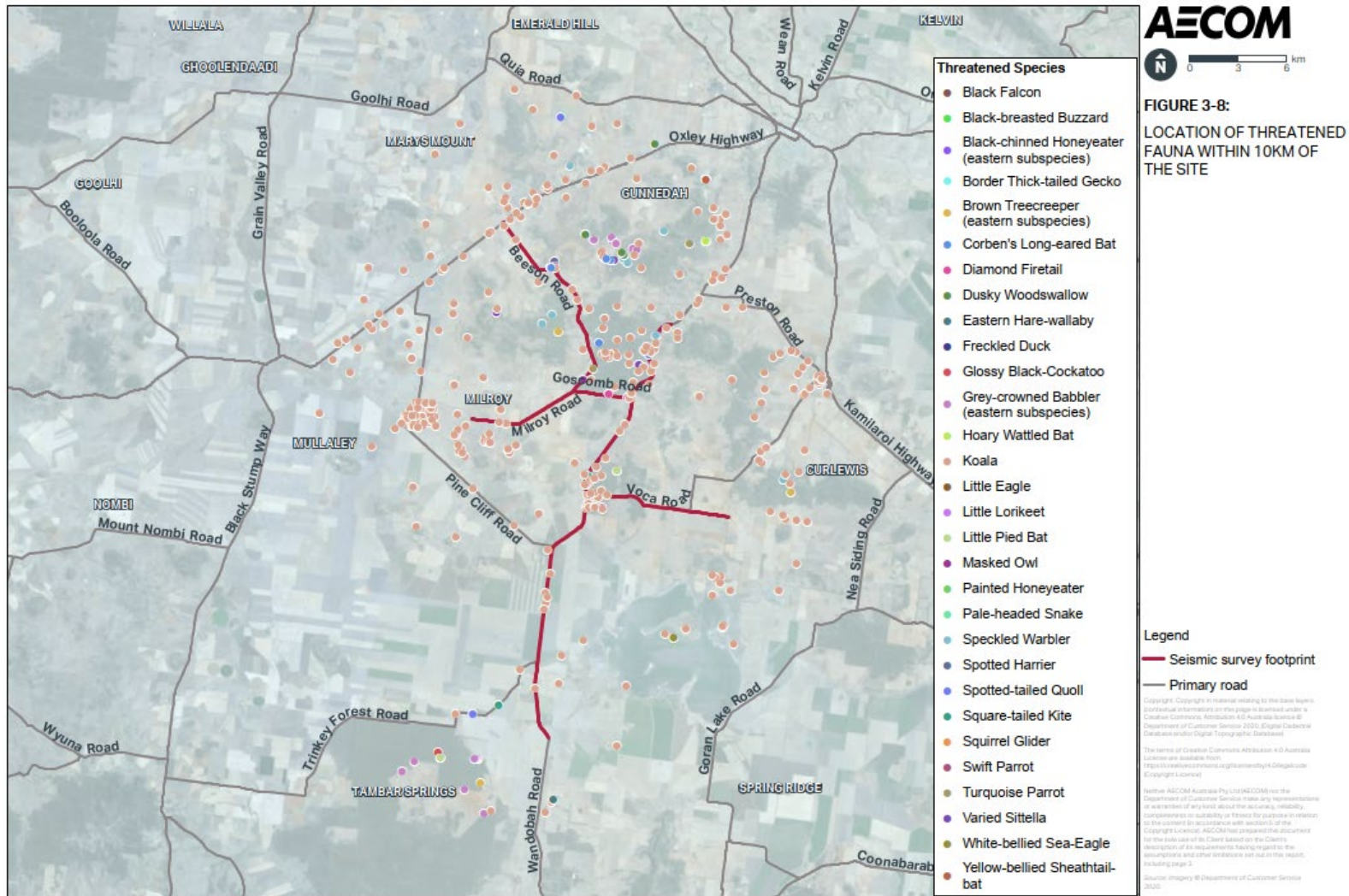


Figure 3-8: Location of threatened fauna within 10 kilometres of the Site



Figure 3-9 Location of threatened flora within 10 kilometres of the Site



Figure 3-10: Threatened species observed during the field survey

3.7 Description of Aboriginal cultural heritage

An Aboriginal Heritage Due Diligence Assessment Report (OzArk, 2022) (refer to **Appendix D**) was undertaken to assess the potential impacts to Aboriginal Heritage located within in or adjacent to the activity.

The seismic line assessment will be the subject of the activity. This activity is considered a low impact activity under Section 58 of the *National Parks and Wildlife Regulation 2019* (NPW Regulation).


As the activity is occurring on roads and within road corridors with known, previously recorded Aboriginal sites such as culturally modified trees nearby, the due diligence process must be applied.




Attempts were made to locate any previously recorded Aboriginal site within 10 metres of the seismic line. Six previously recorded Aboriginal sites were in this category, as shown in **Table 3-5**. Of these, four were located and their coordinates checked, while two were unable to be located and are thought to have the wrong coordinates on Aboriginal Heritage Information Systems (AHIMS).

No Aboriginal objects were recorded during the assessment and previously recorded Aboriginal sites along the seismic line can be protected through the implementation of recommended management measures, as identified in **Table 3-5**.

AHIMS sites 29-1-0113 and 29-1-0117, both modified trees, are within five metres of the proposed seismic line. The location of these modified trees will be marked on the operational maps and discussed in inductions to ensure no inadvertent impacts occur during the seismic work.

Table 3-5 AHIMS Site Information (Source: OzArk Env & Heritage; Due diligence report for the Gunnedah Work Program – Table 3-1)

AHIMS No.	Site Name	Site Type	Coordinates (AGD) From site card	New Coordinates (GDA) From 2022 field site Visit	Image	Management recommendations
29-1-0119	Wandoba Scar Tree 9	Modified Tree	224609E 6554266N	Could not be located at the AHIMS location. From the site card location sketch it is likely that this site is located far to the north of the study area, although this could not be verified.	Site not located	As this tree could not be located, there are no management recommendations. It is unlikely that it is at risk from the proposal.
29-1-0117	Wandoba Scar Tree 7	Modified Tree	225084E 6553162N	225187E 6553367N		This tree is approximately two metres south of Goscomb Road. The location of the tree will be marked on the operational maps and discussed in inductions to ensure no inadvertent impacts occur.
29-1-0122	Wandoba Resource 1	Grass trees	225080E 6553165N	Could not be located at this location. From	Site not located	As this tree could not be located, there are no management

AHIMS No.	Site Name	Site Type	Coordinates (AGD) From site card	New Coordinates (GDA) From 2022 field site Visit	Image	Management recommendations
				the site card location sketch, it is likely that this site is located north of Goscomb Road within the Wondoba Conservation Area, although this could not be verified.		recommendations. Unlikely that it is at risk from the proposal.
29-1-0116	Wandoba Scar Tree 6	Modified Tree	225112E 6553147N	225218E 6553350N		This tree is approximately 10 metres south of Goscomb Road. No management required.
29-1-0113	Wandoba Scar Tree 3	Modified Tree	227261E 6552958N	227368E 6553151N		This tree is approximately three metres south of Goscomb Road. The location of the tree will be marked on the operational maps and discussed in inductions to ensure no inadvertent impacts occur.
29-1-0114	Wandoba Scar Tree 4	Modified Tree	227279E 6552969N	227397E 6553166N		This tree is approximately 10 metres north of Goscomb Road. No management required.

3.8 Description of historic cultural or natural heritage

A search of the relevant non-Aboriginal heritage databases identified that there are no items listed on the World Heritage List, Commonwealth Heritage List, National Heritage List, State Heritage Register or the *Gunnedah LEP 2012*.

Although not located within the footprint of the activity, the curtilage of a locally listed heritage item is located approximately 150 metres from the activity at its closest point, while the building on the land associated with that heritage item is located approximately 700 metres from the activity, as seen in **Figure 3-11**. That heritage item is “*Trelawney*” and is located at Lot 22, DP1003636 Wandobah Road, Gunnedah (item No. I024 under the *Gunnedah LEP 2012*).



Figure 3-11 Historic Heritage

4.0 The activity

4.1 Summary of the activity

The company details relevant for the activity are contained within **Table 4-1**.

Table 4-1 Company Details

Item	Details
Title number	Petroleum Exploration Licence (PEL) 1
Title Holders	Santos QNT Pty Ltd and Australian Coalbed Methane Pty Limited
Operator	Santos QNT Pty Ltd

The activity involves:

- Seismic surveying along Beeson Road, Wandobah Road, Voca Road, Milroy Road, Casey Road and Goscomb Road.
- Vegetation slashing up to three metres from the road.

The activity is expected to take approximately four weeks and would require a peak workforce of 30 crew members. The following equipment would be used:

- Two to three vibroseis trucks (vibrator trucks)
- Four light trucks
- 10 light vehicles (likely to be 4WD)
- One slasher unit (tractor mounted).

Approval is being sought to carry out the activity for the entire duration that is required to complete seismic surveys along the Site. The length of time that may be required to undertake the surveys may be influenced by weather and/or natural events (e.g. bushfires) which may extend the time needed to complete the surveys. There would be no ongoing operations following the completion of the surveys.

4.2 Description of the activity

Seismic surveys allow the explorer to 'image' below the surface and identify areas where oil and gas may have accumulated. The seismic method typically utilises vibrator trucks as the energy source. The energy source causes sound waves, which travel into the earth and are then reflected from subsurface geological structures. The returning reflections are recorded in a digital format and sent to a seismic data processing centre to produce a 'cross-section' of the layers of the earth's crust (refer to **Figure 4-1**).

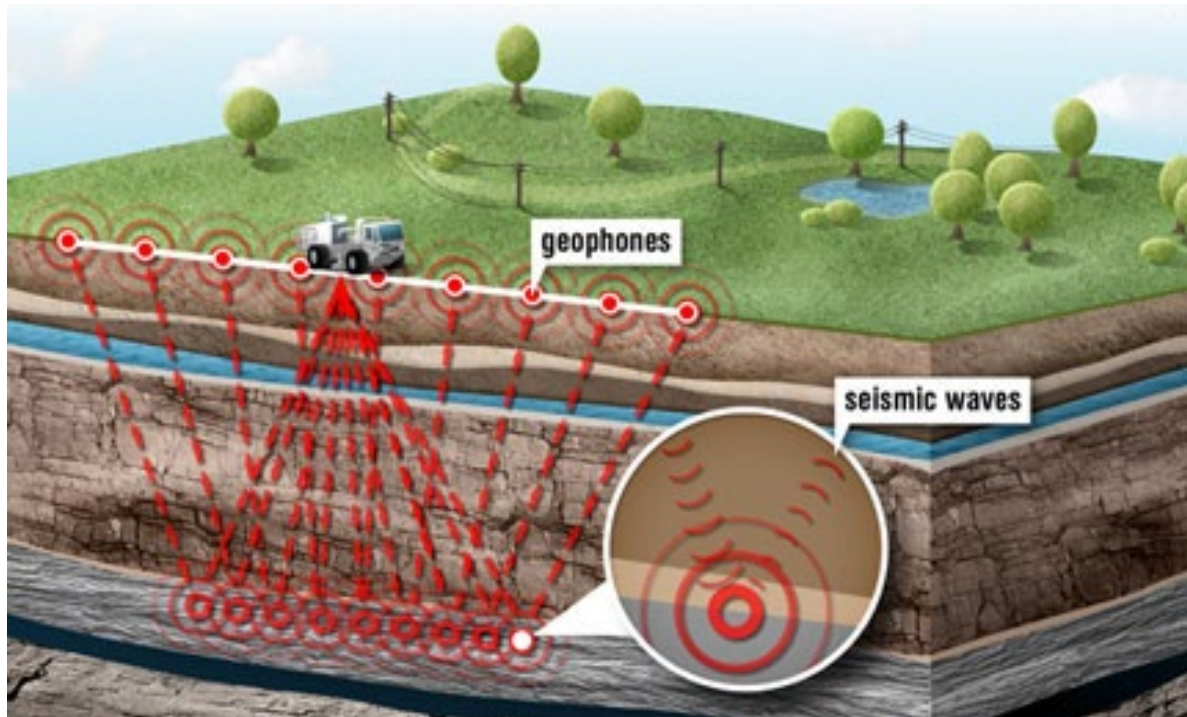


Figure 4-1 The seismic acquisition

4.2.1 Line preparation

Seismic lines are the lines that the vibrator trucks follow to carry out the seismic surveys. For the majority of the activity, the lines would be located entirely along the existing road or road corridors of Beeson Road, Wandobah Road, Milroy Road, Voca Road, Goscomb Road and Casey Road.

As a precautionary measure, a buffer of three metres on both sides of the road has been included within the total footprint of the Site (road corridor), however surveying activities would occur only on one side of the road. Within that three metre buffer there may be vegetation that is required to be slashed in order to accommodate the seismic survey equipment. Slashing would be restricted to grasses and understorey vegetation.

4.2.2 Land surveying

Following preparation of the seismic lines, land surveying of those seismic lines is carried out. During the land surveying process, receiver points are positioned along the seismic lines. Numbered wooden pegs and/or biodegradable paint would be used to indicate the locations of those points. All wooden pegs would be removed upon completion of the seismic surveys.

4.2.3 Recording

Approximately five to seven days from the beginning of line preparation, the recording process starts. In this process, line crews, with the assistance of a 4WD vehicle walk along the seismic lines and place small receiver nodes into the ground (about 100 millimetres deep) every five to 10 metres. Recording commences after the nodes are deployed and activated on the seismic line.

The nodes are used to record the acoustic energy reflected from subsurface layers. The acoustic energy source is typically an array of two to three truck mounted vibrator units (refer to **Figure 4-2** for an example of a truck array). Those trucks line up along the seismic line, centred on a source point. The vibrator units operate for approximately four to 12 seconds before moving onto the next source point.



Figure 4-2 Example of a vibration truck array

4.2.4 Hours of operation and timing

Seismic survey activities would generally be undertaken during day light hours 7 days a week.

The activities are expected to be undertaken over four weeks in Q4 of 2022 subject to relevant approvals.

Landholders adjacent to the Site would be notified in accordance with the stakeholder consultation processes described in **Section 4.3**.

4.3 Stakeholder consultation

4.3.1 Approach and objectives

As one of Australia's most significant domestic gas suppliers, Santos has partnered with many local communities, providing jobs and business opportunities while safely and sustainably developing Australia's natural gas resources and powering Australian industries and households. Santos is committed to engaging with landholders and other key stakeholders who may be impacted by our projects or operations.

Santos has carried out stakeholder engagement regarding its gas exploration program in the Gunnedah Basin since 2008. Santos established and operated a Shopfront in Gunnedah for nine years from 2009 through until September 2018 to provide information to the community. Santos had a strong presence in the Gunnedah area during this period, with involvement in local events and representation on several community groups.

From late 2018, the exploration and appraisal work program in PEL 1 was reduced as part of a wider contiguous exploration project, comprising multiple prospecting titles, where PEL 238 and the Narrabri Gas Project became the focus for Santos' NSW operations. While resources were realigned to meet delivery commitments for the Narrabri Gas Project, relationships with key stakeholders in the Gunnedah area have been maintained. From March 2020 through until January 2022, participation in community events was limited due to COVID-19 restrictions. During this period Santos continued to provide information through the Santos website, activity updates in local newspapers, monthly activity update newsletter emailed to key stakeholders and a quarterly activity update to landowners. Santos has offered an enquiry email address and telephone number during this time.

Santos has developed a specific community and stakeholder engagement plan for the proposed seismic activity. The objectives of the stakeholder engagement plan are to:

- Increase overall awareness and understanding of the CSG industry and the seismic activity in particular
- 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 implementation
- 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.

Stakeholder identification and consultation has been undertaken to meet the requirements associated with a 'medium impact activity' as per the *Exploration Code of Practice: Community Consultation* (Department of Industry, March 2016). A summary of stakeholder engagement is summarised in the following sections.

Santos will continue to carry out stakeholder and community consultation activities in the region in relation to the planning and conduct of activities in accordance with the relevant guidelines including *Exploration Code of Practice: Community Consultation* (Department of Industry, March 2016) and *Exploration Guideline: Petroleum Land Access* (Department of Industry, July 2015).

4.3.2 Stakeholders

The following stakeholders have been identified for the activity based on the 'medium impact' determination for the activity:

- Landholder and residents/tenants of the site of the activity
- Native title holders or claimants - Gomeroi
- Local government – Gunnedah Shire Council
- NSW Government local Member of Parliament – Member for Tamworth
- Community and Environment Groups

- Mullaley Gas and Pipeline Accord
- SOS Liverpool Plains
- Lock the Gate Alliance
- The Wilderness Society
- NSW Farmers
- General community
- Landholders, residents and businesses within 5km of the activity
 - Local contractors/service providers
 - Resource Title Holders
- Local Aboriginal Land Council
 - Red Chief LALC
 - Walhollow LALC
- State government
 - Various state government ministerial offices
 - Department of Regional NSW, Mining, Exploration and Geoscience (MEG)
 - NSW Environment Protection Authority (EPA)
 - North West Local Land Services (LLS)

Santos has also identified and engaged with the following additional stakeholders:

- Local Chamber of Commerce - Gunnedah Chamber of Commerce
- University of Sydney.

No mineral or coal titles overlie or directly adjoin the Site, however engagement will be undertaken with Curlewis Coal and Coke Pty Ltd which holds the licence for CCL711 and Namoi Mining Pty Ltd that hold the licence for CCL701, both of which are within proximity of the Site.

4.3.3 Broad consultation activities

Santos will use a wide range of consultation tools to engage with various stakeholders as part of its overall community engagement program for its activities within PEL 1. This includes:

- Responding to correspondence / submissions regarding our activities
- Providing general information through the Santos website
- Daily presence at the Santos shopfront in Narrabri
- Media announcements
- Activity updates in local newspapers
- A monthly activity update newsletter emailed to key stakeholders
- A quarterly activity update to landowners
- An enquiry email address and telephone number on Fact Sheets
- Community site tours to Santos' operations in the Narrabri Gas Project area
- Community information sessions
- Direct engagement with landholders
- Information stands at local agricultural shows and relevant community events.

Santos delivered a Gunnedah Community Information Session on the 23 June 2022. The intent of this session was to provide information and address any concerns on the proposed seismic program, Kahlua reactivation and the CSG industry more broadly. Santos advertised this community information session in the local newspaper and directly notified key stakeholders about the event. This session was well attended with more than 50 people visiting throughout the day.

Santos has also hosted an information stand at AgQuip which is held near Gunnedah annually for each event held over the past eleven years. Santos had a stand at AgQuip from 16 to 18 August 2022, with representatives able to provide feedback on various aspects of the Narrabri Gas Project and Gunnedah exploration program including the proposed seismic works. More than 400 people attended the Santos stand over the three days.

4.3.4 Activities under stakeholder engagement plan

Table 4-2 identifies specific engagement that has occurred under the stakeholder engagement plan for the seismic activity, identifying the relevance of the stakeholder to the impact level of the activity. Table 4-2 demonstrates that the community consultation in the form of actions / events and meetings has exceeded the requirements for the medium impact activity as prescribed by Table 4 of the *Exploration Code of Practice: Community Consultation* (Department of Industry, March 2016).

Table 4-2 Consultation / Engagement Activities under Stakeholder Engagement plan

Stakeholder		Details of Engagement
Mandatory Stakeholder Engagement for Medium Impact Activity		
Landholder and residents / tenants of the site of the activity	Neighbouring private landowners	Neighbouring landholders (where a contact telephone number was publicly available) were contacted by telephone during the period 27 June 2022 to 5 August 2022 and a follow up letter was sent in August 2022 advising of the activity. Updates will be included in the quarterly activity update which will be distributed to landholders that have subscribed to Santos updates. The activity update will also be published in the Gunnedah Times.
Native Title Holders or claimants	Gomeroi	Correspondence was sent to the Gomeroi People's legal representatives informing them of Santos' successful renewal of their Petroleum Exploration Licences in the Gunnedah Basin. In this correspondence Santos referred to its intentions to undertake seismic surveys on road reserves in areas south west of Gunnedah. An invite was extended to attend the community information sessions held in Gunnedah on the 23 June 2022. Lastly project specific key contacts were provided should they require further information.
Local Government	Gunnedah Shire Council	A presentation was provided to the Gunnedah Shire Council on 15 June 2022 in relation to the activity in the Shire. Written notification of the activity would be sent to the General Manager and a face-to-face meeting arranged if required. Updates would be included in the quarterly Activity Update. Liaison with Council officers would be undertaken in relation to assessment and approvals required for activity being undertaken on Council administered roads.
NSW Government local Member of Parliament	Member for Tamworth	Santos met with the local MP at an event on 16 March where upcoming exploration activities, including seismic works, was discussed. Additional information was sent to the local MP's office on 18 March. The local MP was advised of the Community Information Session on 23 June 2022. We will continue to update the local MP and his office regarding seismic activities.

Stakeholder		Details of Engagement
Community and Environment Groups	<ul style="list-style-type: none"> Mullaley Gas and Pipeline Accord SOS Liverpool Plains Lock The Gate Alliance (North West) The Wilderness Society (Newcastle) 	A letter was emailed to local relevant groups on 24 June 2022 to advise of the activity. A number of members of Mullaley Gas and Pipeline Accord and Knitting Nanas attended the Gunnedah Community Information Session held on the 23 June 2022. The quarterly activity update will be provided to these groups on a regular basis.
	NSW Farmers	A meeting was held with NSW Farmers on 31 May 2022 to discuss the CSG industry and Santos' activities in NSW. Following this meeting, Santos sent an email on 15 June 2022 advising of the activity. NSW Farmers' contact will be included to the quarterly activity update distribution list.
	General community	<p>Santos held a Gunnedah Community Information Session on the 23 June 2022 to provide information and address any concerns on the proposed seismic program. More than 50 people attended throughout the day, including some directly affected landholders and community members who oppose to the CSG industry.</p> <p>Santos had a stand at AgQuip from 16 to 18 August 2022, with representatives able to provide feedback on the proposed Bando seismic works. More than 400 people attended the Santos stand over the three days.</p> <p>Information and progress updates are included in the activity update advertisement in The Gunnedah Times. Regular site tours to the Narrabri Gas Project activity area for the community would be advertised locally.</p>
Landholders, residents and businesses within 5km of the activity	Local contractors & service providers	Updates included in the quarterly activity update published in the Gunnedah Times.
	Resource title holders	On 17 June 2022, a letter was sent to Curlewis Coal and Coke Pty Ltd that hold the licence for CCL711 and Namoi Mining Pty Ltd that hold the licence for CCL701 which are in proximity (but outside) of the activity area.
Local Aboriginal Land Council	Red Chief LALC and Walhallow LALC	A letter was sent to the Red Chief LALC and Walhallow LALC on 8 August 2022 advising of the activity. This was followed up in August with phone calls to relevant contacts within these organisations. The quarterly activity update will be provided to these groups on a regular basis.
NSW Government	MEG	Multiple meetings have been held with the MEG including a session on 7 th July 2022 to discuss the activity and further follow up sessions.
	EPA	A meeting with the EPA was held on 7 th July 2022 to discuss the activity.
	North-West LLS	Written notification of the activity was sent to the General Manager on 24 June 2022 and a face-to-face meeting would be arranged if required. Updates on Project information would be included in the quarterly Activity Update.
Additional Stakeholder Engagement Completed		

Stakeholder		Details of Engagement
Local Chamber of Commerce	Gunnedah Chamber of Commerce	Written notification of the activity was sent to the Secretary on 24 June 2022 and a briefing for members will be arranged at a future meeting if required. The quarterly activity update will be provided to these groups on a regular basis.
Other	University of Sydney	During August Santos contacted a University of Sydney representative relating to a koala study in proximity of the proposed seismic route.

4.3.5 Engagement outcomes

Table 4-3 identifies the issues raised and the outcomes of engagement with the stakeholders identified in Table 4-2.

Table 4-3 Outcomes of Engagement under Stakeholder Engagement Plan

Stakeholder		Issues Raised	How/where issue is addressed
Mandatory Stakeholder Engagement for Medium Impact Activity			
Landholder and residents / tenants of the site of the activity	Neighbouring private landowners	Positive feedback on gaining better geological information. Negative feedback in relation to gas exploration activities recommencing in Gunnedah area.	Provision of background information with landholder letters. Continue to provide regular updates through various sources including direct engagement, Gunnedah Times newspaper, monthly activity updates, website, enquiry phone and email address.
Native Title Holders or claimants	Gomeroi	No response was received.	N/A
Local Government	Gunnedah Shire Council	No issues raised	N/A
NSW Government local Member of Parliament	Member for Tamworth	Concerns raised about exploration activities in the Gunnedah region.	CSIRO research information provided to the local MP's office detailing how water aquifers are protected during CSG activities. Commitment to ongoing engagement with the local MP to clarify members concerns and address issues where possible
Community and Environment Groups	<ul style="list-style-type: none"> • Mullaley Gas and Pipeline Accord • SOS Liverpool Plains • Lock The Gate Alliance (North West) • The Wilderness Society (Newcastle) 	No response received and/or issues raised relating to seismic activity however most groups have published content generally opposing fossil fuel development	Continue to provide regular updates through various sources including Gunnedah Times newspaper, monthly activity updates, website, enquiry phone and email address and letter

Stakeholder		Issues Raised	How/where issue is addressed
		A number of members of Mullaley Gas and Pipeline Accord and Knitting Nanas attended the Gunnedah Community Information Session held on the 23 June 2022 to raise general concerns relating to the CSG industry.	relating to specific activities
	NSW Farmers	No issues raised relating to seismic activity but have members opposed to CSG development in the Gunnedah area	Commitment to ongoing engagement with NSW Farmers to clarify members concerns and address issues where possible
	General community	<p>No issues raised relating to the proposed seismic activity.</p> <p>One landholder near the route had not been contacted in relation to this activity (information unavailable) and contact details were exchanged to allow for follow up engagement.</p> <p>General concerns relating to CSG development including groundwater impacts and general opposition to fossil fuel development.</p> <p>During the Gunnedah Community Engagement Session on 23 June one landholder raised historical concerns relating vibrations from a seismic program around 2007 within 400 metres of their house perceived to have distressed horses; caused tremors to house; and affected bore.</p>	<p>Continue to provide regular updates through various sources including Gunnedah Times newspaper, monthly activity updates, website, enquiry phone and email address and letter relating to specific activities.</p> <p>Discussion held with landholder during the Gunnedah Community Engagement Session, with a follow up telephone call and email on 13 July 2022. It was determined that the concerns raised did not relate to previous Santos activities.</p>
Landholders, residents and businesses within 5km of the activity	Local contractors & service providers	No issues raised	N/A
	Resource title holders	No issues raised	N/A
Local Aboriginal Land Council	Red Chief LALC and Walhallow LALC	No issues raised	N/A
NSW Government	MEG	No issues raised	N/A

Stakeholder		Issues Raised	How/where issue is addressed
	EPA	No issues raised	N/A
	North West LLS	No issues raised	N/A
Additional Stakeholder Engagement Completed			
Local Chamber of Commerce	Gunnedah Chamber of Commerce	No issues raised	N/A
Other	University of Sydney	Concerns relating to potential for impacts from the seismic program undertaken in proximity to the koala study.	Discussion to provide factual information on the proposed seismic program and invitation to visit Narrabri Gas Project

4.3.6 Future and ongoing consultation activities

Santos will continue the broad consultation program prior to and during the activity. Further specific consultation for the activity will occur prior to the activity commencing as shown in **Table 4-5**.

Table 4-4 Proposed Engagement Prior to Activity Commencing

Consultation Activity	Description
Face to face meeting/briefing	Meetings with key stakeholders will continue to provide information, answer questions, identify issues of concern and provide timely responses to questions. Santos will continue to meet and discuss the seismic program with landholders and respond to any concerns raised. Written notice will be provided to all landholders in proximity to the activity a minimum of 21 days prior to commencement.
Community Site Tours	Regular Community Site Tours to visit operational sites in PEL 238 will resume from Q3 2022 and will be advertised in the local newspaper and on the Santos website so community from broader area can see activities on-ground
Narrabri Shopfront	The Santos shopfront will continue to provide a face-to-face opportunity for community members to ask questions and seek information on our activities
Communication tools	The generic email and a contact telephone number will be referenced on Santos website and external printed documentation
Website	Website will be maintained and regularly updated with information
Brochures and fact sheets	Brochures and fact sheets will be regularly reviewed and updated, and new publications will be produced as required
Media Updates	Media releases on key announcements will be made
Social Media	Santos' Facebook and Twitter pages will provide information through social media channels
Attendance at community events and agricultural shows	Santos will continue to attend community events such as agricultural shows, AgQuip, industry events and other relevant community events

4.3.7 Stakeholder complaint and conflict management

Santos' primary approach to conflict management is open and proactive communications with all stakeholders.

An information line is available 24 hours per day, seven days per week and is provided on all activity communication materials including community updates, fact sheets and stakeholder and community letters. Santos aims to respond to all enquiries or complaints received via the information line within two business days.

To manage enquiries or complaints received, Santos maintains a database of:

- All activity related concerns or complaints received from individual members of the community or representative bodies
- The response provided or action taken
- A system to track notes on progress to resolution.

Santos has a documented complaint management procedure which is communicated to relevant staff members. This procedure includes the following:

- Capture enquiry or complaint and record details, including time and date the call/email is received, contact name, phone number, and nature of enquiry/complaint and any response provided
- Assess and investigate enquiry/complaint by the relevant business unit and escalate if unable to be resolved
- Where a complaint involves a reportable incident, notify the Regulator as required by the relevant petroleum lease/licence or environmental protection licence
- Where possible, provide the enquirer/complainant a timeframe for responding to them or resolving the issue, and keep them updated on progress
- Close out complaint/enquiry and record all communication actions and responses.

4.4 Access Arrangements

Prior to the commencement of the activity, permits/ licences which would be obtained by Santos to enable access for the activity are summarised in **Table 4-6**.

Table 4-5 Summary of Licences to be Obtained by Santos

Permit/ Licence to be obtained	What licence is required for
Section 70 of the Petroleum (Onshore) Act	Works on public roads and within Crown land
Section 138 of the <i>Roads Act 1993</i> permit required through Gunnedah Shire Council	Conducting surveys on council roads
Consent/ permission from the north-west LLS	Conducting surveys through travelling stock reserves

No additional access arrangements to those listed in **Table 4-6** are required for the activity.

4.5 Mitigation strategy

Santos seeks to conduct its activities in a way that avoids and minimises potential impacts on the environment. This is based on developing a thorough understanding of the environment, and developing techniques tailored to specific locations. Santos' approach to environment, health and safety stems from its Environment, Health & Safety Policy. The policy outlines Santos' commitments to:

- Integrating environment, health and safety management requirements into the way Santos works

- Complying with all relevant environmental, health and safety laws and continuously improving Santos' management systems
- Including environmental, health and safety considerations in business planning, decision making and asset management processes
- Identifying, controlling and monitoring risks that have the potential for harm to people and the environment, so far as is reasonably practicable
- Reporting, investigating and learning from incidents
- Consulting and communicating with, and promoting the participation of all workers to maintain a strong environment, health and safety culture
- Empowering Santos' people, regardless of position, to "Stop the Job" when they feel it necessary to prevent harm to themselves, others or the environment
- Working proactively and collaboratively with Santos' stakeholders and the communities in which Santos operates
- Setting, measuring, reviewing and monitoring objectives and targets to demonstrate proactive processes are in place to reduce the risk of harm to people and the environment
- Reporting publicly on our environmental, health and safety performance.

Santos uses compliance tracking and incident management systems throughout its operations. These internal systems will be applied to monitor performance against legislative requirements and other regulatory obligations.

A suite of mitigation measures and a statement of commitments have been developed and are based on a hierarchy of impact avoidance and management of residual risks. The commitments would be applied when carrying out the activity and are consistent with many of the principles used in the various guidelines in NSW in relation to biodiversity conservation, Aboriginal cultural heritage protection, noise, dust and waste management measures.

The following sections outline the strategies to be employed by Santos and contractors during the activity to ensure appropriate management of biodiversity, Aboriginal cultural heritage, noise and dust. Only those strategies relevant to the activity have been discussed below. These have been chosen based on operational requirements and the characteristics of the activity.

4.5.1 Biodiversity management strategy

As a precautionary measure, an allowance for slashing of vegetation of up to three metres on one side of the existing road (the road corridor) has been assessed as part of this REF. To assist with the mitigation of impacts posed by slashing, the following mitigation would be applied:

- Areas adjacent to the conservation area would be restricted to the opposite side of the road
- Minimise or where possible avoid affecting threatened flora and fauna, and ecological communities listed under the BC Act and the EPBC Act
- No removal of mature vegetation or hollow-bearing trees
- Ensure that noxious weeds are identified in areas of proposed slashing and risks related to their spread is controlled.

4.5.2 Aboriginal cultural heritage management strategy

The assessment and visual inspection component for the Site followed the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (due diligence; DECCW 2010). The field inspection followed the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales (OEH 2011).

Section 57 of the National Parks and Wildlife Regulation 2019 (NPW Regulation) made under the NPW Act advocates a due diligence process to determining likely impacts on Aboriginal objects. Carrying out due diligence provides a defence to the offence of harming Aboriginal objects and is an important step in satisfying Aboriginal heritage obligations in NSW.

This activity is considered a low impact activity under Section 58 of the NPW Regulation.

Following the Aboriginal Heritage Due Diligence Assessment Report (OzArk, 2022) (**Appendix D**) it was determined Aboriginal cultural heritage would be protected through appropriate mitigation measures and from the activity meeting the following performance outcomes:

- The heritage significance of Aboriginal objects and places is protected so as to not diminish the story and cultural understanding of Aboriginal people in NSW.
- All disturbance activities must be confined to within the site, as this will eliminate the risk of harm to Aboriginal objects in adjacent landforms.
- All staff conducting activities should be provided with the location of these AHIMS sites, and the sites must be avoided.
- All staff and contractors involved in the activity should be made aware of the legislative protection requirements for all Aboriginal sites and objects.

To ensure the greatest possible protection to the area's Aboriginal cultural heritage values.

4.5.3 Noise management strategy

Noise generated by the activity would be managed through mitigation measures that are in place so that the following outcomes can be met:

- Activities are carried out generally in accordance with the *Interim Construction Noise Guideline* (ICNG) (DECCW, 2009). Refer to mitigation measures described in **Section 6.1.4**.

4.5.4 Dust management strategy

Where vehicles are required to travel along unsealed roads to facilitate the activity, it is expected that dust would be generated. In response, mitigation measures would be implemented for the duration of the activity so that the following outcomes can be met:

- Dust generated via vehicle movements on unsealed roads is minimised as far as reasonably practicable.

4.6 Justification of activity and analysis of alternatives

4.6.1 Option 1: Do nothing

This option would require not undertaking the seismic surveys. Within this option, no updates to seismic mapping would be undertaken and no informed locations for core holes to undertake Permian Coal Seam Gas exploration can be made to assess the prospectively of the area. This option would result in the PEL 1 farm-in obligations not being met.

4.6.2 Option 2: Undertake Seismic surveys

The seismic survey aims to reduce the subsurface uncertainty of the Permian Coal Seam Gas potential in PEL 1. The primary target is the Hoskissons Coal seam of the late Permian Black Jack Group and the secondary target are the coals of the early Permian Maules Creek Formation. Acquisition of approximately 63 kilometres of 2D seismic data will infill the current sparse seismic coverage and will aid identification of locations for the next phase of exploration corehole drilling. This activity will fulfil the farm-in obligations for PEL 1 with Australian Coalbed Methane Limited (ACM).

Existing seismic data is of poor to fair quality. Additional infill data will enable improved structural mapping and seismic attribute analysis to map variations in the coal geometry to determine the optimal location of future exploration corehole locations.

There are no existing alternatives which can image subsurface in the detail required for the Coal Seam Gas exploration.

4.6.3 Preferred option

The preferred option is option 2. This option meets the obligations for PEL 1 and allows for informed decision making for future core hole locations to enable further exploration of the Permian Coal Seam

Gas in the Gunnedah Basin. This option aligns with the ecologically sustainable development principles protecting biological diversity and value outlined in the *Protection of the Environment Administration Act 1991* including:

- Application of the precautionary principle
- Intergenerational equity
- Conservation of biological diversity and ecological integrity
- Improved valuation, pricing and incentive mechanisms.

There are no lower impact alternatives to option 2.

By undertaking option 2, these ecological sustainable development principles have been considered, and would be met through the assessment of activity impacts in **Section 6.0** and the implementation of appropriate safeguards.

5.0 Legislation and planning policy

5.1 Commonwealth legislation

5.1.1 *Environment Protection Biodiversity Conservation Act 1999*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) applies to developments and activities that have the potential to impact on *Matters of National Environmental Significance* (MNES) protected under the EPBC Act.

Part 3 of the EPBC Act states that an action, which has, would have, or is likely to have a significant impact on a MNES may not be undertaken without prior approval of the Commonwealth Minister for Environment. The EPBC Act identifies the following as MNES, for which Ministerial approval is required should they be subject to a significant impact:

- World heritage properties
- National heritage places
- Wetlands of international importance (including RAMSAR wetlands)
- Listed threatened species and ecological communities
- Listed migratory species protected under international agreements
- Protection of the environment from nuclear actions
- Commonwealth marine areas.

Taking each of these in turn in relation to the activity (refer to **Table 6-3**):

- There are no World Heritage properties or National Heritage Places in the vicinity of the activity
- The activity is not in the vicinity of a wetland of international importance
- Threatened flora and fauna and ecological communities were identified within the Site. An assessment of significance of the impacts of the activity was undertaken within the Flora and Fauna Assessment (**Appendix B**), which identified that a significant impact to listed threatened species and ecological communities would not occur
- The activity is not a nuclear action
- According to the Significant impact guidelines 1.3: Coal seam gas and large coal mining developments— impacts on water resources (DoE, 2013), if there is no extraction of CSG involved as part of the activity, it is not a 'CSG development' or 'large coal mining development' for the purpose of the water trigger
- The activity is not in the vicinity of a Commonwealth marine area.

The EPBC Act also protects the environment within which any action is proposed to be undertaken, or where an action would affect Commonwealth land. The activity would not be undertaken on Commonwealth land, and there is no Commonwealth land within close proximity of where the activity would be undertaken that could be impacted by the activity.

5.1.2 Native Title Act 1993

The objectives of the *Native Title Act 1993* include:

- Recognises native title rights and sets down basic principles in relation to native title in Australia
- Provides for the validation of past acts which may be invalid because of the existence of native title
- Provides for a future regime in which native title rights are protected and conditions imposed on acts affecting native title land and waters
- Provides a process by which native title rights can be established and compensation determined, and by which determinations can be made as to whether future grants can be made or acts done over native title land and waters
- Provides for a range of other matters, including the establishment of a National Aboriginal and Torres Strait Islander Land Fund.

A search of the National Native Title Tribunal (NNTT) register was undertaken on 16 November 2020 in accordance with the *ESG2: Guideline for Preparing a Review of Environmental Factors*. The search was conducted for the Gunnedah LGA.

This search identified one native title claimant, being the Gomeroi People. Their claim extends over an area of 111,340 square kilometres. This claim was filed with the NNTT on 20 December 2011 and has subsequently been registered by the NNTT. Santos is actively engaged with the Gomeroi native title claim group's elected representatives.

In considering the native title implications of the PEL 1 renewal - the licence holder must not prospect on any land or waters within the Site on which Native Title has not been extinguished under the Native Title Act 1993 (Cth) without the prior written consent of the Minister.

The activity would not be undertaken on land where Native Title has not been extinguished (e.g. Crown Land).

5.2 NSW legislation

5.2.1 Petroleum (Onshore) Act 1991

The *Petroleum (Onshore) Act 1991* (Petroleum Act) regulates the onshore exploration for and production of petroleum. Under the Petroleum Act, petroleum means:

- (a) any naturally occurring hydrocarbon, whether in a gaseous, liquid or solid state, or
 - (b) any naturally occurring mixture of hydrocarbons, whether in a gaseous, liquid or solid state, or
 - (c) any naturally occurring mixture of one or more hydrocarbons, whether in a gaseous, liquid or solid state, and one or more of the following, that is to say, hydrogen sulphide, nitrogen, helium, carbon dioxide and water,
- and includes any substance referred to in paragraph (a), (b) or (c) that has been returned to a natural reservoir, but does not include coal or oil shale or any substance prescribed to be a mineral for the purposes of the Mining Act 1992.

The holder of an exploration licence has the exclusive right in accordance with the conditions of the licence, to prospect for petroleum on the land comprised in the licence. The activity would be undertaken in accordance with PEL 1, granted under the Petroleum Act.

5.2.2 Environmental Planning and Assessment Act 1979

The EP&A Act establishes the system of environmental planning and assessment in NSW. The activity is subject to the environmental impact assessment and planning approval requirements of Part 5 of the EP&A Act by virtue of the *State Environmental Planning Policy (Resources and Energy) 2021* (Resources and Energy SEPP) (refer to **Section 5.3.1**). Part 5 of the EP&A Act specifies the environmental impact assessment requirements for activities which do not require development consent under Part 4 of the EP&A Act.

In accordance with Section 5.5 of the EP&A Act, the Department of Planning and Environment (DPE) as the determining authority must examine and consider to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity. This REF has been prepared under Section 5.5 of the EP&A Act.

Section 171 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) defines the factors which must be considered when determining if an activity assessed under Part 5 of the EP&A Act has a significant impact on the environment. **Chapter 6.0** of this REF provides an environmental impact assessment of the activity in accordance with Section 171 and **Appendix C** specifically responds to the factors for consideration under Section 171.

5.2.3 Protection of the Environment Operations Act 1997

One of the primary objectives of the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act) is to 'protect, restore and enhance the quality of the environment in NSW, having regard to the need to maintain ecologically sustainable development'. The POEO Act provides for the issue of an Environment Protection Licence (EPL) for scheduled activities pursuant to Section 48 of the POEO Act, in relation to pollution and waste disposal caused by development or operation of developments. Activities requiring an EPL are listed in Schedule 1 of the Act. By issuing EPLs, the POEO Act regulates pollution and waste disposal in NSW caused by development or operation of developments.

Petroleum exploration activities are required to hold an EPL, except (among other items), exploration activities that involve geophysical (including seismic) surveying and downhole logging. This exemption from an EPL for the activity is only applicable on land that is not an environmentally sensitive area of State significance. Such an area includes land reserved as a state conservation area under the *NPW Act 1974*. The activity is not on land that is an environmentally sensitive area and therefore no EPL is required.

5.2.4 Water Management Act 2000

The *Water Management Act 2000* (WM Act) establishes a framework for managing water in NSW. The Act creates:

1. Mechanisms for protecting and restoring water sources and their dependent ecosystems
2. Improved access rights to water
3. Partnership arrangements between the community and the Government for water management.

Part 3 of Chapter 3 of the WM Act deals with approvals required under the WM Act. In particular, sections 89, 90 and 91 relate to water use approvals, water management work approvals (including water supply work, drainage work and flood work approvals) and activity approvals (including controlled activity approvals and aquifer interference approvals), respectively. These approvals are discussed below.

Aquifer Interference Approval

The activity would not disturb or encounter groundwater. The need to an aquifer interference approval is not required.

Water use approval

A water use approval under section 89 of the WM Act would not be required for the activity, as the activities would not require the use of water.

Water access licences

Under Part 2 of Chapter 3 of the WM Act, it is an offence to take water from a source regulated by the WM Act unless in accordance with a water access licence (WAL). The taking of water would not be required as part of the activity.

Flood work approval

Under section 90 of the WM Act, a flood work approval is required to construct and use flood work at a specified location. The activity would not involve the carrying out of a flood work and would therefore not require a flood work approval.

5.2.5 Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) provides protection for items of 'environmental heritage' in NSW. 'Environmental heritage' includes places, buildings, works, relics, movable objects or precincts considered significant based on historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic values. Under the Heritage Act, a person must not disturb or excavate land if they know or have reasonable cause to suspect that they might discover, expose, move or damage a relic unless they have an excavation permit.

Items considered to be significant to the State can be listed on the State Heritage Register (SHR) and cannot be demolished, altered, moved or damaged, or their significance altered, without approval from the Heritage Council of NSW. Other items may be listed on the National and Commonwealth Heritage Lists, State Heritage Inventory (SHI) or by local Councils in LEPs. Additionally, under Section 170 of the Heritage Act, all government agencies are required to identify, conserve and manage heritage items in their ownership or control. Items are typically listed in a Heritage and Conservation Register and may also be included on the SHI.

The activity is unlikely to impact on non-Aboriginal heritage. Further details on non-Aboriginal heritage are provided in **Section 6.4**.

5.2.6 Biodiversity Conservation Act 2016

The BC Act provides a framework to avoid, minimise and offset impacts on biodiversity. Under the BC Act it is an offence to harm animals and plants, damage areas of outstanding biodiversity value, and damage habitat of threatened species or ecological communities. Under Part 2, Division 2 of the BC Act it is a defence if the harm or damage was necessary for the carrying out of a Division 5.1 EP&A Act activity undertaken in compliance with the determination for that activity, or undertaken consistent with a state significant infrastructure approval under Division 5.2 of the EP&A Act.

The BC Act establishes a test to establish whether a proposed development or activity is, 'likely to significantly affect threatened species'. If an activity under Division 5.1 is likely to significantly affect threatened species then a Species Impact Assessment or biodiversity development assessment report would be required to be prepared.

The REF considers the potential impacts of the activity on threatened species, populations, ecological communities and critical habitat in accordance with the BC Act. This consideration is presented in **Section 6.2**.

5.2.7 National Parks and Wildlife Act 1979

5.2.7.1 State Conservation Areas

Under the National Parks and Wildlife Act (NPW Act), State Conservation Areas are areas of land that have been reserved to identify, protect and conserve areas that:

- Contain significant representative ecosystems, landforms or natural phenomena or places of cultural significance
- Are capable of providing opportunities for sustainable visitor or tourist use and enjoyment, the sustainable use of buildings and structures or research
- Are capable of providing opportunities for uses permitted under other provisions of the NPW Act in such areas.

The Wondoba State Conservation Area is one such area adjacent to the Site, with its significance stemming from the presence of native flora, native fauna and Aboriginal heritage. The key management objective of the Wondoba State Conservation Area is to protect significant vegetation communities, threatened native fauna and Aboriginal heritage sites (NSW National Parks and Wildlife Service, 2019). The activity is not located within the State Conservation Area and is not anticipated to have a significant impact on threatened flora and fauna or Aboriginal heritage (refer to **Section 6.0**)

5.2.7.2 Aboriginal objects and Aboriginal places

Under the NPW Act, all Aboriginal objects and places are protected, irrespective of their level of significance or matters of land tenure. The Act sets up 'strict liability' offences for harming or desecrating Aboriginal objects and Aboriginal places (this type of offence may apply even if a person is

unaware that they are harming an Aboriginal object). All persons are therefore responsible for taking reasonable precautions and exercising their due diligence to ensure that their actions would not harm Aboriginal objects. A person who exercises their due diligence has a defence against prosecution if they later unknowingly harm an object.

The *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010) provides guidance on how to identify activities that may harm an Aboriginal object or place, and to determine whether they should apply for consent to harm an Aboriginal object or place in the form of an Aboriginal Heritage Impact Permit (AHIP) under Section 90A of the Act. The *National Parks and Wildlife Regulation 2009* removes the need to follow the due diligence process if you are carrying out an activity which is specifically defined as a 'low impact activity'.

Due diligence searches were undertaken as a part of this REF. The assessment and visual inspection component for the study area follows the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (due diligence; DECCW 2010). The field inspection followed the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales (OEH 2011).

The undertaking of the due diligence process and finalisation of the Aboriginal Heritage Due Diligence Assessment Report (OzArk, 2022) resulted in the conclusion that the activity would have an impact on the ground surface. However, it concluded no Aboriginal objects or intact archaeological deposits would be harmed by the proposal following the implementation of recommended safeguards.

5.2.8 Biosecurity Act 2015

The *Biosecurity Act 2015* provides a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers.

The Biosecurity Act introduces the legally enforceable concept of a General Biosecurity Duty. This duty provides that any person who deals with biosecurity matter or a carrier and who knows, or ought reasonably to know, the biosecurity risk posed or likely to be posed by the biosecurity matter, carrier or dealing has a biosecurity duty to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised.

This duty extends to weeds, which under the Biosecurity Act are pests. This means that any person dealing with plant matter must take measures to prevent, minimise or eliminate the biosecurity risk (as far as reasonably practicable).

Information regarding biosecurity and weeds, as well as their potential impact is provided in **Section 6.2.** of this REF.

5.2.9 Roads Act 1993

Section 138 of the *Roads Act 1993* (Roads Act) requires that a person obtain the consent of the appropriate roads authority for the erection of a structure, or the carrying out of a work in, on or over a public road, or the digging up or disturbance of the surface of a public road. The activity would involve works over a public road and would therefore require approval under Section 138 of the Roads Act prior to being carried out.

5.3 State Environmental Planning Policies

5.3.1 State Environmental Planning Policy (Resources and Energy) 2021

The Resources and Energy SEPP aims *'to provide for the proper management and development of mineral, petroleum and extractive material resources for the social and economic welfare of [NSW]*. Section 2.8 of the Resources and Energy SEPP provides that development for the purposes of "petroleum exploration" may be carried out without development consent. "Petroleum exploration" includes prospecting and assessment of petroleum under a PEL or a petroleum assessment lease (PAL). The activity is being carried out for the purposes of petroleum exploration under PEL 1 and requires approval of the Director-General under the conditions of PEL 1. This has the effect that development consent is not required, and the potential environmental impacts of the activity are required to be assessed under Part 5 of the EP&A Act.

5.3.2 State Environmental Planning Policy (Resilience and Hazards) 2021

State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP) provides a state-wide approach to coastal management, hazardous development and remediation of contaminated land. Chapter 4 – Remediation of Land includes the provisions relating to development which require consent for remediation work. While consent for the activity is not required, the provisions of Resilience and Hazards SEPP have still been considered in the preparation of this REF.

Section 6.1.3 of this REF contains an assessment of the potential contamination impacts of the activity.

5.3.3 State Environmental Planning Policy (Biodiversity and Conservation) 2021

Chapter 3 of the *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (Biodiversity and Conservation SEPP) aims to encourage the proper conservation and management of natural vegetation areas that provide habitat for koalas to ensure that permanent, free living areas are maintained over their present range. The policy applies to a number of LGAs across NSW, including the Gunnedah LGA.

An ecological assessment of the area where the activity would be undertaken found that as there would be no clearing of trees, other than potential branch pruning, associated with the activity, there would be negligible impacts to koalas and koala habitat.

5.4 Local Environmental Plan

5.4.1 Gunnedah Local Environmental Plan 2012

The activity is located on lands zoned under the *Gunnedah LEP 2012* as:

- RU1 – Primary Production
- C1 – Nature Parks and Nature Reserves
- C3 – Environmental Management.

Within areas zoned as RU1, the activity is permissible with development consent; however, it would be an activity that is prohibited in the C1 and C3 land use zones.

The Resources and Energy SEPP prevails over the *Gunnedah LEP 2012* to the extent of any inconsistencies. As identified in **Section 5.3.1**, the Resource and Energy SEPP defines the activity as development that is permissible without consent. As the Resources and Energy SEPP prevails over LEPs, this removes the need for consent to be obtained from council, and the activity can be assessed under Part 5 of the EP&A Act.

5.4.2 Gunnedah Shire Council Community Strategic Plan 2017-2027

The *Gunnedah Shire Council Community Strategic Plan 2017-2027* (2022) aims to create a prosperous, caring and proud community by providing a range of goals to be considered during development assessment processes. Within this plan, Gunnedah Shire Council aims to achieve relevant to the activity (not limited to):

- Increased local investment
- An engaged community (especially within decision making)

- An attractive township for investment
- Vibrant and sustainable villages
- A balance between development and environmental protection
- A secure and high-quality Water supply
- Heritage (Aboriginal and non-Aboriginal) are valued and protected
- Waste is sustainably managed and reduced.

These goals would be met through the relevant implementation of mitigation measures contained within this REF.

The activity would not likely negatively impact on this strategic plan and would support the goals of the community through ensuring that the activity fall within these goals by adhering to the relevant legislation.

6.0 Impact Assessment

This section of the REF addresses the potential environmental impacts associated with the activity and identifies mitigation measures to help ensure impacts are appropriately managed. Issues outlined in the *Developments adjacent to National Parks and Wildlife Service lands: Guidelines for consent and planning authorities (2020)* have been assessed to understand the activity impact on any lands managed by the NPWS.

Potential impacts following the implementation of mitigation measures have been categorised in accordance with the ESG2 Guidelines (DPE, 2015). Impact categories include:

- Negligible;
- Low adverse;
- Medium adverse;
- High adverse; and
- Positive.

As stated in **Section 4.2.1**, although the road corridor includes three metres on both sides of the road, the survey activities would occur to only one side of the road. This has been considered when assessing the potential impact of the activity discussed below. The likely residual impact for each environmental aspect is also categorised in accordance with the ESG2 Guidelines in in this chapter.

6.1 Assessment of physical and pollution impacts

6.1.1 Air impacts

6.1.1.1 Potential impacts

Temporary air quality impacts related to dust and some vehicle exhaust emissions may be experienced by nearby sensitive receivers. Impacts to air quality would primarily result from the use of vehicles and machinery along unsealed roads. The use of vehicles and machinery along unsealed roads, would likely generate dust and emissions of carbon monoxide, sulphur dioxide, particulate matter, nitrous oxides, and other substances associated with the combustion of diesel fuel and petrol from vehicles and machinery.

Dust levels generated by the activity would vary depending on weather conditions. The impacts related to dust are likely to be localised, temporary and would be proportionate to the number and speed of vehicles and the weather conditions, such as prolonged dry periods. Equally, the magnitude of any potential dust impacts would be dependent on the proximity of receptors sensitive to dust. As the activity is short-lived at any one location, it is unlikely that potential dust impacts to sensitive receivers would be significant. Notwithstanding, mitigation measures have been identified to manage the impact of dust.

Impacts associated with emissions from vehicles would be highly localised and temporary.

Direct greenhouse gas emissions from the activity would include the temporary and minor emissions from the exhausts of plant and vehicles.

Greenhouse gas emissions generated by the activity would not significantly contribute to State or National greenhouse gas emissions given the scale of impacts and short duration of the activity.

6.1.1.2 Mitigation measures

The following mitigation measures would be implemented to help avoid and mitigate potential impacts relating to dust and emissions:

- Vehicles and machinery would be regularly checked and maintained in a proper and efficient condition
- Vehicle and machinery movements would be restricted to the road and road corridor

- Road speed limits would be followed, however in dry conditions, vehicle movements would be slowed on unsealed roads to limit the amount of dust that is generated
- Workers would maintain a visual awareness of dust emissions. Should excessive dust emissions be observed, the cause would be immediately investigated and measures undertaken to reduce dust.

6.1.1.3 Residual impact category

The activity is considered to have the potential to result in a temporary and low adverse impact. This conclusion is based on the scale of activity proposed, the temporary nature of the activity and the proximity of sensitive receivers to the Site

6.1.2 Water impacts

6.1.2.1 Potential impacts

The activity crosses Red Bobs Creek along Wandobah Road, an ephemeral watercourse that drains into Lake Goran, and Collygra Creek is another watercourse which crosses under Beeson Road. The activity would not likely impact on the quality and flow of these watercourses following the implementation of mitigation measures outlined below, as the activities are minor in scale and temporary in nature.

The activity would not involve works close to any perennial streams or natural water bodies and would not require the discharge of stormwater onto NPWS lands. Additionally, the activity would not involve excavation or sediment/spoil stockpiling. Spills or leaks of petroleum and/or lubricants from vehicle and machinery use may occur close to nearby ephemeral drainage lines. If not removed, during a heavy rain event, those pollutants have the potential to be transported to larger streams and water bodies, depending on the period of time between the spill or leak and the rain event. Whilst this is a risk, actual impacts to surface water are generally unlikely to occur.

The activity would not interact with groundwater and is therefore not anticipated to affect the quantity or quality of groundwater.

The activity would not increase or decrease ground levels and would not alter the storage capacity or behaviour of flood waters.

No wastewater would be generated by the activity and thus would not be discharged into or managed on NPWS land.

6.1.2.2 Mitigation measures

The following mitigation measures are recommended to help avoid and mitigate potential impacts relating to spills of petroleum and/or lubricants:

- Vehicles and machinery would be properly maintained and routinely inspected to minimise the risk of fuel/oil leaks
- The majority of the vehicles and equipment would be refuelled offsite however the seismic vibrators would be refuelled on site using spill mats and strict re-fuelling procedures
- Spill kits appropriate to products used in the machinery and vehicles would be available during the activity
- Spills of fuel, oil, chemicals or the like would be cleaned immediately, and the environmental manager for the activity would be notified of the location of the incident, extent of the incident and type of material spilled.

6.1.2.3 Residual impact category

The activity is considered to have the potential to result in a negligible impact. This conclusion is based on the scale of activity proposed, the temporary nature of the activity and the distance of the activity from any natural perennial streams or water bodies.

6.1.3 Soil and stability impacts

6.1.3.1 Potential impacts

The reduction of surface vegetation, namely grasses, along one side of the road corridor from slashing may temporarily increase erosion. If a heavy wind or rain event were to occur prior to the re-establishment of vegetation, exposed soils may be subject to erosion. The extent of erosion is dependent on the volume, speed and duration of those wind or rain events.

During the activity, whilst unlikely, works could result in soil contamination as a result of spilled or leaked chemicals, fuel or oil. Spills or leaks could occur during the operation or maintenance of plant or equipment. Spills or leaks on-site would likely be minor in extent and magnitude. Measures would be put into place to ensure that the chance of a spill or leak occurring is reduced and if one does occur that it can be intercepted or appropriately managed.

6.1.3.2 Mitigation measures

The following mitigation measures are recommended to help avoid and mitigate potential impacts relating to soil quality and stability:

- Within the road corridor only slashing of vegetation that is necessary to be trimmed to carry out the activity would take place
- Vehicles and machinery would be properly maintained and routinely inspected to minimise the risk of fuel/oil leaks
- The majority of the vehicles and equipment would be refuelled offsite however the seismic vibrators will be refuelled on site using spill mats and strict re-fuelling procedures.
- Spill kits appropriate to products used in the machinery and vehicles would be available during the activity
- Spills of fuel, oil, chemicals or the like would be cleaned immediately, and the environmental manager for the activity would be notified of the location of the incident, extent of the incident and type of material spilled.

6.1.3.3 Residual impact category

The activity is considered to have the potential to result in a negligible impact. This conclusion is based on the scale of activity proposed, the temporary nature of the activity and the implementation of mitigation measures.

6.1.4 Noise impacts

Noise generating activity associated with the proposed mobile and temporary activity would occur intermittently over approximately four weeks and are therefore not permanent. For this reason, the provisions of the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009) have been considered for this noise assessment. More specifically to the requirements of Section 3 of the ICNG, given the temporary, small-scale nature of the activity and the regular movement along the seismic survey line, a qualitative noise assessment has been completed. This assessment method may be used if the works are not likely to affect an individual or sensitive land use for more than three weeks in total. As the activity is mobile and temporary, and would move through the Site corridor, it would not affect individual or sensitive land uses for more than three weeks in total in one location.

6.1.4.1 Potential impacts

Table 6-1 identifies noise sources associated with the activity that have the potential to affect nearby sensitive receivers during the activity.

Table 6-1 Noise sources for the activity

Noise source	Questions relating to noise heard at residences			Is examination of work practices necessary?
	Is noise loud in terms, or relative to other noises in the area	Does the noise include tones or impulses	Does the noise occur at times that interfere with sleep or comfort?	
Seismic trucks during surveys	Yes	Yes	No	No
Truck and 4WD movements	No	Yes	No	No
Vegetation slashing	No	No	No	No

Potential noise emissions from the seismic surveys would be consistent with those associated with the existing agricultural activities undertaken in the region. Whilst the survey duration may be up to 4 weeks, the seismic surveys are mobile and temporary, carried out for four to 12 seconds every five to 10 metres. The noisiest activity is the vibrator trucks which would approach and pass a point for a period of 5 to 10 minutes. Vegetation slashing and vehicle movements would contribute to noise generation, though would be very temporary given the mobile nature of the activity and are considered to be consistent with existing agricultural activities.

The type of noise generated by the activity would be typical of a rural area and would not be obvious to nearby residential receivers. It is not anticipated that sensitive receivers would be highly noise affected, although some residential receivers may be noise affected. As a result, a number of reasonable and feasible measures as outlined below, which would be implemented to manage noise impacts during the activity.

6.1.4.2 Mitigation measures

The following mitigation measures are recommended to help avoid and mitigate potential impacts relating to noise and vibration:

- The activity would only be carried out during daylight hours 7 days a week.
- Identify and consult with the potentially affected residents and/or sensitive receivers prior to the commencement of the activity. This consultation is to include a description of the nature of works, the expected noise impacts, approved hours of work, duration, complaints handling and contact details.
- Implement a complaint handling procedure for dealing with noise complaints
- 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.

6.1.4.3 Residual impact category

The activity is considered to have the potential to result in a low temporary adverse impact. This conclusion is based on the scale of works proposed, the temporary nature of the activity and the implementation of mitigation measures.

6.2 Assessment of biological impacts

6.2.1 Flora and fauna

A Flora and Fauna Assessment was undertaken for the activity, where the potential habitat for 34 threatened species within the study area was assessed for potential impacts. This is outlined below.

6.2.1.1 Potential impacts

6.2.1.1.1 Vegetation communities

There would be nine vegetation communities with a total of nine hectares of native vegetation to be temporarily impacted by the activity, through potential slashing of groundcover vegetation and/or pruning of branches. The majority of the activity would be within the road corridor (along one side), and therefore any impacts to native vegetation would be minimal and temporary. Most of the vegetation communities within the Site are highly modified, with sections surrounded by agricultural activities.

The Test of Significance (BC Act) (Appendix B to the Flora and Fauna Assessment) carried out for EEC/CEECs identified within the Site concluded that the proposed disturbances associated with the activity is unlikely to result in a significant impact upon these communities. The EPBC Act Significant Impact Criteria was also carried out for White Box Yellow Box Blakely's Red Gum Woodland CEEC (**Appendix C** to the Flora and Fauna Assessment), which also concluded that the proposed disturbance associated with these works is unlikely to result in a significant impact upon this community.

6.2.1.1.2 Threatened flora

An assessment of significance under the BC Act and EPBC Act (where relevant) was prepared for the flora species identified as likely or having the potential to occur within the Site (**Appendix B** and **Appendix C** of the Flora and Fauna Assessment). It concluded that the activity is unlikely to be a significant impact to threatened flora species that have the potential to occur within the Site, as majority of the activity would be within the road corridor dominated by exotic ground cover.

6.2.1.1.3 Threatened fauna

An assessment of the significance of impacts under the BC Act and EPBC Act (where relevant) has been undertaken for the species with the potential to occur within the Site and for koalas (**Appendix B** and **Appendix C** of the Flora and Fauna Assessment). It was concluded that no significant impacts to threatened fauna were considered likely as a result of the activity.

6.2.1.2 Mitigation measures

The following mitigation measures are recommended to reduce impacts to flora, fauna and vegetation communities:

- Where possible, the Site should be confined to the road, to reduce the impact on native vegetation groundcover.
- Where slashing is required, the disturbance limit should be clearly delineated to a maximum of three metres, to ensure site disturbance occurs only within the designated site and is not unnecessarily extended. This would apply for the entire length of the line.
- Trimming of branches to allow machinery access is to be limited to branches with a diameter less than 10 centimetres and must not include any hollow-bearing limbs.
- No removal of native trees with a stem diameter greater than 10 cm DBH. In areas to be slashed, fallen logs and debris may be temporarily moved out of the path of seismic testing vehicles. When the vehicles have passed, fallen logs and debris would be left in situ as close as possible to their approximate original location, to reduce disturbance to potential fauna habitat.
- Vehicle movements should be confined to the Site to reduce any further disturbance to the ground layer.
- Machinery coming from outside the Site should be managed to reduce the risk of introducing or further establishing weed species and pathogens. This should include confining vehicle access to the Site, and wash-down of vehicles, machinery and boots prior to entering the Site. Footwear and clothing should be free from mud, dirt and vegetation debris prior to entry into areas of vegetation.

- Due to the temporary and low level of impact associated with the seismic survey, it is expected that slashed areas would naturally regenerate to their pre-slashing condition.
- Vehicle operators and staff to be briefed on the presence of Koalas.

6.2.1.3 Residual impact category

The activity has the potential to result in a negligible impact. This conclusion is based on the scale of activity proposed, the limited amount of vegetation removal required, the temporary nature of the activity and the implementation of mitigation measures.

6.2.2 Bushfire

The potential increase in bushfire incident and the impacts following this were considered below.

6.2.2.1 Potential impacts

The activity would be undertaken adjacent to the Wondoba State Conservation Area (separated by a road), and a number of uncleared reasonably dense vegetation. The areas mapped by the NSW e-spatial viewer contain vegetation categories 1 and 3 areas which represent high and medium bushfire prone land respectively. As defined by the NSW Government SEED website (n.d.), Category 1 generally consists of areas of forest, woodlands or heaths, while Category 2 consists of vegetation such as rainforests or lower risk vegetation.

The potential for a bushfire needs to be considered from two perspectives:

- The risk that the activity contributes to the lighting of a fire due to the presence of flammable substances and potential for accidental ignition by vehicles or machinery
- The management of activities required should a fire occur.

Santos has developed a Bushfire Management Plan in consultation with relevant agencies and an emergency response plan that details the broad responsibilities and duties of personnel during an emergency event such as a bushfire.

The bushfire management plan provides guidance for onsite responsibilities, actions, reporting requirements and resources required to ensure effective and timely preparedness is undertaken in the prevention of any bushfire incident or emergency at operations sites. The plan is relevant to carrying out of the activity.

6.2.2.2 Mitigation measures

The existing Bushfire Management Plan would continue to be implemented to manage potential impacts related to bushfires.

The following additional measures would also be implemented to avoid and/or mitigate potential impacts on public safety:

- An induction for staff and contractors regarding the hazards and risks at the Site would be implemented.

6.2.2.3 Residual impact category

The activity is highly unlikely to increase bushfire risks and therefore the activity can be considered to have a negligible effect on this aspect. Bushfire risks would be minimised through the implementation of the Bushfire Management Plan, general site safety protocols, incident management and emergency procedures.

6.3 Assessment of resource use impacts

6.3.1 Community resources

The activity would require use of community resources in order to undertake the activity. An assessment of the extent, impacts and mitigation measures required are detailed within this section.

6.3.1.1 Potential impacts

Demand for services and infrastructure resources

The activity would require up to 30 staff at the peak of the works for the activity. Some of the associated activities such as slashing and traffic controls may engage locals from the Gunnedah region, however for the purpose of this assessment, the worst-case scenario of 30 staff from outside of this region has been applied. Those 30 staff would require accommodation near to the Site, including in the town of Gunnedah, and would also require food, water and other typical daily services for the duration of the activity. It is unlikely that this minor and temporary increase in population would be noticeable.

The activity would require the temporary use of the road corridors identified in **Section 2.1**. The period that those road corridors would be used is not considered to be significant and the volume and type of vehicles to use those roads would be unlikely to damage those road corridors.

Resource recycling or reuse schemes to reduce resource usage

It is likely that the activity would generate limited volumes of domestic waste and vegetation waste. Domestic waste would be readily managed through appropriate disposal in facilities at worker accommodation, given that this type of waste would typically be comprised of food scraps and packaging. Vegetation waste generated by the activity would be minor, with slashed vegetation being retained onsite, therefore not requiring a resource recycling or reuse scheme.

Diversion of resources

The activity would not result in a diversion of resources to the detriment of other communities or natural systems. All equipment would be brought to the Site. Additional items required including food, water and fuel are not anticipated to be to an extent that would disrupt normal operations of the local community.

No access for the activity or to store materials would be required on NPWS land.

6.3.1.2 Mitigation measures

Mitigation measures outlined in **Section 6.1** regarding the efficient use and operation and equipment, plant and machinery would help ensure that fuel use is minimised.

6.3.1.3 Residual impact category

The activity is unlikely to result in any significant impacts on community resources and therefore can be considered to have a negligible effect on this aspect.

6.3.2 Natural resources

The extent for which the activity would significantly impact upon the level of natural resources and conservation areas available to the community or surrounding areas is outlined within this section.

6.3.2.1 Potential impacts

Disrupt, deplete or destroy natural resources

The activity would not significantly disrupt, deplete or destroy natural resources. Gas, water and fuel would be required while undertaking the activity, but not at levels that would create a significant impact on the supply of these resources.

Disrupt activities or reduce options for future activities

The activity would not disrupt existing activities on the Site or close to the Site through the use of natural resources. All other operations in the local area would be able to continue during construction and operation of the activity.

Degradation of an area reserved for conservation purposes

The activity would involve minor vegetation clearance within the road corridor adjacent to the Wondoba State Conservation Area. As detailed in **Section 6.2.1** this is not considered to have a significant impact and would not degrade the overall environment within the Wondoba State Conservation Area.

6.3.2.2 Mitigation measures

Mitigation measures outlined in **Section 6.1** regarding the efficient use and operation and equipment, plant and machinery would help ensure that fuel use is minimised.

6.3.2.3 Residual impact category

The activity is unlikely to result in any significant impacts on natural resources and therefore can be considered to have a negligible effect on this aspect.

6.4 Assessment of community impacts

6.4.1 Social impacts

The activity are short term and associated social impacts would likely be temporary in nature. As assessment of the social impacts resulting from the activity is detailed below with appropriate mitigation measures to be implemented to reduce any likely impacts.

6.4.1.1 Potential impacts

Demographic structure of the community

The activity would be undertaken over a period of four weeks, depending on weather or other adverse circumstances that have the potential to delay works. The temporary nature of the activity, would not allow for permanent changes to the demographic structure of the community, including to the permanent workforce or industry structure.

Environmental impact that may cause substantial change or disruption

The temporary and small-scale nature of the activity would not result in an environmental impact that may cause a substantial change or disruption to the community. Noise generated by the activity would result in a temporary change to the existing acoustic environment for sensitive receivers (being in a rural noise environment). However, this impact is not considered to be a substantial change or cause a substantial disruption.

Individuals or communities being significantly disadvantaged

The activity is not likely to significantly disadvantage individuals or communities. Works would occur over four weeks and are constantly mobile, not placing a strain on an individual receiver or community for long periods of time, nor taking resources from individuals or communities in a manner that would see them significantly disadvantaged.

Impacts to health, safety, privacy or welfare

The key potential impact in this category is traffic safety. The activity would involve the use of multiple light and heavy vehicles travelling along relatively narrow, unsealed rural roads. While activities are being carried out, vehicles passing by may be required to pass on the opposite side of the road. Additionally, there would be a number of staff members on foot to support the activity within the road corridor. A Traffic Management Plan would be developed for the activity as outlined in **Section 6.4.7** which would include the requirement for appropriate signage. Mitigation measures

Mitigation measures proposed in **Sections 6.1.4 and Section 6.4.7** are considered to be feasible to mitigate potential social impacts.

6.4.1.2 Residual impact category

The activity is unlikely to result in any significant social impacts and therefore can be considered to have a negligible effect on this aspect.

6.4.2 Economic impacts

6.4.2.1 Potential impacts

The activity is considered to have temporary positive economic impacts. For the duration of the activity, staff would be required to purchase items locally, thus contributing to the local economy. Given the temporary nature of the activity, and the small volume of staff needed, this impact is not considered to be significant.

6.4.2.2 Mitigation measures

No additional mitigation measures are considered necessary for economic impacts.

6.4.2.3 Residual impact category

The activity is unlikely to result in any significant economic impacts and therefore can be considered to have a negligible effect on this aspect.

6.4.3 Non-Aboriginal heritage impacts

6.4.3.1 Potential impacts

The activity is located within 150 metres of the curtilage of a heritage listed lot, and approximately 700 metres from the closest building on that lot. The temporary nature of the activity would not result in any direct or indirect impacts to the heritage item. The distance of the activity from the building would not result in cosmetic damage to the building on that lot. Accordingly, no impacts are anticipated to non-Aboriginal heritage.

6.4.3.2 Mitigation measures

No mitigation measures are proposed as no impacts are anticipated.

6.4.3.3 Residual impact category

The activity is unlikely to result in any significant non-Aboriginal heritage impacts and therefore can be considered to have a negligible effect on this aspect.

6.4.4 Aboriginal heritage impacts

The due diligence process concluded that the activity may have an impact on the ground surface, however, no Aboriginal objects or intact archaeological deposits would be harmed by the proposal.

The assessment has concluded that there is a low likelihood that the activity would adversely harm Aboriginal cultural heritage items or sites.

6.4.4.1 Potential impacts

From the Aboriginal Heritage Due Diligence Assessment Report (OzArk, 2022) (AHDDAR) (**Appendix D**) it was concluded that the activity would not likely impact upon Aboriginal Heritage should the recommended mitigation measures be implemented. **Table 6-2** summarises the impact assessment from the report.

The two sites which are identified to be within five metres of the seismic line would require additional mitigation measures, as outlined in **Table 6-2** below.

Table 6-2 Summary of Aboriginal Cultural Assessment. Source: Aboriginal heritage Due Diligence Assessment: Santos Gunnedah Works Program (OzArk)

Site Name	Type of Harm	Degree of Harm	Consequence of Harm
29-1-0117	None	None	No loss of value if appropriate management is undertaken
29-1-0116	None	None	No loss of value
29-1-0113	None	None	No loss of value if appropriate management is undertaken
29-1-0114	None	None	No loss of value
29-1-0119 29-1-0122	Sites unable to be located during the survey but unlikely to be harmed by the proposal.		

6.4.4.2 Mitigation measures

The mitigation measures as recommended in the Aboriginal Heritage Due Diligence Assessment include the following:

- The activity may proceed without further archaeological investigation under the following conditions:
 - a) All land and ground disturbance activities must be confined to within the Site, as this will eliminate the risk of harm to Aboriginal objects in adjacent landforms. Should the parameters of the proposal extend beyond the Site, then further archaeological assessment may be required.
 - b) All staff and contractors involved in the activity will be made aware of the legislative protection requirements for all Aboriginal sites and objects.
- This assessment has concluded that there is a low likelihood that the activity will adversely harm Aboriginal cultural heritage items or sites. If during works, however, Aboriginal artefacts or skeletal material are noted, all work should cease and the procedures in the Unanticipated Finds Protocol (Appendix 2 to the Aboriginal Heritage Due Diligence Assessment) will be followed.
- AHIMS sites 29-1-0113 and 29-1-0117, both modified trees, are within five metres of the proposed seismic line (coordinates provided in **Table 3-5**). The location of these modified trees would be marked on the operational maps and discussed in inductions to ensure no inadvertent impacts during the seismic work.
- The work crew will be provided with the location of these AHIMS sites, and the sites must be avoided.
- Inductions for work crews should include a cultural heritage awareness procedure to ensure they recognise Aboriginal artefacts (see Appendix 3 to the Aboriginal Heritage Due Diligence Assessment) and are aware of the legislative protection of Aboriginal objects under the NPW Act and the contents of the Unanticipated Finds Protocol.
- The information presented in the Aboriginal Heritage Due Diligence Assessment meets the requirements of the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales.

6.4.4.3 Residual impact category

The activity is unlikely to result in any significant Aboriginal heritage impacts following the implementation of management measures and therefore can be considered to have a negligible effect on this aspect.

6.4.5 Aesthetic impacts

6.4.5.1 Potential impacts

During the activity, the activities have the potential to result in temporary visual impacts because of:

- Vehicles, plant and equipment moving around
- Vegetation slashing.

While works at each location have the potential to result in a minor and temporary visual amenity impact through the presence of workers, vehicles, plant and equipment, works would only be of a short duration and of a small scale. The visual impacts of the activity are not considered to be significant.

Vegetation slashing would be a relatively longer visual impact for vehicles travelling along the roads within the Site compared to the visual impact posed by the presence of equipment and personnel associated with the activity. Despite this, the cleared vegetation along one side of the road corridor is not considered to result in a significant visual impact. It is anticipated that it would give the appearance of a maintained road corridor.

6.4.5.2 Mitigation measures

No additional mitigation measures are proposed as a significant visual impact is not anticipated.

6.4.5.3 Residual impact category

The activity is unlikely to result in any significant visual impacts and therefore can be considered to have a negligible effect on this aspect.

6.4.6 Land use impacts

6.4.6.1 Potential impacts

The activity is mobile and temporary, and would be undertaken on existing roads and within the defined road corridor. The activities do not require excavation or other intrusive works beneath the ground surfaces.

The location of the activities, predominantly within the existing road corridor along one side of the road, minor scale of works and temporary nature of those activities would likely not result in permanent or significant impacts on existing or future land uses, particularly in areas mapped as SAL.

6.4.6.2 Mitigation measures

The following mitigation measures are recommended to reduce impacts on land use:

- The activity is not to encroach beyond the Site footprint identified in **Section 2.1**.

6.4.6.3 Residual impact category

The activity is unlikely to result in any significant land use impacts and therefore can be considered to have a negligible effect on this aspect.

6.4.7 Transportation impacts

6.4.7.1 Potential impacts

The activity would require the use of the following vehicles during the period of works:

- Two to three vibroseis trucks (vibrator trucks)
- Four light trucks
- 10 light vehicles (likely to be 4WD)
- One slasher unit (tractor mounted).

This would result (in a worst-case scenario) an additional 18 vehicles on the roads within the Site and along the access roads to the Site per day. The activity would be carried out 7 days per week during daylight hours.

On the approach roads to the Site, the number of vehicles would temporarily increase traffic volumes to a small degree. This increase is unlikely to result in a significant impact to traffic flows, intersection performance or level of service on those roads.

Within the Site, the roads are primarily relatively narrow, unsealed roads. The key traffic impact that would arise during the activity relates to vehicles being able to pass by safely, while seismic surveys and vegetation slashing is being undertaken. The existing volume of vehicles on those roads has not been assessed through traffic counts, however given the rural setting, it is not anticipated that the volume of vehicles would be high.

Where vehicles not associated with the activity are required to pass the vehicles, plant and equipment associated with the activity, they would need to pass on the opposite side of the road. This creates a potential safety risk, particularly where other vehicles are approaching from the opposite direction. Unmitigated, this has the potential to result in a significant impact, however with reasonable and feasible mitigation measures in place, those risks can be readily managed.

6.4.7.2 Mitigation measures

The following measures would be implemented to avoid and/or mitigate potential impacts associated with traffic:

- A traffic management plan would be prepared by Santos prior to commencing the activity. This plan will outline a number of measures to manage traffic movements to and from the Site. These would include:
 - Designated routes for vehicles associated with the activity
 - Signage to indicate to other drivers that works are currently occurring on the road
 - Work zone speed limits with appropriate signage displayed for passing vehicles to slow to 40 km/h
 - Traffic control to be in place where vehicles are required to pass on the opposite side of the road.

6.4.7.3 Residual impact category

The activity is considered to have the potential to result in a low adverse impact. This conclusion is based on the scale of activities proposed, the temporary nature of the activity and the potential risks associated with traffic impacts.

6.5 Assessment of national impacts

Impacts on MNES are detailed below in **Table 6-3**, based on a Protected Matters Search Tool search undertaken on 19 July 2022.

Table 6-3 EPBC Protected Matters Search Tool Results Summary

MNES Under the EPBC Act	Identified within the Search Area	Potential for Significant Impact
World Heritage Properties	None	Unlikely No World Heritage Properties identified in the search.
National Heritage Places	None	Unlikely No National Heritage Places identified in the search.
Wetlands of International Importance	Three Wetlands of International Importance were identified within the search area: <ul style="list-style-type: none"> Banrock station wetland complex (900 – 1000 kilometres upstream) Riverland (800 – 900 kilometres upstream) The coorong, and lakes alexandrina and albert wetland (1000 – 1100 kilometres) 	Unlikely The three Wetlands of International Importance have been recorded at a minimum distance of 800 kilometres from the activity. The activity is not an activity that is of a scale that would result in impacts to wetlands located at such a considerable distance from the activities.
The Great Barrier Reef Marine Park	None	Unlikely The Great Barrier Reef Marine Park is located at a considerable distance from the activity and is unlikely to be affected directly or indirectly.
Commonwealth Marine Area	None	Unlikely No Commonwealth Marine Areas identified in the search.
Listed threatened ecological communities	Six Listed threatened ecological communities were identified by the search: <ul style="list-style-type: none"> Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland Poplar Box Grassy Woodland on Alluvial Plains Weeping Myall Woodlands White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland 	Unlikely The Flora and Fauna Assessment prepared for the activity (refer to Appendix B) found that a significant impact upon listed threatened ecological communities is unlikely to occur.

MNES Under the EPBC Act	Identified within the Search Area	Potential for Significant Impact
Listed threatened species	The search identified 26 listed threatened species including: <ul style="list-style-type: none"> • 10 birds • Five mammals • Nine plants • Two reptiles 	Unlikely The Flora and Fauna Assessment prepared for the activity (refer to Appendix B) found that a significant impact upon listed threatened species is unlikely to occur.
Listed migratory species	The search identified 10 listed migratory species including: <ul style="list-style-type: none"> • One migratory marine bird • Four migratory terrestrial species • Five migratory wetlands species 	Unlikely The scale of the activity, including the extent of vegetation slashing required is not likely to result in a significant impact to listed migratory species.
Commonwealth Lands	The search identified one Commonwealth Land including: <ul style="list-style-type: none"> • Commonwealth Land - Australian Telecommunications Commission NSW [12931] 	Unlikely In a search of available GIS data, no commonwealth lands are on or adjacent to the Site No ground works are required for the activity. It would not likely impact on Telecommunications.
Commonwealth Heritage Places	None	Unlikely No Commonwealth Heritage Places identified in the search.
Listed Marine Species	The search identified 17 Listed Marine Species all of which are birds.	Unlikely The activity would occur at a considerable distance from any marine areas and is not likely to have direct or indirect impacts upon listed marine species.
Whales and other cetaceans	None	Unlikely No whales or other cetaceans identified in the search.
Critical Habitats	None	Unlikely No Critical Habitats identified in the search.
Commonwealth Reserves - Terrestrial	None	Unlikely No Commonwealth Reserves - Terrestrial identified in the search.
Australian Marine Parks	None	Unlikely No Australian Marine Parks identified in the search.
Nuclear Action	N/A	N/A
Water Resources, in relation to coal seam gas/coal mining development	N/A	N/A – According to the <i>Significant impact guidelines 1.3: Coal seam gas and large coal mining developments—impacts on water resources</i> (DoE, 2013), if there is no extraction of CSG involved as part of the activity, it is not a ‘CSG development’ or ‘large coal mining

MNES Under the EPBC Act	Identified within the Search Area	Potential for Significant Impact
		development' for the purpose of the water trigger.

6.6 Assessment of cumulative impacts

In accordance with Section 171 of the EP&A Regulation, any cumulative environmental effects of the activity associated with other existing and likely future activities must be taken into account in determining the potential impacts of the proposal on the environment.

Cumulative impacts occur when two or more projects are carried out concurrently and in close proximity to one another. The impacts may be caused by both construction and operational activities and can result in a greater impact to the surrounding area than would be expected if each project was undertaken in isolation. Multiple projects undertaken at a similar time/similar location may also lead to construction fatigue, particularly around noise, traffic and air quality impacts, if not appropriately managed.

This assessment has made reference to the European Commission (EC) Guidelines for the *Assessment of Indirect and Cumulative Impacts as well as Impact Interactions 1999* and the *Canadian Environmental Assessment Agency Cumulative Effects Assessment Practitioner's Guide 1999*. These guidelines provide for detailed assessment and consideration of indirect and cumulative impacts caused by a variety of proposals, and ensure that all relationships between the proposal and existing environmental factors are considered.

Cumulative Effects Assessment (CEA) is a receptor based assessment, whereby in order to have a cumulative effect two projects or impacts must affect the same receptor. Therefore, if the activity is not affecting a receptor or group of receptors 'alone' then it cannot have a cumulative effect with another project, activity or action. As such, CEA focusses on the residual impacts (i.e. those impacts that remain post mitigation) from a project or activity.

Cumulative effects can be formed antagonistically¹, synergistically² or additively³. They are often caused by an action in combination with other past, present, and reasonably foreseeable future human actions⁴.

The first stage of the CEA is to understand the adverse residual impacts of the activity. The second stage is to identify other developments or actions nearby that may affect the same receptors as the activity and/or change the effectiveness of the other's mitigation and management measures. This identification process would use the following assessment parameters:

- Spatial parameter – The spatial parameter depends on the characteristics of the environmental impact and the likely area over which a residual impact would occur. For example, an air quality impact would potentially affect a wider area than a noise impact and would therefore affect different human or environmental receptors in different ways.
- Temporal parameter – The temporal parameter relates to how far into the future or the past the assessment considers cumulative proposals or activities. Projects that are not on exhibition or have not been lodged/submitted have been discounted as their assessments do not contain enough detail on residual effects or final design to allow a robust CEA to take place.

6.6.1 Potential impacts

As noted above, the first stage in the CEA process is to understand the adverse residual impacts of the activity. The residual impacts associated with the activity are presented in **Section 6.0**. The environmental assessment within **Section 6.0** has concluded that the activity would result in more than negligible impacts to the following aspects:

- Air quality
- Noise
- Traffic

¹ Opposing each other potentially resulting in a lower overall environmental effect.

² Where two or more impacts produce a total impact greater than the sum of the individual parts. For example oxides of nitrogen and volatile organic compounds each have impacts on human health, but when they combine they form ozone, their combined impact is potentially greater and of more concern to human health.

³ For example two sources of equally powerful noise can combine to create a greater overall impact.

⁴ Defined by the European Commission 1999.

The remaining aspects are considered to have a negligible impact and would be unlikely to significantly impact any sensitive receivers. This cumulative impact assessment has therefore only considered issues posed to air quality, noise and traffic.

A search of the following databases was undertaken to identify projects that have the potential to affect the same receivers as the activity:

- NSW Planning Portal application tracker (Gunnedah Shire Council)
<https://www.planningportal.nsw.gov.au/map>
- NSW Planning Portal Major Projects <https://www.planningportal.nsw.gov.au/major-projects/projects/search-location?name=&searchvalue=Gunnedah%2C+New+South+Wales&minx=&maxx=&miny=&maxy=&project-search-type=location>
- Gunnedah Shire Council Development Application Tracker, applications submitted in June and July 2022 and applications approved in June and July 2022
<http://datracking.gunnedah.nsw.gov.au/Home/Index>

Screening of potential cumulative impacts was then undertaken by comparing the extent and duration of residual impacts and their potential to affect the same receiver as the activity.

From this process, no projects were identified that would result in cumulative impacts to receivers that would be affected by the activity.

6.6.2 Residual impact category

The activity is unlikely to result in any significant cumulative effects and therefore this issue is considered negligible.

7.0 Summary of impacts

The potential impacts associated with the activity are summarised in **Table 7-1**.

This table presents a summary of the potential impacts related to the activity in the format recommended in Appendix 2 of *ESG2: Guideline for Preparing a Review of Environmental Factors* (DPE, 2015).

Please note that we have changed the header of the final column in the table from 'Ranking of Potential Significance' to 'Ranking of Residual Significance'. This has been done to recognise that this is a summary table and therefore should conclude the assessment presented in **Section 6.0** of this REF and because the table discusses mitigation and therefore should conclude with a summary of residual impacts.

Table 7-1 Impact Assessment Summary

Impacts (Refer to Heading 4 of ESG2)	Size	Scope	Intensity	Duration	Level of Confidence in predicting impacts	Resilience of environment to cope with impacts?	Level of reversibility of impacts?	Ability to manage or mitigate impacts	Ability of the impacts to comply with standards, plans or policies?	Level of public interest	Requirement for further information on the impacts of the activity or mitigation	Ranking of residual significance
Physical or Pollution Impacts												
Air	Small scale size/volume	Highly localised	Small impact over a short period	Short term (four weeks)	High	High Resilience	Potential Impacts are temporary and would quickly reverse	Effective mitigation measures available	Total compliance	Medium interest and predictable impacts on community	High level of understanding and information on impact	Low adverse
Water	Small scale size/volume	Highly localised	Small impact over a short period	Short term (four weeks)	High	High Resilience	Potential Impacts are temporary and would quickly reverse	Effective mitigation measures available	Total compliance	Low interest and predictable impacts on community	High level of understanding and information on impact	Negligible
Soil and Stability	Small scale size/volume	Highly localised	Small impact over a short period	Short term (four weeks)	High	High Resilience	Potential Impacts are temporary and would quickly reverse	Effective mitigation measures available	Total compliance	Low interest and predictable impacts on community	High level of understanding and information on impact	Negligible
Noise and Vibration	Small scale size/volume	Highly localised	Small impact over a short period	Short term (four weeks)	High	High Resilience	Potential Impacts are temporary and reversible	Effective mitigation measures available	Total compliance	Medium interest and predictable impacts on community	High level of understanding and information on impact	Low adverse
Biological Impacts												
Flora and Fauna	Small scale size/volume	Highly localised	Small impact over a short period	Short term (four weeks)	High	High Resilience	Potential Impacts are temporary and reversible	Effective mitigation measures available	Total compliance	Low interest and predictable impacts on community	High level of understanding and information on impact	Negligible
Bushfire	Small scale size/volume	Highly localised	Small impact over a short period	Short term (four weeks)	High	High Resilience	Potential Impacts are temporary and reversible	Effective mitigation measures available	Total compliance	Low interest and predictable impacts on community	High level of understanding and information on impact	Negligible
Resource Use Impacts												
Community Resources	Small scale size/volume	Highly localised	Small impact over a short period	Short term (four weeks)	High	High Resilience	Potential Impacts are temporary and reversible	Effective mitigation measures available	Total compliance	Low interest and predictable impacts on community	High level of understanding and information on impact	Negligible
Natural Resources	Small scale size/volume	Highly localised	Small impact over a short period	Short term (four weeks)	High	High Resilience	Potential Impacts are temporary and reversible	Effective mitigation measures available	Total compliance	Low interest and predictable impacts on community	High level of understanding and information on impact	Negligible
Community Impacts												
Social	Small scale size/volume	Highly localised	Small impact over a short period	Short term (four weeks)	High	High Resilience	Potential Impacts are temporary and reversible	Effective mitigation measures available	Total compliance	Low interest and predictable impacts on community	High level of understanding and information on impact	Negligible
Economic	Small scale size/volume	Highly localised	Small impact over a short period	Short term (four weeks)	High	High Resilience	Potential Impacts are temporary and reversible	Mitigation not required	Total compliance	Low interest and predictable impacts on community	High level of understanding and information on impact	Negligible
Non-Aboriginal heritage	Small scale size/volume	Highly localised	Small impact over a short period	Short term (four weeks)	High	High Resilience	Potential Impacts are temporary and reversible	Mitigation not required	Total compliance	Low interest and predictable impacts on community	High level of understanding and information on impact	Negligible

Impacts (Refer to Heading 4 of ESG2)	Size	Scope	Intensity	Duration	Level of Confidence in predicting impacts	Resilience of environment to cope with impacts?	Level of reversibility of impacts?	Ability to manage or mitigate impacts	Ability of the impacts to comply with standards, plans or policies?	Level of public interest	Requirement for further information on the impacts of the activity or mitigation	Ranking of residual significance
Aboriginal heritage	No impacts likely	Highly localised	No impacts likely	Short term (four weeks)	High	High Resilience	Potential Impacts are temporary and reversible	Effective mitigation measures available	Total compliance	Medium interest and predicable impacts on community	High level of understanding and information on impact	Negligible
Aesthetic	Small scale size/volume	Highly localised	Limited	Short term (four weeks)	High	High Resilience	Potential Impacts are temporary and reversible	Mitigation not required	N/A	Low interest and predicable impacts on community	High level of understanding and information on impact	Negligible
Land Use	No impacts likely	No impacts likely	No impacts likely	Short term (four weeks)	High	High Resilience	Potential Impacts are temporary and reversible	Mitigation not required	Total compliance	Low interest	High level of understanding and information on impact	Negligible
Transportation	Small scale size/volume	Localised	Small impact over a short period	Short term (four weeks)	High	High Resilience	Potential Impacts are temporary and reversible	Effective mitigation measures available	Total compliance	Low interest and predicable impacts on community	High level of understanding and information on impact	Low adverse
RANKING OF ACTIVITY AS A WHOLE												Negligible

8.0 Conclusion

Santos has a long-term commitment to the development of natural gas supplies to the growing NSW market. Santos is constantly reviewing its process, procedures and assets to identify feasible opportunities to improve health, safety and environmental safeguards. The activity has been developed to aid in the exploration of potential new high-value targets and unlocking future core assets.

The activity is permissible without consent and requires assessment and determination under Part 5 of the EP&A Act in accordance with the Resources and Energy SEPP.

This REF assesses the potential environmental impacts of the activity in accordance with the requirements of Part 5 of the EP&A Act, Section 171 of the EP&A Regulation and the *ESG2 Guidelines*. It has identified the potential impacts together with measures to mitigate those potential impacts.

The potential impacts of the activity are temporary and minor in scale.

In considering the likely environmental significance of the impacts from the activity it has been predicted that:

- The potential impacts are in most cases likely to be negligible and would be negligible overall
- Any impacts that could occur are considered to be localised and temporary in nature
- The activity is unlikely to have a significant effect on surface water or groundwater resources
- The activity is unlikely to have a significant effect on the environment or the community
- The activity is unlikely to have a significant effect on threatened species, populations, ecological communities or their habitats
- The activity is not on land that is, or is part of, critical habitat.
- The activity is consistent with the principles of ecologically sustainable development.

Based on the assessments within this REF, the impact of the activity would be negligible provided that the mitigation measures identified in **Section 6.0** and summarised in **Section 9.0** are employed. As such an EIS or SIS is not required for the activity.

9.0 Statement of commitments

Table 9-1 provides a statement of commitments for the activity.

Table 9-1 Statement of commitments

Item	Commitment
Activity type and location	<p>The activity would be carried out within the following road and road corridors:</p> <ul style="list-style-type: none"> Seismic surveying along Beeson Road, Milroy Road, Wandobah Road, Voca Road, Goscomb Road and Casey Road Vegetation slashing up to three metres from the road No work outside of the allotments within which the roads noted above are located.
Hours of operation	Daylight hours 7 days per week
Activity duration	Four weeks
Proposed commencement date	Q4 2022 (subject to relevant regulatory approvals)
Maximum area of disturbance	9 hectares - comprised of ground layer vegetation and pruning of overhead branches within 3 metres of the road (the road corridor) to allow access of seismic testing vehicles where required. It is acknowledged that this upper limit is an overestimate and is more than double the required amount as works would be undertaken only on one side of the road corridor.
Community consultation and complaint management	<ul style="list-style-type: none"> An information line is available 24 hours per day, seven days per week and the number will be published on project communication materials including fact sheets and stakeholder letters. Santos aims to respond to all enquiries or complaints received via the information line within two business days. A complaints register will be maintained, including a summary of the main areas of complaint, action taken, response given and intended strategies to reduce recurring complaints. A Monthly Activity Update will be published in the Gunnedah Times to keep stakeholders and the community informed of proposed activities, timing, and progress. Quarterly Activity Updates would be published and distributed to nearby landowners.
Air Impacts	<ul style="list-style-type: none"> Vehicles and machinery would be regularly checked and maintained in a proper and efficient condition Vehicle and machinery movements would be restricted to the road corridor Road speed limits would be followed, however in dry conditions, vehicle movements would be slowed on unsealed roads to limit the amount of dust that is generated Workers would maintain a visual awareness of dust emissions. Should excessive dust emissions be observed, the cause would be immediately investigated and measures undertaken to reduce dust.
Water	<ul style="list-style-type: none"> Vehicles and machinery would be properly maintained and routinely inspected to minimise the risk of fuel/oil leaks The majority of the vehicles and equipment will be refuelled offsite however the seismic vibrators would be refuelled on site using spill mats and strict re-fuelling procedures. Spill kits appropriate to products used in the machinery and vehicles would be available during the activity

Item	Commitment
	<ul style="list-style-type: none"> Spills of fuel, oil, chemicals or the like would be cleaned immediately, and the environmental manager for the activity would be notified of the location of the incident, extent of the incident and type of material spilled.
Soil quality and land stability	<ul style="list-style-type: none"> Within the road corridor, only slashing of vegetation that is necessary to be trimmed to carry out the activity would take place Vehicles and machinery would be properly maintained and routinely inspected to minimise the risk of fuel/oil leaks The majority of the vehicles and equipment would be refuelled offsite however the seismic vibrators will be refuelled on site using spill mats and strict re-fuelling procedures. Spill kits appropriate to products used in the machinery and vehicles would be available during the activity Spills of fuel, oil, chemicals or the like would be cleaned immediately, and the environmental manager for the activity would be notified of the location of the incident, extent of the incident and type of material spilled.
Noise	<ul style="list-style-type: none"> The activity would only be carried out during daylight hours, 7 days a week. Identify and consult with the potentially affected residents and/or sensitive receivers prior to the commencement of the activity. This consultation is to include a description of the nature of works, the expected noise impacts, approved hours of work, duration, complaints handling and contact details. Implement a complaints handling procedure for dealing with noise complaints 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.
Flora and fauna	<ul style="list-style-type: none"> Where possible, the Site should be confined to the road corridor, to reduce the impact on native vegetation groundcover. Where slashing is required, the disturbance limit should be clearly delineated to a maximum of three metres, to ensure site disturbance occurs only within the designated sites and is not unnecessarily extended. This will apply for the entire length of the line. Trimming of branches to allow machinery access is to be limited to branches with a diameter less than 10 centimetres and must not include any hollow-bearing limbs. No removal of native trees with a stem diameter greater than 10 cm DBH. In areas to be slashed, fallen logs and debris may be temporarily moved out of the path of seismic testing vehicles. When the vehicles have passed, fallen logs and debris will be left in situ as close as possible to their approximate original location, to reduce disturbance to potential fauna habitat. Vehicle movements should be confined to the Site to reduce any further disturbance to the ground layer. Machinery coming from outside the site should be managed to reduce the risk of introducing or further establishing weed species and pathogens. This should include confining vehicle access to the Site, and wash-down of vehicles, machinery and boots prior to entering the Site. Footwear and clothing should be free from mud, dirt and vegetation debris prior to entry into areas of vegetation.

Item	Commitment
	<ul style="list-style-type: none"> • Due to the temporary and low level of impact associated with the activity, it is expected that slashed areas will naturally regenerate to their pre-slashing condition. • Vehicle operators and staff to be briefed on the presence of Koalas.
Bushfire	<p>The existing Bushfire Management Plan would continue to be implemented to manage potential impacts related to bushfires.</p> <p>The following additional measures would also be implemented to avoid and/or mitigate potential impacts on public safety:</p> <ul style="list-style-type: none"> • An induction for staff and contractors regarding the hazards and risks at the Site would be implemented.
Aboriginal heritage	<ul style="list-style-type: none"> • The activity may proceed without further archaeological investigation under the following conditions: <ul style="list-style-type: none"> - All land and ground disturbance activities must be confined to within the Site, as this will eliminate the risk of harm to Aboriginal objects in adjacent landforms. Should the parameters of the proposal extend beyond the Site, then further archaeological assessment may be required. - All staff and contractors involved in the activity will be made aware of the legislative protection requirements for all Aboriginal sites and objects. • This assessment has concluded that there is a low likelihood that the activity will adversely harm Aboriginal cultural heritage items or sites. If during works, however, Aboriginal artefacts or skeletal material are noted, all work should cease and the procedures in the Unanticipated Finds Protocol (Appendix 2 to the Aboriginal Heritage Due Diligence Assessment) will be followed. • AHIMS sites 29-1-0113 and 29-1-0117, both modified trees, are within five metres of the proposed seismic line (coordinates provided in Table 3-5). The location of these modified trees would be marked on the operational maps and discussed in inductions to ensure no inadvertent impacts during the seismic work. • The work crew will be provided with the location of these AHIMS sites, and the sites must be avoided. • Inductions for work crews should include a cultural heritage awareness procedure to ensure they recognise Aboriginal artefacts (see Appendix 3 to the Aboriginal Heritage Due Diligence Assessment) and are aware of the legislative protection of Aboriginal objects under the NPW Act and the contents of the Unanticipated Finds Protocol. <p>The information presented in the Aboriginal Heritage Due Diligence Assessment meets the requirements of the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales.</p>
Land use	<ul style="list-style-type: none"> • The activity is not to encroach beyond the Site, being the road and road corridors identified in Section 2.1.
Traffic and Access	<ul style="list-style-type: none"> • A traffic management plan would be prepared by Santos prior to commencing the activity. This plan will outline a number of measures to manage traffic movements to and from the Site. These would include: <ul style="list-style-type: none"> - Designated routes for vehicles associated with the activity; - Signage to indicate to other drivers that works are currently occurring on the road - Work zone speed limits would be applied, with appropriate signage displayed for passing vehicles to slow to 40 km/h - Traffic control to be in place where vehicles are required to pass on the opposite side of the road.

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**APPENDIX A DEVELOPMENTS ADJACENT TO NATIONAL PARKS AND WILDLIFE
SERVICE LANDS: GUIDELINES FOR CONSENT AND PLANNING
AUTHORITIES (2020)**



NSW NATIONAL PARKS & WILDLIFE SERVICE

Developments adjacent to National Parks and Wildlife Service lands

**Guidelines for consent and planning
authorities**



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Cover photo: Urban development adjacent to William Howe Regional Park. John Yurasek/DPIE

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1. Introduction

1.1 Background

These guidelines have been prepared for use by councils and other planning authorities when they assess development applications that may impact on land and water bodies managed by the National Parks and Wildlife Service (NPWS).

NPWS is directly or jointly responsible for managing a wide range of lands acquired or reserved under the *National Parks and Wildlife Act 1974* (NPW Act). Lands acquired under the NPW Act include those that are pending formal reservation under a formal category of reserve or can remain unreserved for operational reasons. Lands reserved under the NPW Act fall within one of the following categories of reserve:

- national parks
- historic sites
- nature reserves
- Aboriginal areas
- karst conservation areas
- regional parks
- state conservation areas.

These areas of land are commonly referred to as the conservation reserve system or protected areas. They fall within the definition of 'environmentally sensitive areas' under NSW planning legislation.

In this document, the terms 'NPWS park', 'NPWS lands' or 'land managed by NPWS' are used as abbreviated references to the full spectrum of parks and reserves, including acquired lands. Spatial data for reserved areas of NPWS land are available online and can assist in identifying areas of park near a proposed development, as well as the specific features and values of that particular park.¹

NPWS recognises the benefits of working in partnership with planning authorities to ensure that developments adjoining or in the vicinity of NPWS parks are sympathetic to the values of those lands and NPWS ongoing capacity to manage its parks in the public interest. The issues and approaches outlined in these guidelines are provided to assist planning authorities in their decision-making.

Planning authorities can contact NPWS Communication Coordination² or the nominated contact for the relevant NPWS park³ if they have further queries about the potential for developments that may impact lands managed by NPWS.

For developments in proximity to, or that may impact on marine parks or aquatic reserves, guidance and advice should be sought from the Department of Primary Industries⁴.

¹ datasets.seed.nsw.gov.au/dataset/nsw-national-parks-and-wildlife-service-npws-estate3f9e7

² npws.commscoordination@environment.nsw.gov.au

³ www.nationalparks.nsw.gov.au/visit-a-park

⁴ www.dpi.nsw.gov.au/fishing/marine-protected-areas

1.2 Values of NPWS parks

Lands managed by NPWS include some of the most biologically diverse, culturally significant and scenic areas in Australia. Some of these parks contain wetlands of international significance (Ramsar wetlands), are in world heritage areas, or are on the National Heritage List or State Heritage Register. Approximately 30% of NPWS parks are declared wilderness areas under the *Wilderness Act 1987*.

These parks play an important role in protecting native plants and animals (including threatened species, migratory birds and endangered ecological communities) and natural features such as rainforests, old-growth forests, wetlands, estuaries and caves. They also protect natural and cultural landscapes that support Aboriginal sites and cultural heritage, and also sites of shared and historic heritage.

NPWS parks provide direct benefits to the community through opportunities for recreation, tourism, education and scientific research, and services in the form of clean water and amenity.

1.3 Applying the guidelines

The goal of these guidelines is to guide consent and planning authorities in their assessment of development applications that are adjacent to land managed by NPWS. This advice aims to avoid any direct or indirect adverse impacts on NPWS parks.

The guidelines will also be of assistance to planning authorities in the development of environmental planning instruments (such as local environmental plans) applying to land adjoining, or in the vicinity of, land managed by NPWS.

Councils and other consent authorities need to consider the following issues when assessing proposals adjacent to NPWS land and, in particular, their impacts on the park, its values and NPWS management of the park:

- erosion and sediment control
- stormwater runoff
- wastewater
- management implications relating to pests, weeds and edge effects
- fire and the location of asset protection zones
- boundary encroachments and access through NPWS lands
- visual, odour, noise, vibration, air quality and amenity impacts
- threats to ecological connectivity and groundwater-dependent ecosystems
- cultural heritage
- road network design and its implications for continued access to the park.

For each of these issues, the guidelines identify the key risks to NPWS land and a recommended approach for consideration by planning authorities. The potential for cumulative impacts from developments proximate or immediately adjoining NPWS land should be considered as part of case-by-case assessments.

There are also specific legislative requirements for development in the locality of wild rivers declared under the NPW Act. These requirements, which may include consultation with the Minister for Energy and Environment, are discussed below.

While every effort has been made to ensure that these guidelines are as comprehensive as possible, it is acknowledged that they cannot foresee every possible circumstance or proposed development that may potentially impact NPWS land. Nevertheless, where unique

or unusual circumstances arise, the main priority should still be to avoid and then minimise any direct or indirect adverse impacts on land managed by NPWS.

Special requirements for wild rivers

Wild rivers⁵ are declared under s.61 of the NPW Act and can only be declared over areas in NPWS land. The purpose of declaration is to identify, protect and conserve any water course of natural origin and exhibiting substantially natural flow. Wild rivers are managed to restore or maintain natural processes, and to identify, conserve and protect Aboriginal objects and places associated with wild rivers.

Under s.61A of the NPW Act, a statutory authority **cannot** carry out development in relation to a wild river unless it has consulted with, and considered any advice given by, the Minister for Energy and Environment in relation to the development. This requirement could potentially apply to upstream developments that may affect a wild river.

⁵ www.environment.nsw.gov.au/topics/parks-reserves-and-protected-areas/types-of-protected-areas/wild-rivers

2. Issues to be considered when assessing proposals adjacent to NPWS parks

2.1 Erosion and sediment control

Aim

To prevent erosion and the movement of sediment onto NPWS land.

Risks to NPWS land

Removal of vegetation and disturbance of groundcover from construction activities will expose the soil and increase the risk of erosion. Eroded sediments, including those from soil stockpiles, may be transported downstream or down slope, and deposited on vegetation and in creeks, rivers, wetlands and other aquatic habitats.

Works on development sites may increase the intensity and frequency of stream flows due to vegetation clearing and increasing the area of impermeable surfaces. Even if the development is occurring on lands that may not immediately adjoin parks, these changes can impact land managed by NPWS.

These changes can result in damage (sometimes permanent) to downstream aquatic habitats by scouring the bed and banks of watercourses, altering water quality and smothering sensitive areas (such as seagrass beds). Coastal lakes, which may intermittently be closed, are particularly susceptible to increased sedimentation. Several NPWS coastal parks, such as Cudgen Nature Reserve and Jervis Bay National Park, include important coastal lake systems. Consideration should be given increased sedimentation levels entering parks containing Ramsar wetlands, given the potential that such increases could have on the ecological character and international significance of these wetlands. The coastal lake system in Myall Lakes National Park is a wetland of international significance (Ramsar wetland).

Developments may also direct flows to a single discharge point thereby increasing erosion potential downstream.

Erosion can affect the landscape values assigned to a location by Aboriginal people and impact on any Aboriginal objects present through the removal and subsequent displacement of sediments. Changes to an Aboriginal site caused by erosion will affect the site's setting in the landscape which is important to Aboriginal people. The setting of a place is often as important as the objects the place may contain.

Furthermore, erosion can directly affect Aboriginal objects, including stone objects, shells and rock art, that may be present. It can expose objects to increased weathering and other impacts, resulting in a greater chance of displacement from the original location. Sediment accumulation over Aboriginal objects can also result in further damage if the objects are in contact with acidic soils.

Many parks also support significant historic heritage, including archaeological relics, convict-built roads, cemeteries, buildings and bridges, which is vulnerable to the impacts of erosion.

Recommended approach

Appropriate erosion and sedimentation control measures should be implemented before works commence, and maintained for the duration of construction and until soil is stabilised

after construction. In some cases, it will be necessary to prepare detailed sediment and erosion control plans (soil and water management plans) for the proposed development.

As general erosion and sediment control measures, NPWS recommends that:

- clearance of native vegetation is kept to a minimum
- areas of retained vegetation are fenced off during construction
- areas of bare soil and stockpiles are managed to prevent erosion during the construction process
- disturbed areas are rehabilitated and appropriately stabilised as soon as possible following construction (this includes removal of control measures, such as sediment fences, when they are no longer required).

To prevent sediment moving from an adjacent property onto NPWS land, and to avoid and minimise erosion risks, NPWS also recommends that appropriate controls should be applied in accordance with the following guidance documents:

- *Erosion and sediment control on unsealed roads* (OEH 2012)⁶
- *Managing Urban Stormwater – Soils and Construction, Volume I* (Landcom 2004)⁷
- *Managing Urban Stormwater – Soils and Construction, Volume II* (DECC 2008)⁸
- *A Resource Guide for Local Councils: Erosion and Sediment Control* (DEC 2006).⁹

Erosion and sediment control is an appropriate response for smaller scale developments with short term disturbance. Land and water management (such as sediment basins and flocculation) may be required where longer periods of disturbance or larger or steeper areas of land will be disturbed.

2.2 Stormwater runoff

Aim

Nutrient levels are minimised, and stormwater flow regimes and patterns mimic natural levels before reaching NPWS land, to ensure no detrimental change to hydrological regimes.

Risks to NPWS land

The discharge of stormwater to NPWS land poses a threat to the values of land and downstream environments by:

- dispersing litter and pest species (especially weeds)
- altering nutrient composition and pollutant levels, which can damage native vegetation and aquatic ecosystems, reduce water recreation safety and promote weed growth
- causing potential erosion and sedimentation in watercourses, particularly where new developments have led to an increased volume and concentration of flow

⁶ www.environment.nsw.gov.au/Stormwater/ESCtrUnsealedRds.htm

⁷ www.environment.nsw.gov.au/research-and-publications/publications-search/managing-urban-stormwater-soils-and-construction-volume-1-4th-edition

⁸ www.environment.nsw.gov.au/topics/water/water-quality/all-publications

⁹ www.environment.nsw.gov.au/research-and-publications/publications-search/resource-guide-for-local-councils-erosion-and-sediment-control

- impacting on Aboriginal sites, which are frequently located close to watercourses, and historic heritage.

These potential impacts, which are also cumulative, have a range of implications for the management of NPWS land. They pose serious risks to the protection of park values and assets, and catchment ecological health.

These risks are recognised in provisions in the National Parks and Wildlife Regulation 2019 which requires the consent of NPWS to discharge stormwater into a park (for example, where a development proposes new infrastructure that alters stormwater flows and directs them into a park).

Developments which increase or interrupt natural flows can significantly impact the habitat for threatened species which use downstream riparian or wetland areas. Under the State Environmental Planning Policy (Coastal Management) 2018 development proximate coastal wetlands and littoral rainforest must not significantly impact the hydrological integrity of these areas, or the quantity and quality of surface and groundwater flows entering or leaving such sites.

Potential stormwater impacts of development should also be considered closely where development sites are proximate Ramsar wetlands. Ramsar wetlands are identified as having international importance due to various factors, including their hydrology. Impacts to this hydrological functioning, such as through changes to nutrient levels or stormwater flow patterns, has the potential to affect the ecological character of these internationally significant wetlands.

Recommended approach

- Development proposals for areas adjacent to NPWS land should incorporate stormwater detention and water quality systems (with appropriately managed buffer areas) **within** the development site.
- Water sensitive urban design (WSUD) principles should be applied to developments in catchments upstream from wetlands.¹⁰
- Stormwater should be diverted to council stormwater systems or to infiltration and subsurface discharge systems **within** the development site.
- The discharge of stormwater to NPWS land, where the quantity and quality of stormwater differs from natural levels, must be avoided.

Infrastructure associated with stormwater treatment must **not** be located on NPWS land and any stormwater outlets should disperse the flow at pre-development levels. Landowners and development proponents are responsible for ensuring that all tanks, storage areas and associated infrastructure are appropriately sized and maintained to ensure that there is no unauthorised overflow onto NPWS land.

MUSIC software modelling is commonly used to estimate pollutant loads resulting from developments and different treatment options. Online tools such as the eWater Toolkit¹¹, employ MUSIC software to project runoff quantity and quality post development. Such tools allow assessing authorities to ensure WSUD principles are applied and potential impacts resulting from changes to stormwater discharge to park are avoided. It is recognised that councils commonly require a percentage decrease of pollutant levels immediately downstream of a development relative to the 'no treatment' (post development) option. However, given the potential for pollutants to significantly impact park values, NPWS

¹⁰ <https://www.hccrems.com.au/wp-content/uploads/2016/02/wsud-for-catchments-above-wetlands-final.pdf>

¹¹ <https://toolkit.ewater.org.au/>

recommends that developments proximate to parks should not result in any net increase in pollutant levels discharged to NPWS land.

NPWS acknowledges that in some limited and exceptional cases it may not be possible to avoid the discharge of stormwater from development sites onto NPWS land. In these cases, NPWS may be willing to grant an approval to allow the discharge of stormwater onto NPWS land. Such an approval will only be granted where it can be clearly shown to be in the best overall interests of the environment (for example, by addressing existing impacts from unmanaged stormwater). The final decision rests solely with NPWS.

Any person seeking approval to discharge stormwater onto NPWS land should provide a written request to the relevant NPWS Area Manager containing detailed information on the proposal which should include:

- current stormwater flows (volume and quality) emanating from the nearby property into NPWS land, including existing undeveloped and developed areas
- current stormwater management arrangements (if any)
- identification of any existing impacts on the land as a result of stormwater from the property (including erosion, sedimentation, weeds and tree dieback)
- proposed changes to stormwater related to the development where the following stormwater management standards should be met:
 - for subdivisions, multi-unit dwellings, commercial and industrial development:
 - no increase in pre-development peak flows from rainfall events with a 1 in 5 year and 1 in 100 year recurrence interval
 - no increase in the natural annual average load of nutrients and sediments
 - no increase in the natural average annual runoff volume.
 - for single residential dwellings or small developments on highly constrained lots:
 - standard local council discharge requirements and best practice stormwater treatment to reduce nutrient and sediment loads and average annual runoff volumes to pre-development levels.
- likely impacts from those changes to NPWS land
- clear explanation of the reasons why stormwater discharge is considered unavoidable
- an explanation of the overall environmental benefits to NPWS land from the proposed stormwater management system.

In considering any requests to allow stormwater discharge, NPWS may also require the proponent to submit an environmental impact assessment to meet relevant requirements of Part 5 of the *Environmental Planning and Assessment Act 1979*.

Councils and other planning authorities should **not** grant approvals that involve the discharge of stormwater to NPWS land or include conditions requiring such an outcome from NPWS.

The Environmental Protection Authority has developed a *Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions*.¹² The framework assists in assessing land-use decisions that have the potential to change the health of a waterway and the principles can also be applied to waterways that flow through park and are likely to be impacted by upstream development.

¹² <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Water/Water-quality/risk-based-framework-waterway-health-strategic-land-use-planning-170205.pdf>

Where new stormwater infrastructure may discharge into marine parks or aquatic reserves, planning authorities should consult with the Department of Primary Industries.

2.3 Wastewater

Aim

There are no adverse impacts on NPWS land due to wastewater from nearby development.

Risks to NPWS land

Some new developments, particularly in remote or rural areas, do not have access to mains sewerage systems. In these cases, other options for sewage disposal are required, including septic tanks and composting toilets. Some developments (such as horticultural or turf industries) may propose to undertake effluent irrigation or the discharge of other types of wastewater into the environment.

If wastewater disposal systems are not designed, installed, operated and maintained correctly they can pose significant risks to NPWS land. These risks are similar to the risks from stormwater runoff, although the degree of risk is relatively greater given the nature of waste products involved and the potential impacts to the ecosystem and human health.

Recommended approach

In considering proposals involving wastewater disposal, including sewage management, consent authorities should ensure that disposal systems will be designed and operated to the highest standards. This will require consideration of compliance measures that will be used to ensure ongoing satisfactory operation of the systems.

Except for facilities that are directly related to the provision of park visitor or management facilities, wastewater management infrastructure must **not** be located on NPWS land. Also (with the same exception), there must be no discharge of wastewater to NPWS land, including nutrient or pathogen export from effluent disposal areas.

- As well as any current Office of Local Government guidelines, planning authorities should refer to the Environmental Protection Authority's water quality¹³ guidelines when considering wastewater management.

2.4 Pests, weeds and edge effects

Aim

Adjoining or nearby development does not:

- lead to increased impacts from invasive species (weeds and pests), domestic pets and stock
- facilitate unmanaged visitation, including informal tracks, resulting in negative impacts on cultural or natural heritage values
- lead to impacts associated with changes to the nature of the vegetation surrounding the park

¹³ www.environment.nsw.gov.au/topics/water/water-quality

- impede NPWS access for management purposes, including inappropriate fencing (refer also to section 2.10).

Risks to NPWS land

Development adjoining or in the vicinity of NPWS land has the potential to significantly affect the management of NPWS land, resulting in damage to conservation values and cost implications for future management. Development may result in:

- inappropriate and unauthorised access and uses (such as by trail-bike riders)
- increase in invasive species and decline in biodiversity and ecosystem health (such as dieback)
- impacts on areas of particular environmental sensitivity, including Aboriginal and historic heritage sites, watercourses, threatened ecological communities and threatened species habitat
- disturbance and predation by domestic pets or ingress by stock animals.

Clearing of vegetation (including aquatic vegetation) along or near the boundary of NPWS land can lead to edge effects such as:

- increased drying of soils and consequent changes to vegetation at the land boundary
- decline in fauna species that are sensitive to changes in vegetation along newly created edges
- increased predation in the vicinity of the NPWS land boundary associated with aggressive species in open situations (such as nest predation by ravens and currawongs).

NPWS encourages and supports the sustainable management and development of nearby land, particularly where it is sympathetic to the protection of conservation values in NPWS parks and reserves. The Biodiversity Conservation Trust provides support for landowners interested in voluntarily protecting the conservation values of their land through the Conservation Partners Program.¹⁴

NPWS also works with adjoining neighbours and other authorities to undertake strategic pest management programs. Regional Pest Management Strategies focus efforts on the highest priority pest species across NPWS lands.¹⁵

Recommended approach

In assessing proposals, consent authorities should consider the types of impacts associated with development close to land managed by NPWS. NPWS considers that site layout and design should seek to avoid (and then minimise and mitigate) any adverse environmental impacts.

NPWS encourages consideration of an appropriate buffer, vegetated where possible, or set-back between any development and NPWS land. Where managed effectively, a buffer may minimise the impact to the natural and cultural values of NPWS parks, and increase the resilience of the area to counter potential impacts of climate change. Given the differences between sites and development types, it is not possible to specify a standard buffer; each development will need to be assessed on its merits. Developments that are designed to be

¹⁴ www.bct.nsw.gov.au/conservation-partners-program

¹⁵ www.environment.nsw.gov.au/topics/animals-and-plants/pest-animals-and-weeds/regional-pest-management-strategies

sympathetic to adjoining lands, and to integrate with the landscape, are likely to require less need for buffers or set-backs.

Where there is no buffer, consideration should be given to developing appropriate conditions or land management practices that minimise the potential edge effects from development. This might mean requiring the retention of areas of vegetation or siting a building back from a NPWS boundary.

During construction works adjoining parks, the boundary of the NPWS park and any buffer will require demarcation using a visually obvious barrier such as temporary fencing or flicker tape to reduce the risk of accidental encroachments.

The management of companion animals, such as cats and dogs, and stock is a particular challenge for developments close to NPWS land. NPWS recommends that planning authorities investigate all available options for minimising the risks from domestic pets and stock that may arise from new development. This includes educational tools (such as signage), compliance (such as regular council patrols), physical controls (such as fencing), and other options (such as restrictive covenants where legally possible). For proposals involving boundary fencing, NPWS has established policies and procedures to guide the choice of suitable fencing and cost-sharing arrangements. Consent authorities should refer development proponents to the *Boundary Fencing Policy*.¹⁶

NPWS acknowledges that in some situations clearing of vegetation on neighbouring land is required to manage risks associated with bushfire (see section 2.5). NPWS nevertheless recommends the retention of existing native vegetation where appropriate. This will assist in reducing edge effects, as well as retaining wildlife corridors and minimising the isolation of NPWS parks (see section 2.8).

2.5 Fire and the location of asset protection zones

Aim

All asset protection measures are within the development area, and there is no expectation for NPWS to change its fire management regime for the land it manages.

Risks to NPWS land

NPWS recognises fire as a natural and recurring factor which shapes the environment. However, it also acknowledges that fire poses a significant threat to life and property, and that altered fire regimes may degrade park values including biodiversity, cultural heritage and tourism. The onset of climate change is likely to exacerbate these risks.

NPWS lands are mapped as bushfire prone lands. The majority of fires on NPWS parks, however, originate from sources outside the park and from human-caused ignitions.

Fire management is one of the most important tasks in managing NPWS lands¹⁷. Adjacent land uses have implications for fire management in parks and so fire management in parks needs to be integrated with bushfire management on adjacent lands.

¹⁶ www.environment.nsw.gov.au/topics/parks-reserves-and-protected-areas/park-policies/boundary-fencing

¹⁷ www.environment.nsw.gov.au/topics/parks-reserves-and-protected-areas/fire/managing-fire

Recommended approach

Councils and other planning authorities should not grant approvals that involve the undertaking of bush fire hazard reduction works within NPWS land, including the establishment of asset protection zones, or include conditions requiring such an outcome.

For any proposals adjacent to NPWS land, consent authorities need to consider an assessment of the fire risk in accordance with the bushfire guidelines.¹⁸ The assessment should address appropriate fire management practices for the area. Councils should also ensure that the provisions of the *Rural Fires Act 1997* and section 4.14 of the *Environmental Planning and Assessment Act 1979* are implemented in the area proposed for development. Further consultation with the NSW Rural Fire Service may be required.

While the bushfire guidelines note that asset protection zones are possible but not encouraged, they also state that easements for bushfire protection should not be considered where the adjoining land is used for a public purpose and where vegetation management is not likely or is unable to be granted, such as in a national park. This means that asset protection zones should be provided in the development site and not extend into NPWS land or rely on actions being undertaken by NPWS. Appropriately designed fire protection zones and firefighting access should be located on the land where development is proposed.

Fencing to be erected between the boundary of the property and NPWS land should be of non-combustible material and designed for the intended purpose (for example, stock exclusion). Factors such as disruption to wildlife movements and impacts on fire suppression activities (including the ability of firefighting personnel to safely evacuate an area) should always be considered.

2.6 Boundary encroachments and access through NPWS land

Aim

No pre-construction, construction or post-construction activity occurs on land managed by NPWS. Any access that does occur must be legally authorised and comply with park management objectives.

Risks to NPWS land

Unauthorised access to NPWS land can have direct physical impacts on the conservation values of parks, such as those due to the removal of vegetation, erosion and soil disturbance. If such access continues or other encroachments occur (such as the construction of buildings, car parks or roads) this can have long-term implications affecting park management (for example fire protection), and public use and enjoyment of the park.

Recommended approach

Spatial data for NPWS land is available online and can assist in identifying park locations and boundaries in relation to development sites.¹⁹ Consent authorities should ensure that

¹⁸ NSW Rural Fire Service 2019, *Planning for Bushfire Protection*, www.rfs.nsw.gov.au/plan-and-prepare/building-in-a-bush-fire-area/planning-for-bush-fire-protection

¹⁹ datasets.seed.nsw.gov.au/dataset/nsw-national-parks-and-wildlife-service-npws-estate3f9e7 (requires GIS software)

where land involved in a proposal shares a common boundary with NPWS land the boundary has been accurately surveyed to ensure there is no encroachment on NPWS land as a result of the proposed development.

NPWS land is **not** to be used:

- to access development sites
- to store materials, equipment, workers' vehicles or machinery
- for maintenance access after development.

Measures, such as temporary fencing of 'no-go' areas during construction or installation of permanent, wildlife-compatible fencing should be considered, and will require NPWS approval if they are proposed to be located along the site boundary.

In addition, where ongoing access to the development site requires access through NPWS land, the consent authority should ensure that there is a legal basis for such access before granting approval. Consent authorities should specifically consider whether:

- access will be via an existing public access road
- access has been, or will be, granted by NPWS including any conditions or limitations on such access (such as road widths) if there is no existing public access road
- there are any statutory limits on the rights for continued use of access roads through parks recognised by national park reservations acts since 1996
- councils and other planning authorities should not grant approvals that involve access through or across NPWS land, or include conditions requiring such access, without clear written evidence of an agreement from NPWS.

2.7 Visual, odour, noise, vibration, air quality and amenity impacts

Aim

There is no reduction of amenity on NPWS land due to adjacent development.

Risks to NPWS land

Certain developments may significantly intrude on the environment of NPWS lands, affecting the senses of wildlife and park visitors. For example, noise, vibration and lighting may disrupt foraging and breeding habits of native animal species. These impacts and any degradation of air quality (including odours) may adversely affect the use and public enjoyment of walking tracks, campgrounds and picnic areas in the park.

Recommended approach

Planning authorities should take into account the visual (including lighting), noise, odour and air quality impacts of development adjacent to NPWS land to ensure that they do not affect the amenity or public enjoyment of the land. NPWS land should never be considered as a buffer zone between a development and other surrounding uses (such as residential areas).

Planning authorities should consider whether it is appropriate to apply control measures so that the development is sympathetic with the park's natural and cultural heritage values. Such controls may include landscaping with local native plant species, implementing buffer areas and set-backs, limiting hours of operation, and use of appropriate colours, building

materials, lighting and height controls. Light trespass into parks from street or security lighting should be minimised.

Some types of developments, such as quarries and road works, can result in particularly significant impacts (for example noise and dust). Large-scale developments of this type are likely to need detailed site-specific management plans.

2.8 Threats to ecological connectivity and groundwater-dependent ecosystems

Aim

Native vegetation and other flora and fauna habitats that provide a linkage, buffer, home range or refuge role on land that is adjacent to parks are maintained and enhanced, where possible.

Groundwater-dependent ecosystems in NPWS land are protected.

Risks to NPWS land

Naturally vegetated areas adjoining NPWS land provide essential linkages for the maintenance of biodiversity and also minimise potential edge effects. These areas have a role in maintaining the viability of local populations and form an important component of home ranges of mobile species, as well as providing valuable wildlife refuge areas (including during periods of stress). Streams, rivers and other water bodies close to NPWS land may play similar roles.

Avoiding native vegetation clearing and fragmentation and retaining landscape connectivity will also assist in mitigating some of the impacts of climate change on biodiversity. Native vegetation in good condition and with a minimal edge to area ratio will be better able to resist weed invasion, wind damage, desiccation and other edge effects.

Development in areas of native vegetation or along water bodies that adjoin NPWS land can result in fragmentation of habitat corridors and isolation from other areas of habitat in the locality. Landowners are encouraged to protect and manage the conservation values of their properties, such as through the Conservation Partners Program noted in section 2.4.

Recommended approach

NPWS recommends that vegetation, waterways and water bodies close to NPWS land that exhibit ecological connectivity should be retained, protected and, where necessary, rehabilitated. Consent authorities should consider the corridor values, or connective importance, of any vegetation (not only trees) and waterways or water bodies and possible impacts from the proposed development.

For proposals involving the extraction of groundwater, NPWS recommends that consent authorities obtain and consider a comprehensive assessment of any potential impacts that may occur to groundwater-dependent ecosystems in NPWS lands. This can include wetlands, vegetation, mound springs, river base flows, cave ecosystems, playa lakes and saline discharges, springs, mangroves, river pools, billabongs and hanging swamps. The groundwater dependence of ecosystems can range from complete reliance to a partial reliance on groundwater, such as might occur during droughts.

Ecological processes in groundwater-dependent ecosystems are threatened by the regular extraction of groundwater and changes in land use or management.

The protection of groundwater-dependent ecosystems is a key principle of the NSW State Groundwater Protection Policy.²⁰ Further information on groundwater, including groundwater vulnerability maps, is available from the Department of Planning, Industry and Environment.²¹

2.9 Cultural heritage

Aim

Areas and sites of heritage value on NPWS land, including Aboriginal cultural heritage, are protected.

Risks to NPWS land

NPWS land contains some of the most significant and intact areas of Aboriginal²² and historic cultural heritage values in NSW. This includes physical objects, items and places, as well as areas that are significant with respect to cultural traditions, customs, beliefs and history. It can include values that pre-date the arrival of settlers to Australia (for example, Aboriginal objects), as well as more contemporary associations (such as cemeteries). Some NPWS parks or sites in parks are world heritage or national heritage listed or on the State Heritage Register.

Cultural heritage values can, and often do, extend across the landscape, spanning multiple land tenures and properties. Ensuring that these values endure and can be interpreted and appreciated by future generations requires protective action across boundaries.

As noted above, there are a number of NPWS parks that are world heritage listed (such as Blue Mountains National Park) and/or on the National Heritage List (such as Ku-ring-gai Chase National Park)²³. The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* requires that approval be obtained from the Australian Government before undertaking any action that could have a significant impact on the world heritage or national heritage values of a listed place. Such impacts are not limited to those from adjoining properties, and could occur due to developments some distance away.

There are also many NPWS lands (or areas, items or features in parks) that are listed on the State Heritage Register²⁴ and protected under the *NSW Heritage Act 1977*. Many heritage items in NPWS parks are listed under local environmental plans.

Impacts on these values may be related to the issues discussed in previous sections (for example, there may be impacts on Aboriginal objects resulting from erosion, sediment and stormwater from nearby developments). The cultural context or significance of a site may be dramatically affected by unsympathetic nearby development.

²⁰ www.water.nsw.gov.au/ArticleDocuments/34/nsw_state_groundwater_quality_policy.pdf.aspx

²¹ www.industry.nsw.gov.au/water/science/groundwater

²² www.nationalparks.nsw.gov.au/conservation-and-heritage/aboriginal-culture

²³ www.environment.gov.au/heritage/index.html

²⁴ www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx

Recommended approach

Consent and planning authorities should ensure that they give adequate consideration to potential impacts of nearby development on the heritage values of NPWS land. In particular, this includes:

- Aboriginal heritage values on NPWS land which can, but do not always, include areas declared as an Aboriginal Place
- historic heritage values, especially any areas or specific places listed on the State Heritage Register
- world heritage or national heritage values.

2.10 Access to parks

Aim

Adjacent developments do not compromise public and NPWS access to parks.

Risks to NPWS land

Maintaining legal and viable access to NPWS land is important in ensuring park values are conserved and that NPWS can undertake its functions as the manager of the land. Where proposals include changes to local access, such as road closures, new master planned areas or subdivision, any potential impacts to park access should be assessed.

Planning authorities should recognise NPWS has a responsibility to establish, maintain and protect a sustainable network of fire trails to prevent and control bushfires. Ensuring ongoing access to this network of trails aids in the protection of neighbouring lands as well as the park.

Proposals that remove, destroy, obstruct or limit access to a strategic or tactical fire trail have the potential to impede NPWS's ability to undertake preventative bushfire hazard reduction and to respond in the event of a bushfire. Even temporary closures of or obstruction to fire trails can cause significant risk to life, property and park values. Subdivision proposals or developments involving landform modifications may block park access through new retaining walls, and the exclusion of trail entry points from new road networks, or through new guttering or other infrastructure at trail heads that hinders or blocks vehicular access.

Access to existing visitor sites in NPWS parks (including lookouts, picnic areas, campgrounds and tourist drives) may also be blocked by poorly planned road networks on lands adjacent to parks. This may impact on the recreational values of the park to the broader community and opportunities for tourist operators.

Recommended approach

Consent and planning authorities should ensure that they consider any potential impacts on the accessibility to NPWS parks due to a proposed development in both the long- and short-term.

Road networks and landform modifications in new subdivisions should be designed to ensure that they accommodate current access points to parks. Conditions may need to specify that the storage of materials, equipment, workers' vehicles or machinery should not block or impede access to park roads and fire trails. The location of temporary fencing should also be considered with regard to the access to park roads and fire trails.

Consideration should also be given to the planning for strategic or tactical fire trails proximate to the development. The Fire Access and Fire Trail (FAFT) plan and the NPWS reserve fire management strategy for the park should be consulted as to the location of such trails.

Once designated under the relevant FAFT plan, strategic fire trails cannot be closed under Section 62ZI of the *Rural Fires Act 1997*, with closure encompassing obstruction or impacts that do not allow for the proper use of the fire trail.

While not necessarily designated or registered, tactical fire trails play an important role in supporting the prevention and suppression of fire. Consent authorities should ensure that development does not block or in any way impede tactical fire trails.

APPENDIX B FLORA AND FAUNA ASSESSMENT



PEL 1 Seismic Line Flora and Fauna Assessment

Santos Limited

DOCUMENT TRACKING

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Template 2.8.1

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Abbreviations

Abbreviation	Description
BAM	Biodiversity Assessment Method
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BS Act	Commonwealth <i>Biosecurity Act 2015</i>
CEEC	Critically Endangered Ecological Community
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DotE	Commonwealth Department of the Environment
EEC	Endangered Ecological Community
ELA	Eco Logical Australia
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FFA	Flora and Fauna Assessment
FM Act	NSW <i>Fisheries Management Act 1994</i>
LEP	Local Environmental Plan
LGA	Local Government Authority
LLS	Local Land Services
MNES	Matters of National Environmental Significance
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
PEL	Petroleum Exploration Lease
TSC Act	NSW <i>Threatened Species Conservation Act 1995</i>

Executive Summary

Eco Logical Australia (ELA) was engaged by Santos Limited to undertake a Flora and Fauna Assessment (FFA) along a series of seismic lines (totally approximately 63 km) within Petroleum Exploration Lease (PEL) 1.

The FFA was undertaken in accordance with Part 5 of the NSW *Environmental Planning and Assessment Act* (EP&A Act), as per the requirements of Part 7 of the NSW *Biodiversity Conservation Act 2016* (BC Act). The FFA comprised an assessment of the biodiversity values which may be impacted by the proposed activity, identified through a comprehensive data audit and ecological field survey. The data audit included searches of the relevant threatened species registers. The field survey included vegetation validation to delineate vegetation communities and inform vegetation mapping, Biodiversity Assessment Method (BAM) plots to assign Plant Community Types (PCTs) and identify Threatened Ecological Communities (TECs), and opportunistic fauna surveys.

The impacts of the seismic testing activity include slashing of ground layer vegetation and pruning of overhead branches within 3 m of the road side edge to allow access of seismic testing vehicles where required. Within a 1.5m buffer (total 3m wide footprint) of this seismic line, there is unlikely to be any impacts to native vegetation as works will be conducted within cleared areas.

The field surveys identified up to 9 ha of native vegetation in proximity to the proposed works, including sections which meet the listing criteria for Endangered Ecological Communities (EEC) under the BC Act and Critically Endangered Ecological Communities (CEEC) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is acknowledged that this upper limit is an overestimate and is more than double the required amount, as works will be undertaken only on one side of the road.

The field surveys identified nine Plant Community Types (PCTs) present within the Subject Site:

1. PCT 27 – Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion
2. PCT 81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion
3. PCT 101 – Poplar Box – Yellow Box – Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion
4. PCT 102 – Liverpool Plains grassland mainly on basaltic black earth soils, Brigalow Belt South Bioregion
5. PCT 281 – Rough-barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion
6. PCT 433 – White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool plains sub-region, BBS Bioregion
7. PCT 435 – White Box – White Cypress Pine shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion
8. PCT 459 – Narrow-leaved Ironbark – Black Cypress Pine – White Box shrubby woodland in sedimentary hills of the Gunnedah region, Brigalow Belt South Bioregion

9. PCT 599 – Blakely’s Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion.

Four threatened flora species were identified from the data audit as known, likely or having the potential to occur within the Subject Site. Thirty (30) threatened fauna species were identified from the data audit as known, likely or having the potential to occur within the Subject Site, with one of these identified and confirmed during the field survey (*Phascolarctos cinereus* (Koala)).

Assessments of significance were completed for the threatened species and communities identified as known, likely or having the potential to be impacted by the proposed activity, in accordance with s7.3 of the BC Act and Commonwealth significant impact criteria in accordance with the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (Department of the Environment, 2013). It was concluded that the proposed activity would not result in significant impacts to any threatened species, population or ecological community listed under the BC Act and/or the EPBC Act.

1. Introduction

1.1 Project Description

Eco Logical Australia Pty Ltd (ELA) was engaged by Santos Limited to undertake a Flora and Fauna Assessment (FFA) along a series of seismic lines (totally approximately 63 km) within Petroleum Exploration Lease (PEL) 1 (herein referred to as the Subject Site) (**Figure 1**).

This FFA has been undertaken to identify the biodiversity values which will be potentially impacted by the proposed seismic lines within the Subject Site. It includes an assessment of flora and fauna including threatened species, populations, and ecological communities, and provides recommendations for mitigation and / or remediation of impacts.

1.2 Study Area

PEL 1 is located approximately 13 km south of Gunnedah, NSW. In the Gunnedah Shire Council Local Government Area (LGA), as shown in **Figure 1**. PEL 1 is held by Santos Limited.

The seismic line exploration area comprises approximately 63 km. The proposed activity will be carried out primarily within the road corridor within the available road shoulder, with a potential temporary impact involving slashing and seismic testing 3 m on one side of the road. Sections of the seismic line may require slashing of roadside vegetation and trimming of overhead branches that are less than 10 cm diameter (within 3 m of the road). Importantly, the proposed activity will not involve removal of native tree species, hollow bearing trees or stags.

Whilst the majority of the proposed activity will take place within the road corridor, with a potential disturbance footprint 3 m either side of the road, the Study Area was extended to 50m either side of the Subject Site, to allow for a comprehensive assessment of biodiversity values.

1.3 Report Objectives

The aims of this report are to:

- Report on the ecological values present within the Study Area
- Assess the impact of the proposed activity on threatened species, populations and ecological communities listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) that occur or are likely to occur within the Study Area.

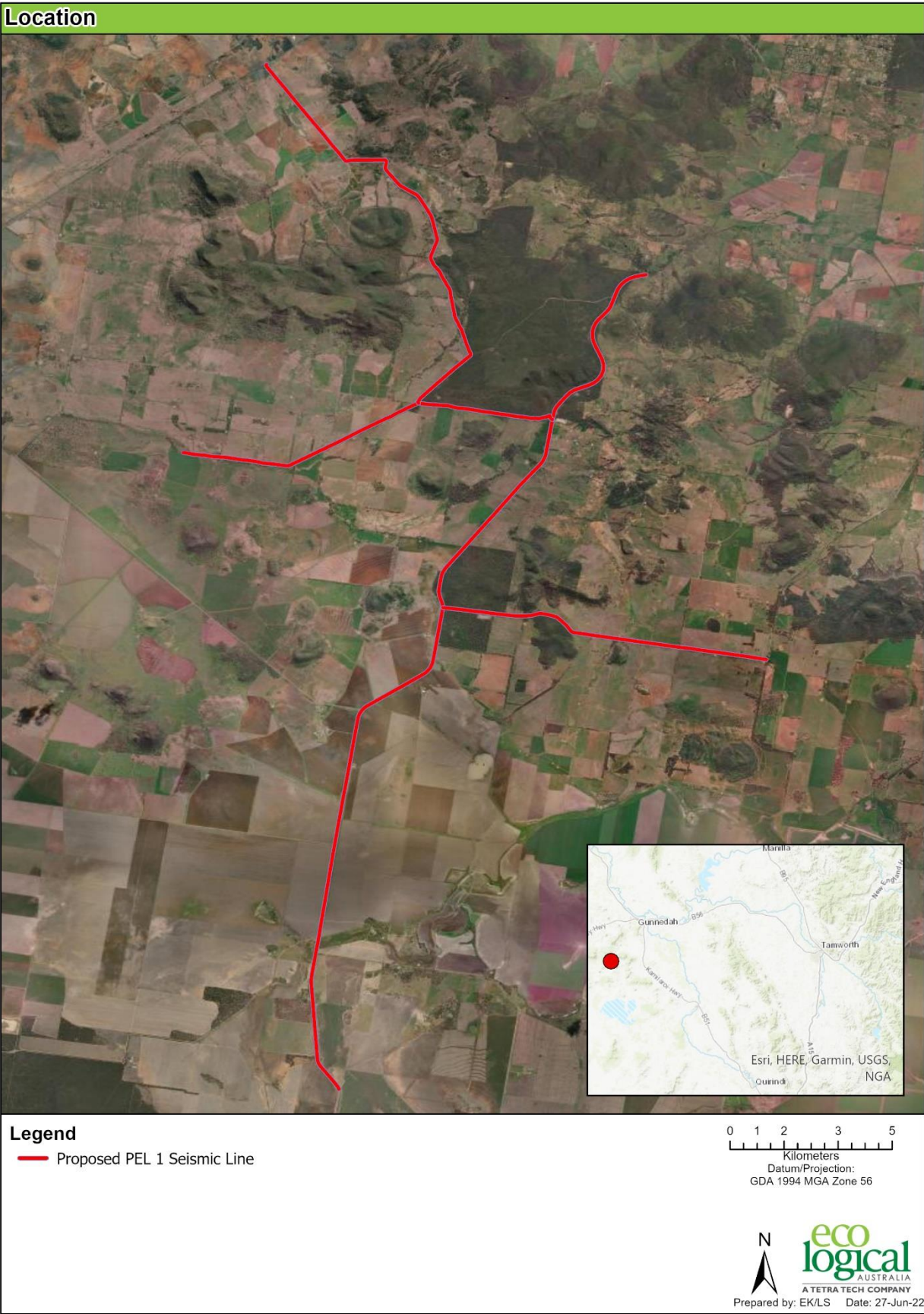


Figure 1: Location of the Study Area

1.4 Legislative context

The proposed seismic testing activity is assessed under the State Environmental Planning Policy (Resources and Energy) 2021 (Resources and Energy SEPP), which requires a Part 5 assessment under the NSW Environmental Planning and Assessment Act (EP&A Act).

State Environmental Planning Policy (Resources and Energy) 2021 provides that mineral exploration (and fossicking) is development permissible without consent and is therefore subject to assessment under part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Table 1: Legislation relevant to the proposed activity

Name	Relevance to the project
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)	<p>The EPBC Act establishes a process for assessing the environmental impact of activities and developments where ‘matters of national environmental significance’ (MNES) may be affected. Under the Act, any action which “has, will have, or is likely to have a significant impact on a matter of national environmental significance” is defined as a “controlled action”, and requires approval from the Commonwealth Department Agriculture, Water and the Environment (DAWE) responsible for administering the EPBC Act. Threatened species, populations and ecological communities listed under the EPBC Act are MNES, as well as Wetlands of International Importance, the Commonwealth marine environment, national and world heritage properties and nuclear actions. Specific ‘Significant Impact Criteria’ are provided for each MNES.</p> <p>MNES have been identified as occurring or having potential to occur within the Study Area. This report has assessed the impact of the proposed seismic exploration on MNES and concludes that the proposed seismic exploration is unlikely to have an impact on MNES.</p>
<i>Environmental Planning and Assessment Act 1979</i> (EP&A Act)	<p>Petroleum exploration activity is assessed under Part 5 of the EP&A Act. Part 5 of the EP&A Act applies to activities requiring consent. A determining authority must consider to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity. Where relevant, assessments of significance for impacts to threatened species and endangered ecological communities (EECs) must be prepared in accordance with Part 5 of the EP&A Act and the report addresses the relevant requirements of s228 of the <i>Environmental Planning and Assessment Regulation 2000</i></p>
<i>Biodiversity Conservation Act 2016</i> (BC Act)	<p>The BC Act contains provision relating to threatened species and ecological communities’ listings and assessment repealing the <i>Threatened Species Conservation Act 1995</i> (TSC Act) and Section 5A of the EP&A Act. The <i>Biodiversity Conservation Regulations 2017</i> supports the Act.</p> <p>Under Part 7, division 1 of the BC Act, the test of significance is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. This test has been applied to ecological communities and species listed under the BC Act that are considered to be potentially impacted by the proposal.</p> <p>Thirty-seven (37) threatened entities listed under the BC Act have the potential to occur on or near the Study Area. This report has assessed impacts to these species or communities and concludes that the proposed activity is not likely to have an impact upon these species or their habitat.</p>
<i>Fisheries Management Act 1994</i> (FM Act)	<p>The FM Act provides for the protection, conservation, and recovery of threatened species defined under the FM Act. It also makes provision for the management of threats to aquatic threatened species, populations and ecological communities defined under the FM Act, as well as the protection of fish and fish habitat in general.</p> <p>The proposed seismic exploration does not involve impacts to Key Fish Habitat, does not involve harm to marine vegetation, dredging, reclamation or obstruction of fish passage. A permit or consultation under the FM Act is not required.</p>

Name	Relevance to the project
<p><i>Biosecurity Act 2015</i> (BS Act)</p>	<p>The <i>Biosecurity Act 2015</i> provides the framework for the prevention, elimination and minimization of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carries, and other activities that involve biosecurity matter, carriers or potential carriers. Whilst the Act provides for all biosecurity risks, implementation of the Act for weeds is supported by Regional Strategic Weed Management Plans developed for each region in NSW. Appendix 1 of the North West Regional Strategic Weed Management Plan 2017 - 2020 identifies the priority weeds for control at a regional scale for the proposed seismic exploration (North West LLS 2017).</p> <p>Two state priority weeds were identified within the Study Area:</p> <ul style="list-style-type: none"> • <i>Opuntia aurantiaca</i> • <i>Opuntia tomentosa</i>
<p>State Environmental Planning Policy (Resources and Energy) 2021 (Resources and Energy) 2021 (Resources and Energy SEPP)</p>	<p>State Environmental Planning Policy (Resources and Energy) 2021 provides that mineral exploration (and fossicking) is development permissible without consent and is therefore subject to assessment under part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act).</p>

2. Methods

2.1 Literature and data review

A literature review and data audit were undertaken to identify the potential presence of any threatened species, populations and ecological communities listed under the NSW *Biodiversity Conservation Act 2016* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* likely to be present within the Study Area. The following databases were reviewed prior to conducting the field surveys:

- EPBC Act protected matters search, for Matters of National Environmental Significance using a radius of 10 km around the Subject Site, at coordinates North: -30.93, East: 150.31, South: -31.40, West: 149.93 (DAWE 2020a)
- BioNet (Wildlife Atlas) search for threatened species/populations listed under the NSW BC Act previously recorded within 10 km radius around Subject Site at coordinates North: -30.93, East: 150.31, South: -31.40, West: 149.93 (OEH 2020a).
- Gunnedah Shire Council Local Environmental Plan (LEP) 2012
- NSW Threatened Species Profiles (OEH 2020b)
- Commonwealth Department of Agriculture, Water and the Environment (DAWE 2020b) Species Profile and Threats Database.

Aerial photography of the Study Area and surrounds were also used to investigate the extent of native vegetation cover and landscape features in the Study Area. Species searches from both the NSW BioNet Atlas and EPBC Protected Matters search were combined to produce a list of threatened species, populations and ecological communities that may occur within the Study Area. **Appendix A** identifies the threatened species returned by the data audit together with an assessment of the likelihood of occurrence for each species within the Study Area. Likelihood of occurrence was determined for each species by reviewing the records of previous observations in the area, and consideration of species ecology and habitat availability.

Five terms for the likelihood of occurrence of species are used, as defined below:

- “yes” = the species was or has been observed on the site
- “likely” = a medium to high probability that a species uses the site
- “potential” = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely, or unlikely to occur
- “unlikely” = a very low to low probability that a species uses the site
- “no” = habitat on site and in the vicinity is non-existent or unsuitable for the species

2.2 Field survey

A three-day field survey was undertaken from 4th November to 6th November 2020 by ELA Senior Ecologist Nicole McVicar and ELA Ecologist Elise Keane. The survey involved traversing the entire Study Area to:

- Validate and map the extent and condition of vegetation communities. Vegetation communities were identified and delineated using rapid assessment points
- One vegetation integrity plot per vegetation community, following vegetation integrity plot methodology in accordance with the Biodiversity Assessment Method (BAM) Study Area. Vegetation integrity plot data was used to assign PCTs in accordance with the PCT criteria set out in the VIS database (DPIE 2020b)
- Determine whether the PCTs identified meet the listing criteria of Endangered Ecological Community (EEC) under the BC Act and/or Critically Endangered Ecological Community (CEEC) under the EPBC Act.
- Identify and record potential habitat for threatened flora and fauna listed under the BC Act and the EPBC Act.
- Observe and record opportunistic fauna observations

The field survey included Milroy Road, traversing through Wondoba State Conservation Area. This section has been excluded from the final assessment in order to avoid any potential impacts in this area.

Whilst the majority proposed activity will take place within the road corridor, with a potential disturbance footprint 3 m on one side of the road, the Study Area was extended to 50m either side of the Subject Site, to allow for more information in order to assign PCTs. The field survey effort is shown in **Figure 2**.

No formal fauna surveys were undertaken for this assessment.

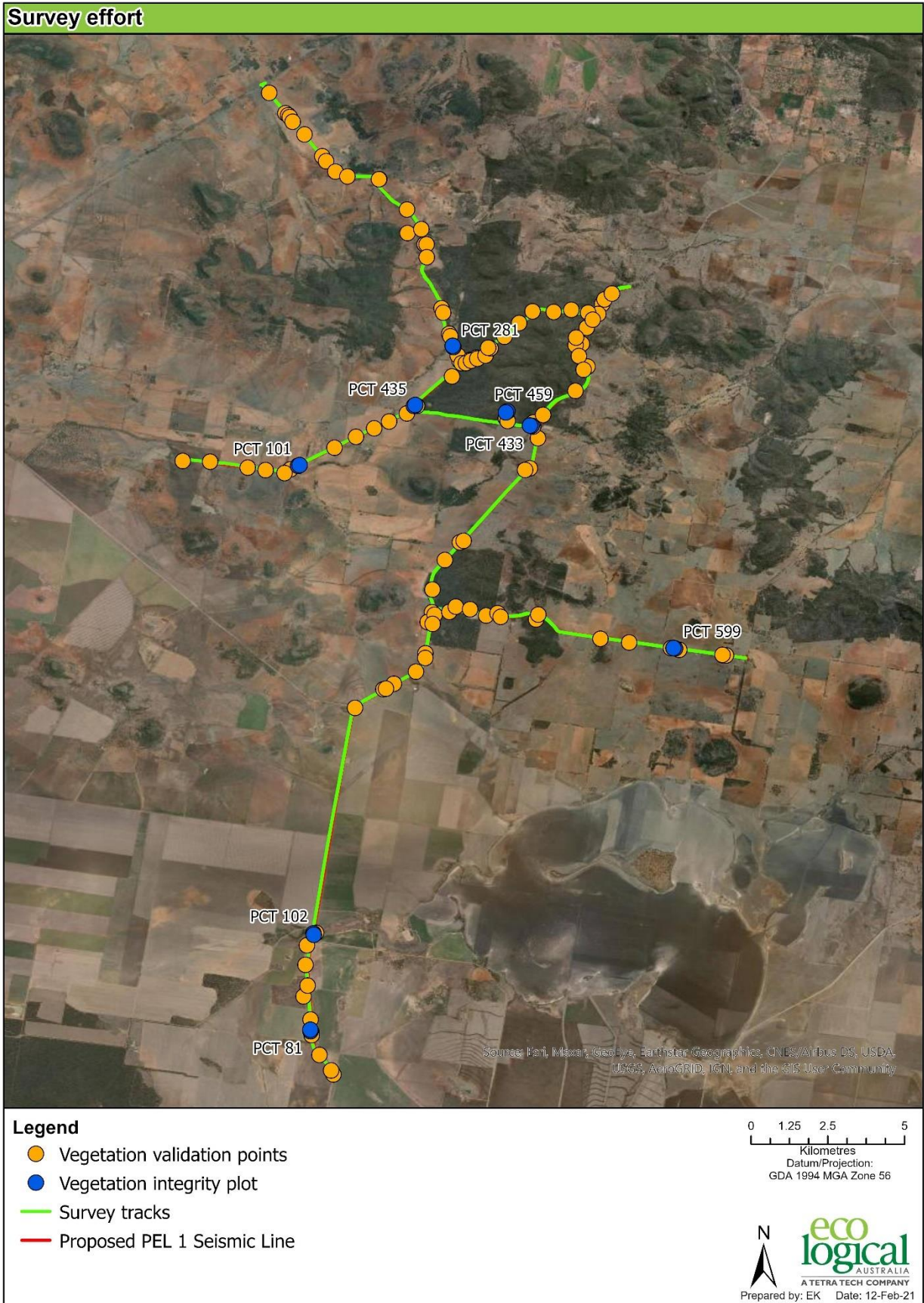


Figure 2: Field survey effort

2.3 Native vegetation mapping and impact calculations

Vegetation mapping was undertaken in ESRI ArcGIS Pro utilising field vegetation validation and vegetation integrity data, and aerial imagery. Vegetation mapping included the existing road corridor which was interpreted from aerial imagery.

Likely vegetation impacts were calculated by buffering the proposed seismic testing line to 6 m (3 m either side of the seismic testing line), and clipping the vegetation mapping within the buffered seismic testing line. This approach provides a realistic estimation of impact area, however does not account for the full potential impact of slashing within 3 m on one side of the road only. This impact area is therefore more than double the final impacts of the proposal.

The seismic testing line is based on the road centreline, however due to inaccuracies (+/- 10 m) in the location of the seismic testing line in relation to the actual road centreline, the seismic testing line may appear to traverse through roadside vegetation in some areas. However, seismic testing will be restricted to the road corridor and within 3 m from the road edge, therefore impact calculations are acknowledged to be overestimated and should be considered as double the maximum upper limit.

2.4 Impact Assessment – BC Act listed species

Under Section 7.3 of the NSW BC Act, an assessment of significance of impacts is required for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats.

A likelihood of occurrence assessment was undertaken for each species, population and ecological community and is provided in **Appendix A**. An Assessment of Significance under the BC Act was undertaken for species with a likelihood of occurrence of “yes”, “likely” and “potential”, and is detailed in **Appendix B**.

2.5 Impact Assessment – EPBC Act listed species

The EPBC Act Administrative Guidelines on Significance sets out ‘Significant Impact Criteria’ that are to be used to assist in determining whether a proposed action is likely to have a significant impact on Matters of National Environmental Significance (MNES). Matters listed under the EPBC Act as being of national environmental significance are as follows:

- Listed threatened species and ecological communities
- Listed migratory species
- Wetlands of International Importance
- The Commonwealth marine environment
- World Heritage properties
- National heritage places
- Nuclear actions

Specific ‘Significant Impact Criteria’ are provided for each MNES above, and with separate criteria provided for species listed as endangered, vulnerable and migratory (within the ‘listed threatened species and ecological communities’ matter).

The EPBC Act Significant Impact Criteria assessment completed for the exploration program are found in **Appendix C**.

2.6 Limitations

This assessment was not intended to provide an inventory of all species present across the Study Area, but instead an overall assessment of the ecological values of the Study Area with particular emphasis on endangered ecological communities. It is important to note that some threatened species may not have been detected in the Study Area during the inspection as they may be cryptic or seasonal and only detectable during flowering or during breeding. Whilst the survey was undertaken during the period recommended for *Dichanthium setosum* and *Tylophora linearis*, targeted surveys were unable to be undertaken for these species. Therefore, the likelihood of occurrence for threatened species has been assessed based on the presence of potential habitat.

Field survey was undertaken using ESRI Collector and a hand-held GPS unit. It is noted that these units can have errors in accuracy of approximately 10 m (subject to availability of satellites on the day).

Changes to the alignment, scope and/or methodology may require a reassessment of potential impacts, both direct and indirect and a revision of this FFA.

3. Results

3.1 Literature and data review

The literature and database review, including the results of the BioNet database and EPBC Act Protected Matters Search Tool, identified 11 EECs/CEECs, 54 threatened fauna species, and nine threatened flora species with the potential to occur within a 10 km radius of the Study Area. Each of these were assessed for likelihood of occurrence, incorporating the results of the field survey and assessment of potential habitat within the Subject Site. The list was refined to 37 threatened species or communities that are likely or with the potential to occur within the Subject Site.

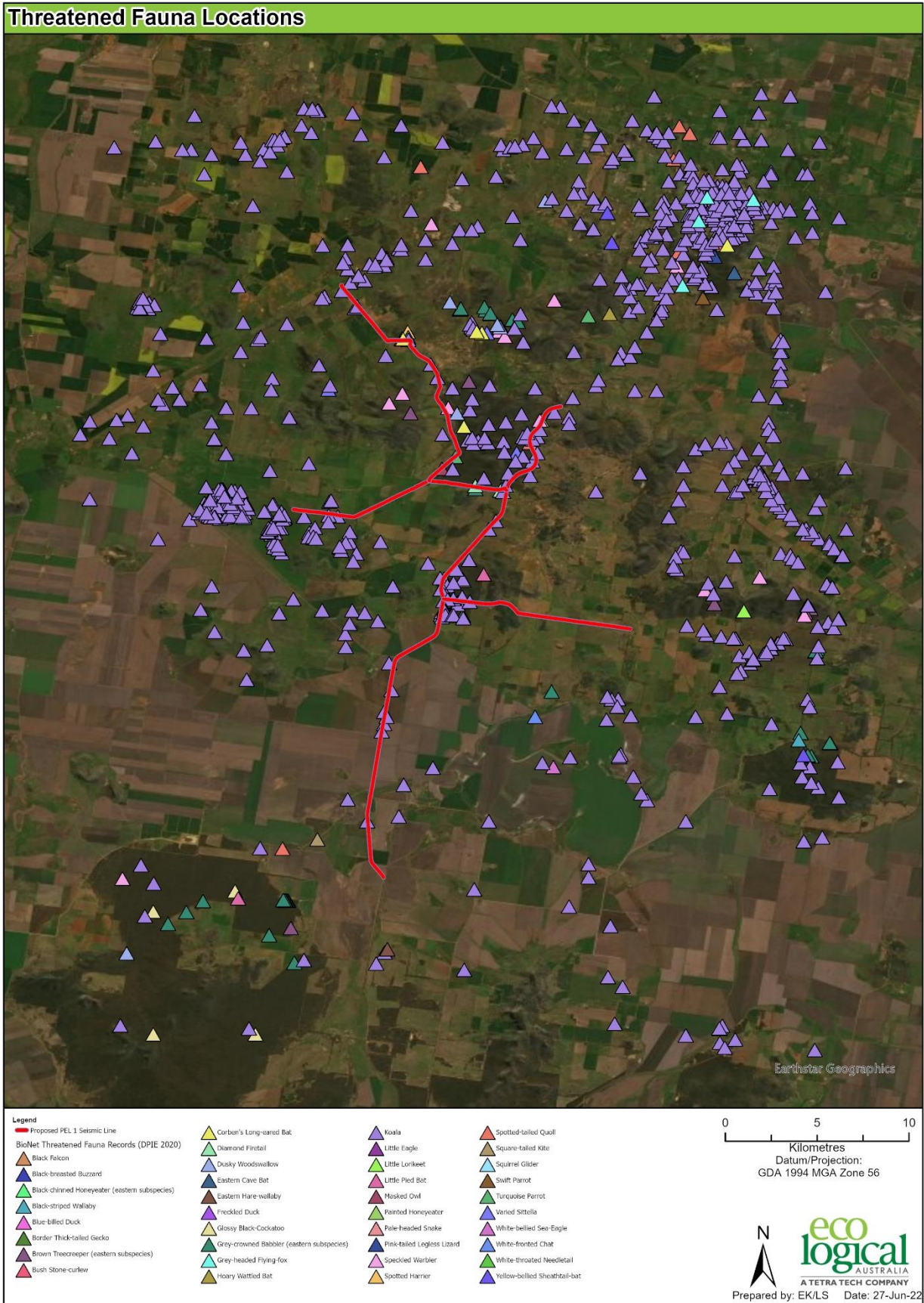


Figure 3: Location of threatened fauna within 10 km of the Study Area



Figure 4: Location of threatened flora within 10 km of the Study Area

3.2 Vegetation communities

The Subject Site (3 m buffer) contains 9 ha mapped as native vegetation, including nine Plant Community Types (PCT) and 27.88 ha of exotic vegetation/cleared areas (Table 2). A breakdown of potential impact areas for each PCT is provided in Table 2. **Figure 5** to **Figure 12** display the distribution and extent of PCTs in the Study Area.

Table 2: Area of each vegetation community to be disturbed

Vegetation Communities	Likely Study Area impact (ha) (3 m buffer)	BC Act	EPBC Act
PCT 27 – Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	0		
PCT 81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	0.07	EEC	EEC
PCT 101 – Poplar Box – Yellow Box – Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion	0.25		
PCT 102 – Liverpool Plains grassland mainly on basaltic black earth soils, Brigalow Belt South Bioregion	0.98	EEC	
PCT 281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	0.06	CEEC	CEEC
PCT 433 – White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool plains sub-region, BBS Bioregion	3.22	CEEC	CEEC
PCT 435 – White Box – White Cypress Pine shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion	4.33	CEEC	CEEC
PCT 459 – Narrow-leaved Ironbark – Black Cypress Pine – White Box shrubby woodland in sedimentary hills of the Gunnedah region, Brigalow Belt South Bioregion	0.16		
PCT 599 – Blakely’s Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	0.95	CEEC	CEEC
Cleared/exotic	27.88		
Total native vegetation	9		
Total Area	37.89		



Figure 5: Vegetation Mapping of proposed PEL 1 Seismic Line

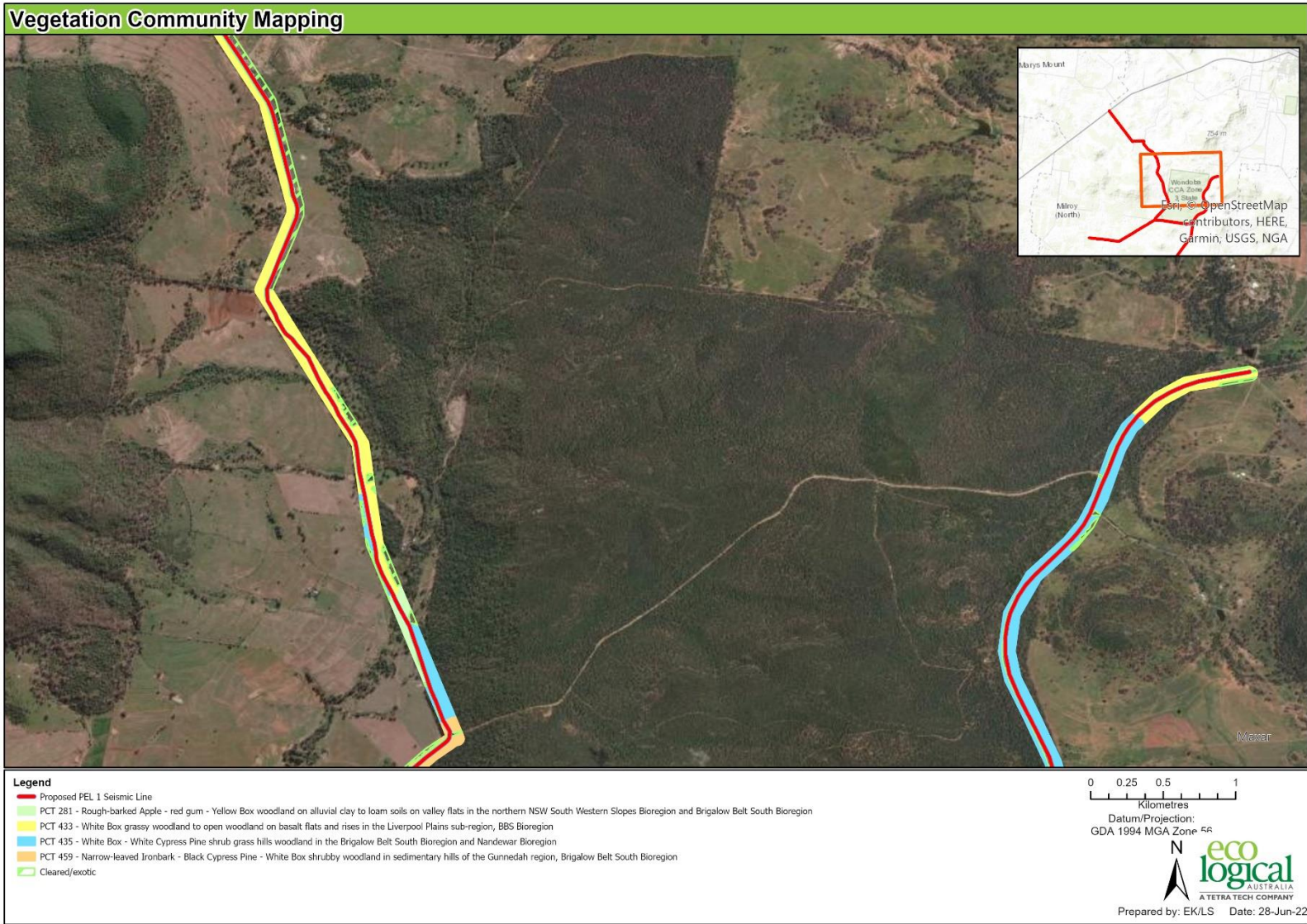


Figure 6: Vegetation Mapping of proposed PEL 1 Seismic Line

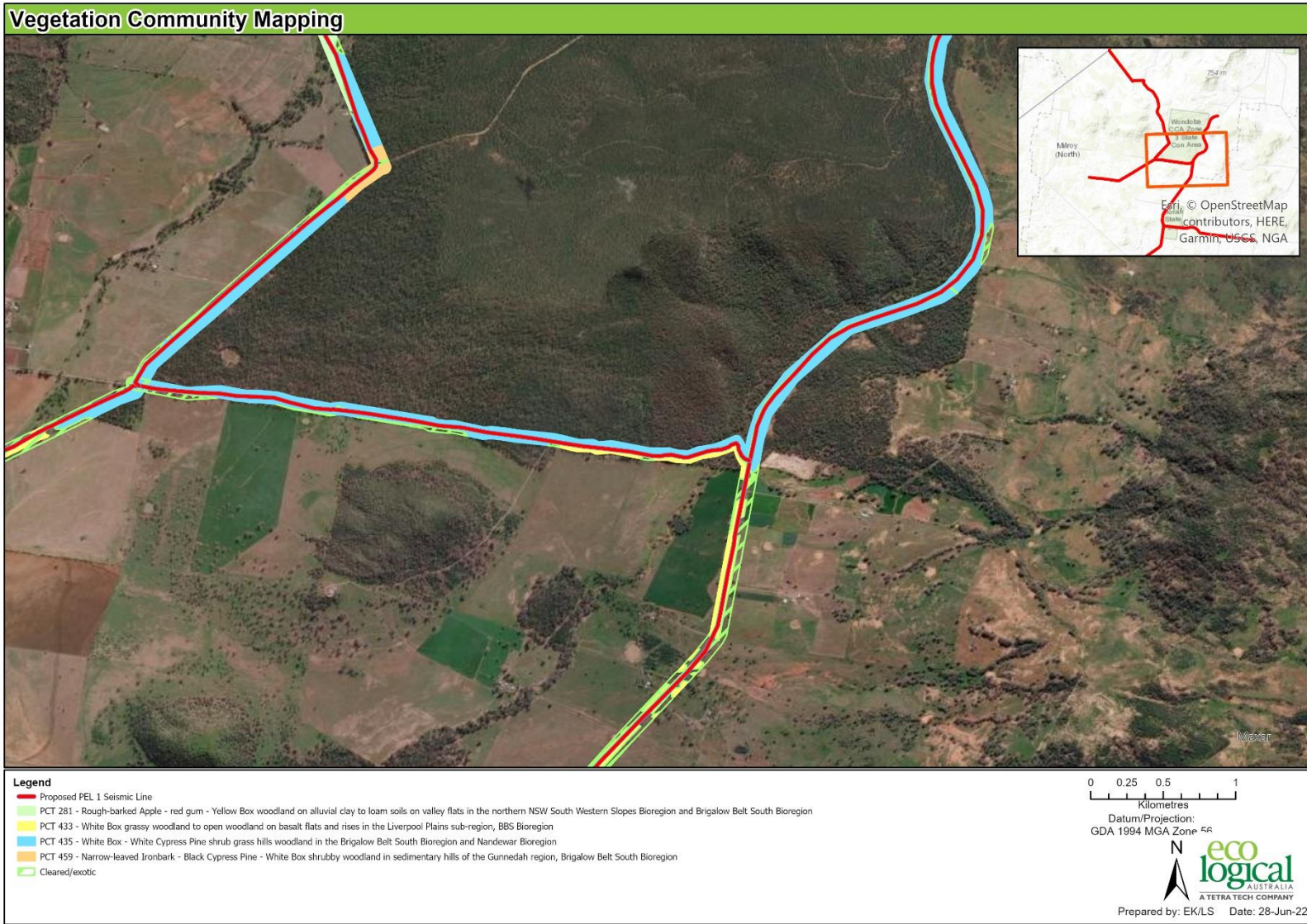


Figure 7: Vegetation Mapping of proposed PEL 1 Seismic Line

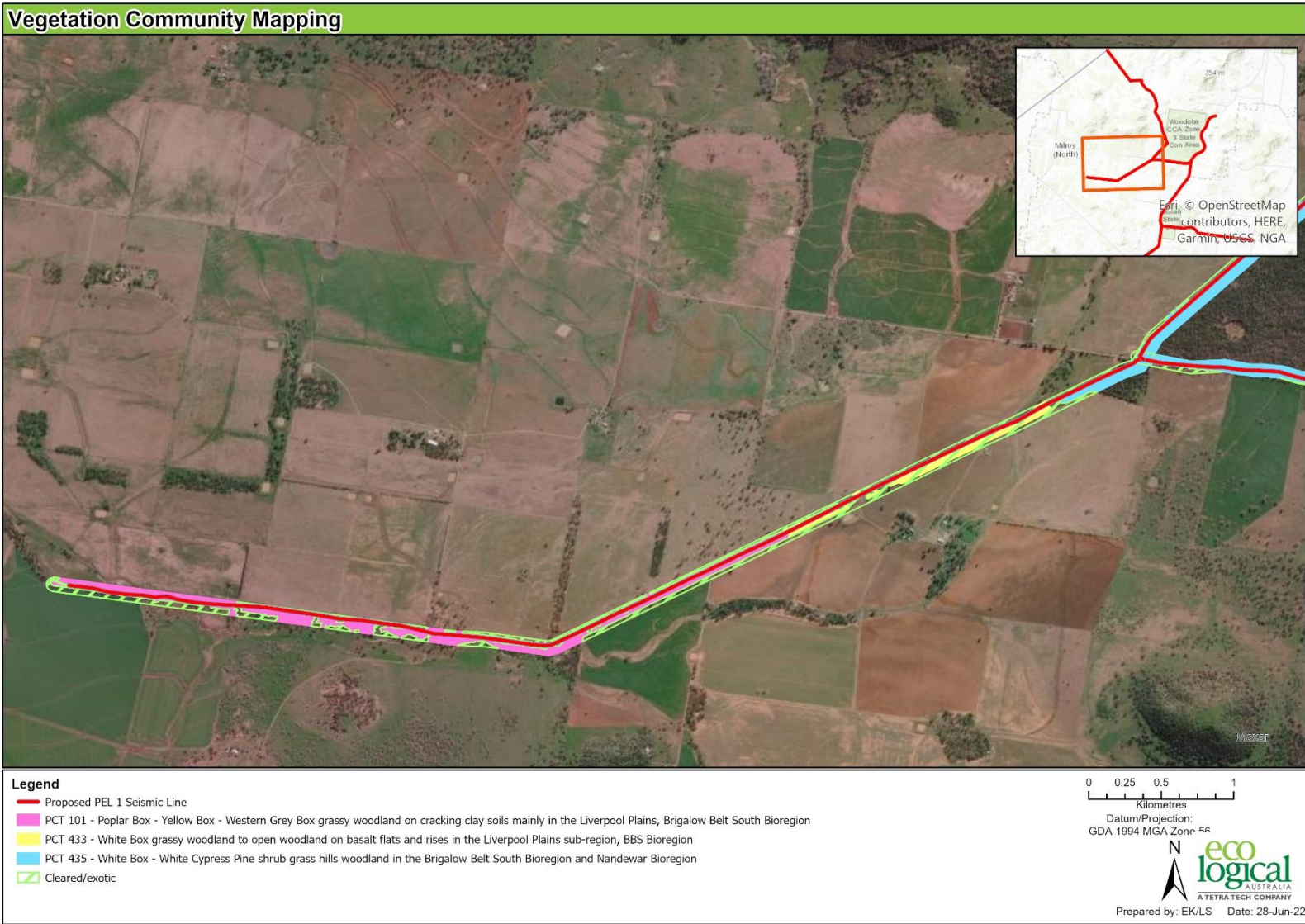


Figure 8: Vegetation Mapping of proposed PEL 1 Seismic Line

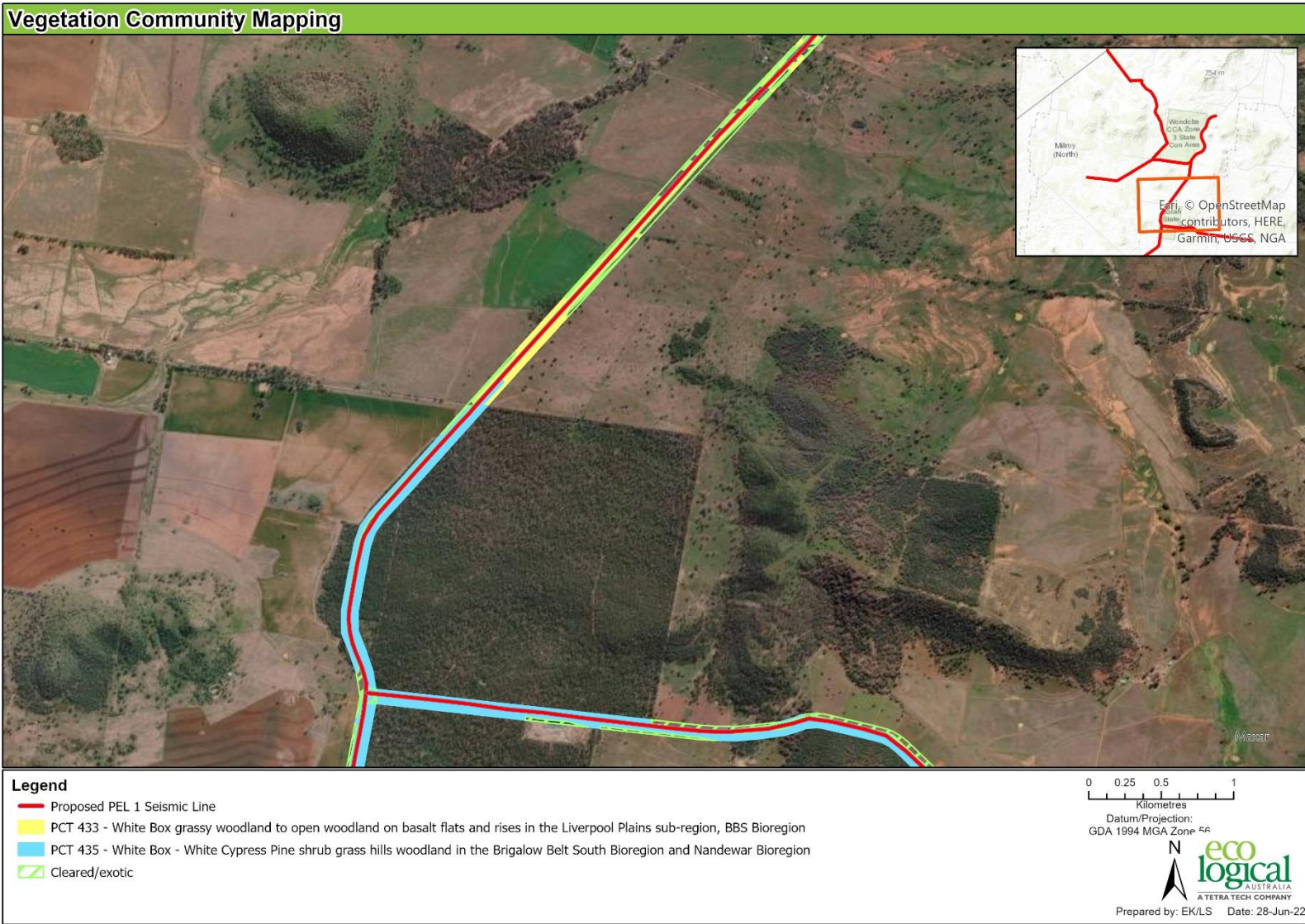


Figure 9: Vegetation Mapping of proposed PEL 1 Seismic Line



Figure 10: Vegetation Mapping of proposed PEL 1 Seismic Line



Figure 11: Vegetation Mapping of proposed PEL 1 Seismic Line

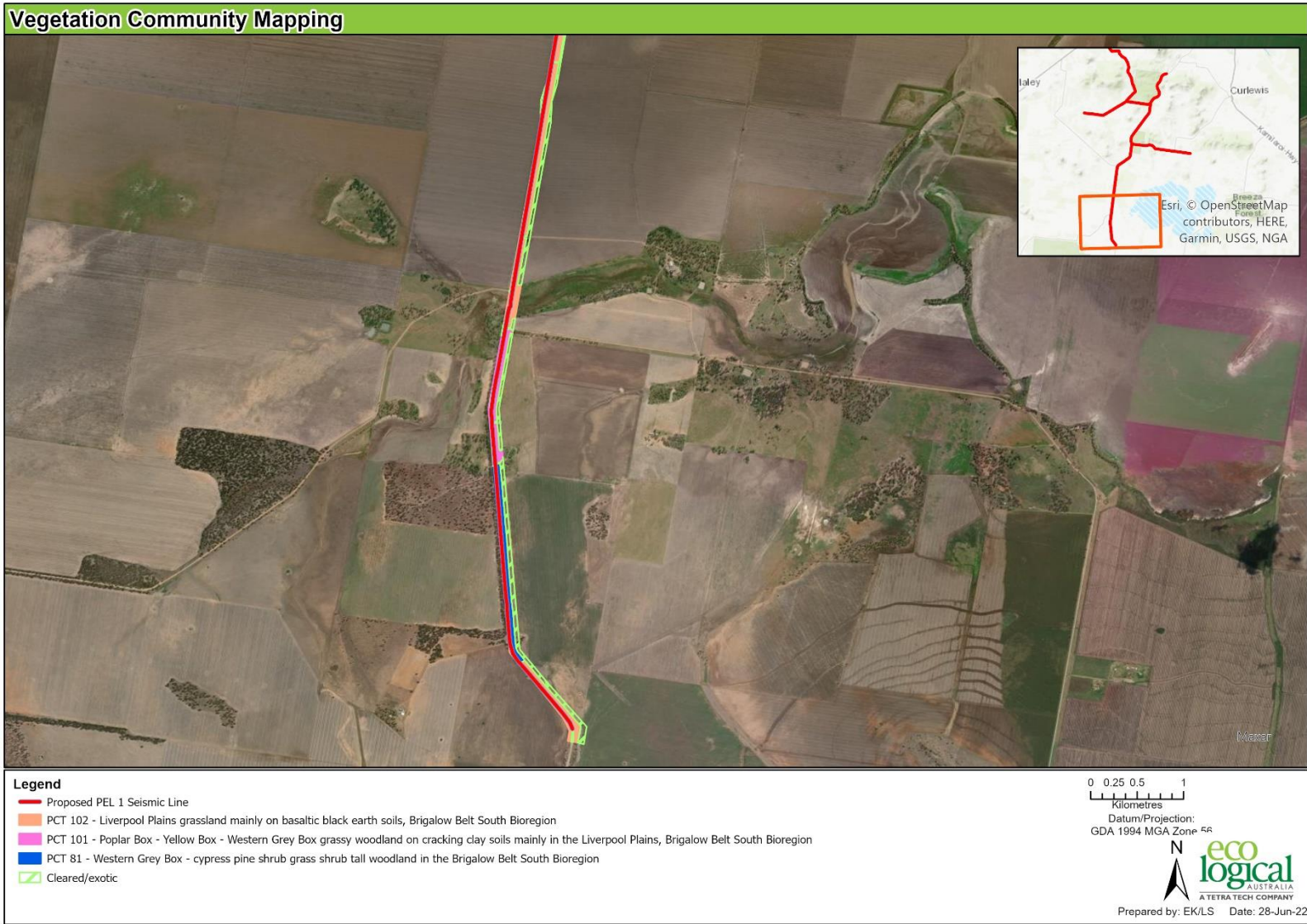


Figure 12: Vegetation Mapping of proposed PEL 1 Seismic Line

3.2.1 Vegetation community descriptions

3.2.2 PCT 27 - Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion

Within the Study Area PCT 27 is dominated by *Acacia pendula* (Weeping Myall). The PCT within the Study Area was highly disturbed, with an exotic dominated ground layer, including *Lolium rigidum* (Wimmera Ryegrass) and *Avena barbata* (Bearded Oats), with no other shrubs present (**Figure 13**).

PCT 27 is listed under the BioNet Vegetation Classification as comprising part of the NSW *Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions*. PCT 27 within the Study Area does not conform to this listed EEC as the site is dominated by exotic species within the understorey. PCT 27 is also listed as comprising part of the NSW *Artesian Springs Ecological Community in the Great Artesian Basin*. PCT 27 within the Study Area does not conform to this listed EEC as there were no Artesian Spring present within the Study Area, and the ground layer was dominated by exotic grasses.

PCT 27 is listed as part of the *Weeping Myall Woodland* EEC under the EPBC Act (DotE 2020a). However, the Study Area does not conform to the listed EPBC Act CEEC, as it is not predominately native understorey (i.e. there was less than 50% of perennial native vegetation groundcover).



Figure 13: PCT 27 within the Study Area

3.2.3 PCT 81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion

PCT 81 was selected based on the dominant canopy species of *Eucalyptus microcarpa* (Western Grey Box) (**Figure 14**). The mid-storey was absent within this PCT in the Study Area. Dominant ground

stratum included *Carex inversa*, *Enteropogon acicularis*, *Calotis lappulacea* (Yellow Burr-daisy), *Craspedia canens* (Grey Billy-buttons), *Einadia polygonoides*, *Euchiton involucratus* (Star Cudweed), and exotic grasses including *Lolium perenne* (Perennial Ryegrass) and *Lolium rigidum* (Wimmera Ryegrass).

PCT 81 is listed under the BioNet Vegetation Classification as comprising part of the *NSW Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions EEC* (NSW Scientific Committee, 2020). Justification of including PCT 81 as conforming to the listed community is due to the following:

- The site is within the Brigalow Belt South Bioregion
- *Eucalyptus microcarpa* was the dominant overstorey species
- A variable ground layer of grass and herbaceous species was present, and the shrub layer was absent

PCT 81 is also listed as part of the *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia EEC* under the EPBC Act (DotE 2020b). However, the Study Area does not conform to the listed EPBC Act EEC community, as it is not predominately native understorey (i.e. there was less than 50% of perennial native vegetation groundcover).



Figure 14: PCT 81 within the Study Area

3.2.4 PCT 101 – Poplar Box – Yellow Box – Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion

PCT 101 was selected based on the dominant canopy species which included *Eucalyptus populnea* subspecies *bimbil* (Bimble Box) and *Callitris glaucophylla* (White Cypress Pine) (Figure 15). The mid-storey was dominated by *Geijera parviflora* (Wilga) and *Myoporum montanum* (Western Boobialla), with

the dominant ground stratum including *Austrostipa verticillata* (Slender Bamboo Grass), *Carex inversa*, *Cheilanthes sieberiana* subspecies *sieberi* (Poison Rock Fern), *Cyperus gracilis* (Slender Flat-sedge) and *Einadia hastata* (Berry Saltbush).

PCT 101 is listed under the BioNet Vegetation Classification as comprising part of the NSW *Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions EEC* under the BC Act (NSW Scientific Committee, 2020). PCT 101 within Study Area does not conform to this listed EEC community, as there was no *Acacia harpophylla* recorded within this vegetation community in the Study Area. PCT 101 is also listed as comprising part of the NSW *Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penneplain, Nandewar and Brigalow Belt South Bioregions EEC*. This PCT within the Study Area does not conform to this listed EEC community, as *E. microcarpa* was not the most characteristic species within this community in the Study Area.

PCT 101 is listed as part of the *White Box Yellow Box Blakely's Red Gum Woodland CEEC* under the EPBC Act (DotE 2020c). However, the Study Area does not conform to this listed CEEC community, as the community was not dominated or co-dominated by *Eucalyptus albens*, *Eucalyptus melliodora*, or *Eucalyptus blakelyi*.



Figure 15: PCT 101 within the Study Area

3.2.5 PCT 102 – Liverpool Plains grassland mainly on basaltic black earth soils, Brigalow Belt South Bioregion

Within the Study Area, PCT 102 was in a highly degraded form, with a mix of native and exotic ground stratum species (**Figure 16**). Dominant ground cover species included *Austrostipa aristiglumis* (Plains Grass), *Lachnagrostis filiformis* and *Carex inversa*, as well as the exotic species *Lolium rigidum* (Wimmera Ryegrass) and *Phalaris aquatica* (Phalaris).

PCT 102 is listed under the BioNet Vegetation Classification as comprising of the NSW *Native Vegetation on Cracking Clay Soils of the Liverpool Plains EEC* (NSW Scientific Committee, 2020). Justification of including PCT 102 as conforming to the listed community is due to the following:

- The site is in the Brigalow Belt South Bioregion
- The site has native species, including *Austrostipa aristiglumis*, in the ground cover and although is currently dominated by exotic species, is likely to be dominated by native species under appropriate management.

PCT 102 is also listed as the CEEC *Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland* under the EPBC Act (DotE 2020d). However, the Study Area does not conform to the listed CEEC community because of the following:

- There are less than three perennial native grass indicator species present
- Perennial non-woody introduced species make up more than 30% of the total perennial projected foliage cover



Figure 16: PCT 102 within the Study Area

3.2.6 PCT 281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion

PCT 281 was selected based on the dominant canopy species which included *Eucalyptus blakelyi* (Blakely's Red Gum), *Angophora floribunda* (Rough-barked Apple) and regenerating *Brachychiton populneus* (Kurrajong) (Figure 17). The mid-storey was dominated by *Bursaria spinosa* (Blackthorn), *Dodonaea viscosa* (Sticky Hop-bush), *Geijera parviflora* (Wilga), and *Notelaea microcarpa* (Native Olive),

with the dominant ground stratum including *Austrostipa scabra* (Speargrass), *Anthosachne scabra* (Wheatgrass), *Cyperus gracilis* (Slender Flat-sedge) and *Dichondra repens* (Kidney Weed).

PCT 281 is listed under the BioNet Vegetation Classification as comprising of the NSW *White Box-Yellow Box-Blakely's Red Gum Woodland EEC* (NSW Scientific Committee, 2020). Justification of including PCT 281 as conforming to the listed community is due to the following:

- The site is in the Brigalow Belt South Bioregion
- *Eucalyptus blakelyi* is present within the Study Area
- The site is dominated by native species in the understorey

PCT 281 is also listed as the CEEC *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* under the EPBC Act (DotE 2020c). Justification of including PCT 281 as conforming to the listed community is due to the following:

- The ecological community was dominated by *Eucalyptus blakelyi*
- The site had a predominantly native understorey, with more than 50% of the perennial vegetation ground layer comprising of native species.
- The site contained greater than 12 native understorey species (excluding grasses), including greater than one important species as listed in Appendix 1 of the National Recovery Plan for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland (DECCW 2010).



Figure 17: PCT 281 within the Study Area

3.2.7 PCT 433 – White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool plains sub-region, BBS Bioregion

PCT 433 was selected based on the dominant canopy species of *Eucalyptus albens* (White Box) and *Brachychiton populneus* (Kurrajong) (**Figure 18**). The mid-storey was dominated by *Geijera parviflora* (Wilga) and *Notelaea microcarpa* (Native Olive), with the dominant ground stratum including *Dichondra repens* (Kidney Weed), *Swainsona galegifolia* (Smooth Darling-pea), *Vittadinia cuneata* (Fuzzweed), *Calotis lappulacea* (Yellow Burr-daisy), *Desmodium brachypodum* (Large Tick-trefoil) and *Einadia hastata* (Berry Saltbush).

PCT 433 is listed under the BioNet Vegetation Classification as comprising part of the NSW *White Box-Yellow Box-Blakely's Red Gum Woodland EEC* (NSW Scientific Committee, 2020). Justification of including PCT 433 as conforming to the listed community is due to the following:

- The site is in the Brigalow Belt South Bioregion
- *Eucalyptus albens* is the dominant canopy species
- The site is dominated by native species in the understorey

PCT 433 is also listed as the CEEC *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* under the EPBC Act (DotE 2020c). Justification of including PCT 433 as conforming to the listed community is due to the following:

- The ecological community was dominated by *Eucalyptus albens*
- The site had a predominantly native understorey, with more than 50% of the perennial vegetation ground layer comprising of native species.
- The site contained greater than 12 native understorey species (excluding grasses), including greater than one important species as listed in Appendix 1 of the National Recovery Plan for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland (DECCW 2010).



Figure 18: PCT 433 within the Study Area

3.2.8 PCT 435 – White Box – White Cypress Pine shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion

PCT 435 was selected based on the dominant canopy species which included *Eucalyptus albens* (White Box), *Callitris glaucophylla* (White Cypress Pine) and *Eucalyptus blakelyi* (Blakely's Red Gum) (Figure 19). The mid-storey was dominated by *Geijera parviflora* (Wilga) and *Notelaea microcarpa* (Native Olive), with the dominant ground stratum including *Dichondra repens* (Kidney Weed), *Solanum ferocissimum* (Spiny Potato Bush), *Vittadinia cuneata* (Fuzzweed), *Rostellularia adscendens*, *Brunoniella australis* (Blue Trumpet), *Calotis lappulacea* (Yellow Burr-daisy), *Dysphania carinata* (Keeled Goosefoot), *Einadia hastata* (Berry Saltbush), *Einadia polygonoides* and *Oxalis perennans*.

PCT 435 is listed under the BioNet Vegetation Classification as comprising of the NSW *White Box-Yellow Box-Blakely's Red Gum Woodland EEC* (NSW Scientific Committee, 2020). Justification of including PCT 435 as conforming to the listed community is due to the following:

- The site is in the Brigalow Belt South Bioregion
- *Eucalyptus albens* is the dominant canopy species
- The site is dominated by native species in the understorey

PCT 435 is also listed as the CEEC *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* under the EPBC Act (DotE 2020c). Justification of including PCT 435 as conforming to the listed community is due to the following:

- The ecological community was dominated by *Eucalyptus albens*

- The site had a predominantly native understorey, with more than 50% of the perennial vegetation ground layer comprising of native species.
- The site contained greater than 12 native understorey species (excluding grasses), including greater than one important species as listed in Appendix 1 of the National Recovery Plan for White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland (DECCW 2010).



Figure 19: PCT 435 within the Study Area

3.2.9 PCT 459 – Narrow-leaved Ironbark – Black Cypress Pine – White Box shrubby woodland in sedimentary hills of the Gunnedah region, Brigalow Belt South Bioregion

PCT 459 was selected based on the dominant canopy species which included *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Callitris glaucophylla* (White Cypress Pine) (Figure 20). The mid-storey was dominated by *Cassinia sifton* (Sifton Bush) and *Acacia deanei* (Green Wattle), with the dominant ground stratum including *Cheilanthes sieberi* subspecies *sieberi* (Poison Rock Fern), *Bulbine semibarbata* (Native Leek), *Gonocarpus elatus*, *Einadia hastata* (Berry Saltbush) and *Solanum ferocissimum* (Spiny Potato Bush).

There are no associated TECs with PCT 459.



Figure 20: PCT 459 within the Study Area

3.2.10 Study Area PCT 599 – Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion

PCT 599 was selected based on the dominant canopy species which included *Eucalyptus blakelyi* (Blakely's Red Gum) and *Eucalyptus melliodora* (Yellow Box) (Figure 21). The mid-storey was dominated by *Geijera parviflora* (Wilga), with the dominant ground stratum including *Einadia hastata* (Berry Saltbush), *Solanum parvifolium*, *Dichondra repens* (Kidney Weed) and *Oxalis perennans*.

PCT 599 is listed under the BioNet Vegetation Classification as comprising of the NSW *White Box-Yellow Box-Blakely's Red Gum Woodland EEC* (NSW Scientific Committee, 2020). Justification of including PCT 599 as conforming to the listed community is due to the following:

- The site is in the Brigalow Belt South Bioregion
- *Eucalyptus blakelyi* and *Eucalyptus melliodora* are the dominant canopy species
- The site is dominated by native species in the understorey

PCT 599 is also listed as the CEEC *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* under the EPBC Act (DotE 2020c). Justification of including PCT 599 as conforming to the listed community is due to the following:

- The ecological community was dominated by *Eucalyptus blakelyi* and *Eucalyptus melliodora*
- The site had a predominantly native understorey, with more than 50% of the perennial vegetation ground layer comprising of native species.

- The site contained greater than 12 native understorey species (excluding grasses), including greater than one important species as listed in Appendix 1 of the National Recovery Plan for White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland (DECCW 2010).



Figure 21: PCT 599 within the Study Area

3.3 Threatened flora

There were no threatened flora species identified within the Study Area during the field survey. However, the survey period was outside that recommended for *Digitaria porrecta* and *Swainsona murrayana*, and therefore an assessment of significance for these species was conducted under the BC Act, as well as the EPBC Act for *S. murrayana*. Whilst the survey was undertaken during the period recommended for *Dichanthium setosum* and *Tylophora linearis*, targeted surveys were unable to be undertaken for these species, and therefore using the precautionary principle impacts to these species were also assessed under the BC Act and the EPBC Act.

3.4 Threatened fauna

One threatened fauna species, *Phascolarctos cinereus* (Koala), which is listed as vulnerable under both the BC Act and EPBC Act, was identified within the Study Area during the field survey (**Figure 22**). Of the 54 species identified from the data audit, the likelihood of occurrence assessment concluded that 30 threatened fauna species are considered likely to occur in the Study Area. This included 21 species listed as threatened under the BC Act, one species listed as threatened under the EPBC Act, and eight species listed as threatened under both the BC Act and EPBC Act.

Tests of significance under the BC Act were undertaken for 29 species listed under the BC Act (**Appendix B**) and tests of significance under the EPBC Act were undertaken for nine species listed under the EPBC Act (**Appendix C**).

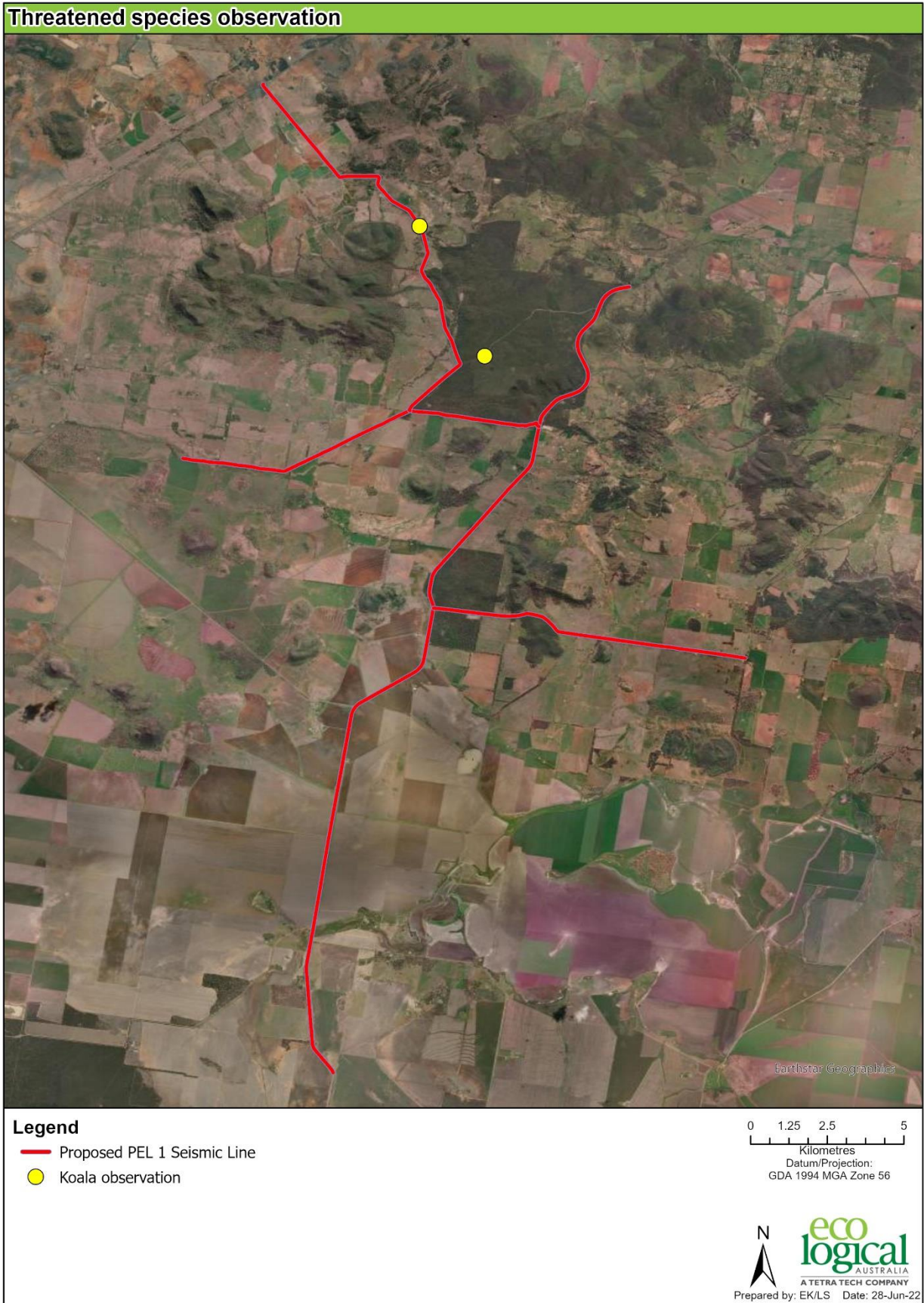


Figure 22: Threatened species observed during the field survey

4. Impact Assessment

4.1 Summary of impacts

The works will be undertaken generally within 1.5m of the proposed seismic line, and will avoid all areas of woody and shrubby native vegetation. Impacts within this 3m easement will be limited to slashing only, and only on one side of the road.

The works will potentially result in temporary impacts to 9 ha of native vegetation. It is noted that the upper limit impact area is an overestimation, however, allows the proponent flexibility in selecting which areas of the roadside require slashing and/or overhead vegetation trimming (within 3m of the road edge).

The majority of the Subject Site occurs within cleared land (primarily within the road corridor) and exotic vegetation.

Sections of vegetation to be impacted conforms to listed EEC under the BC Act and EEC/CEEC under the EPBC Act.

The Study Area provides potential habitat for 34 threatened species. The significance of potential impacts to these species was assessed under both the BC Act and EPBC Act provisions. Given that there will be minimal clearing undertaken for the works, which will only involve potential pruning of minor branches (less than 10cm branch diameter) and/or slashing of groundcover, and considering that there are large areas of contiguous habitat outside the Study Area, the assessment concluded that the proposed activity will not result in a significant impact to any threatened species.

4.2 Vegetation communities

The most likely impact scenario will result in eight vegetation communities with a total of 9 ha of native vegetation to be potentially impacted by the proposed activity, through slashing of groundcover vegetation and/or trimming of branches.

The majority of the works will be within the road corridor, and therefore any impacts to native vegetation will be minimal and temporary. Most of the vegetation communities within the Subject Site are highly modified, with sections surrounded by agricultural activities.

There were three EEC/CEECs recorded within the Subject Site. These included:

- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions (BC Act EEC, EPBC Act EEC)
- Native Vegetation on Cracking Clay Soils of the Liverpool Plains (BC Act EEC)
- White Box Yellow Box Blakely's Red Gum Woodland (BC Act CEEC, EPBC Act CEEC)

The Test of Significance (BC Act) (**Appendix B**) was carried out for these community and concluded that the proposed disturbances associated with these works is unlikely to result in a significant impact upon these communities. Therefore, no Species Impact Statement (SIS) under the BC Act is required. The EPBC Act Significant Impact Criteria was also carried out for White Box Yellow Box Blakely's Red Gum Woodland CEEC (**Appendix C**), which also concluded that the proposed disturbance associated with

these works is unlikely to result in a significant impact upon this community. Therefore, no referral is required under the EPBC Act.

4.3 Threatened flora

Four flora species listed as threatened under either the BC Act or EPBC Act were determined as likely or having the potential to occur within the Study Area. These species were not recorded during the field survey, however targeted threatened flora searches were not undertaken, and therefore these species cannot be discounted as occurring within the Subject Site or the remainder of the Study Area.

The majority of the works will be within the road corridor, or alongside the road corridor which is dominated by exotic groundcover across most of the Study Area. An assessment of significance under the BC Act and EPBC Act (where relevant) was prepared for the species (**Appendix B** and **Appendix C**), where it was concluded that it is unlikely to be a significant impact to these species.

4.4 Threatened fauna

One threatened fauna species (Koala) was recorded in the Study Area during the field survey. An assessment of potential habitat identified a further 28 threatened fauna species with the potential to occur within the Study Area. As there will be no clearing of trees other than potential branch pruning associated with the proposed activity, there will be minimal impacts to these species.

An assessment of the significance of impacts under the BC Act and EPBC Act (where relevant) has been undertaken for these species (**Appendix B** and **Appendix C**). It was concluded that no significant impacts to threatened fauna were considered likely as a result of the proposed activity.

4.5 Impact mitigation measures

The following mitigation measures are recommended to reduce impacts to flora, fauna and vegetation communities.

- Where possible, the Subject Site should be confined to the road corridor, to reduce the impact on native vegetation groundcover. Where slashing is required, the disturbance limit should be clearly delineated to a maximum of 2.5 m from the existing road edge, to ensure site disturbance occurs only within the designated works areas and is not unnecessarily extended. This will apply to the entire length of the line.
- Trimming of branches to allow machinery access is to be limited to branches with a diameter less than 10 cm, and must not include any hollow-bearing limbs.
- No removal of native trees with a stem diameter greater than 10 cm DBH.
- In areas to be slashed, fallen logs and debris may be temporarily moved out of the path of seismic testing vehicles. When the vehicles have passed, fallen logs and debris will be left in situ as close as possible to their approximate original location, to reduce disturbance to potential fauna habitat.
- Vehicle movements should be confined to the Subject Site to reduce any further disturbance to the ground layer.
- Machinery coming from outside the works area should be managed to reduce the risk of introducing or further establishing weed species and pathogens. This should include confining vehicle access to the Subject Site, and wash-down of vehicles, machinery and boots prior to

entering the Subject Site. Footwear and clothing should be free from mud, dirt and vegetation debris prior to entry into areas of vegetation.

- Due to the temporary and low level of impact associated with the seismic survey, it is expected that slashed areas will naturally regenerate to their pre-slashing condition.
- Vehicle operators and staff to be briefed on the presence of Koalas

5. Conclusion and recommendations

The ecological assessment was undertaken in accordance with Part 5 of the EP&A Act, as per the requirements of Part 7 of the BC Act. The biodiversity values of the Study Area were identified through a comprehensive data audit and ecological field surveys, and assessment of the biodiversity values which may be impacted by the proposed activity was undertaken. The data audit included searches of the relevant threatened species registers. The field surveys included vegetation validation, BAM plots and opportunistic fauna surveys.

The field surveys identified nine native vegetation communities present within the Study Area. The proposed footprint will impact less than 9 ha of native vegetation during the proposed activity.

Four threatened flora species and 30 threatened fauna species were identified as known, likely or having the potential to occur within the Study Area and the Subject Site. Assessments of significance were completed in accordance with the relevant sections of the BC Act and the EPBC Act. It was concluded that the proposed activity will unlikely result in significant impacts to any threatened species, populations or community listed under the BC Act and/or the EPBC Act.

A number of mitigation measures have been recommended within this report to ameliorate potential direct and indirect impacts on native vegetation within and adjacent to the development.

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Appendix A – Likelihood of Occurrence

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database search. Five terms for the likelihood of occurrence of species are used in this report. This assessment was based on database or other records, presence or absence of suitable habitat, features of the proposal site, results of the site inspection and professional judgement. Some migratory, marine and aquatic species identified from the Commonwealth database search have been excluded from the assessment, due to lack of habitat. The terms for likelihood of occurrence are defined below:

- “yes” = the species was or has been observed on the site
- “likely” = a medium to high probability that a species uses the site
- “potential” = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- “unlikely” = a very low to low probability that a species uses the site
- “no” = habitat on site and in the vicinity is unsuitable for the species.

An assessment of significance was conducted for threatened species or ecological communities that were recorded within the site. An assessment of significance was also conducted for threatened species that had a high likelihood of occurring, were not recorded during the site visit, and have the potential to be significantly impacted. It is noted that some threatened fauna species that are highly mobile, wide ranging and vagrant may use portions of the site intermittently for foraging. For these fauna species, the habitat present and likely to be impacted is not considered to be important to the threatened species, particularly in relation to the amount of similar habitat remaining in the surrounding landscape. As such, for these species, an assessment of significance in reference to State or Commonwealth legislation was not considered necessary.

The records column refers to the number of records occurring within 10 km of the Subject Site, as provided by the NSW Wildlife Atlas (BioNet) database search. Information provided in the habitat associations’ column has primarily been extracted (and modified) from the Commonwealth Species Profile and Threats Database (DAWE 2020b), NSW Threatened Species Profiles (OEH 2020b) and BioNet (OEH 2020a).

- “CE” = critically endangered
- “E” = endangered
- “V” = vulnerable
- “M” = migratory

Table A - 1: Likelihood of occurrence table - fauna

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
<i>Actitis hypoleucos</i>	Common Sandpiper		M	The Common Sandpiper is a summer migrant to Australia. In NSW, it is widespread along the coastline and also occurs in many areas inland. Habitat is coastal wetlands, especially muddy margins or rocky shores. Also, estuaries and deltas, lakes, pools, billabongs, reservoirs, dams and claypans, and mangroves.	No	There is no suitable habitat in the form of wetlands within the Subject Site	No
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE	The Regent Honeyeater occurs in inland slopes of south-east Australia, and less frequently in coastal areas. In NSW, most records are from the North-West Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; also recorded in the Central Coast and Hunter Valley regions. Occurs in Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of <i>Casuarina cunninghamiana</i> (River Oak).	Potential	Habitat in the form of eucalypt woodland is present within the Subject Site	Yes
<i>Aprasia parapulchella</i>	Pink-tailed Legless Lizard	V	V	In NSW, the Pink-tailed Legless Lizard is only known from the Central and Southern Tablelands, and the South Western Slopes. Occurs in sloping, open woodland areas with predominantly native grassy ground layers, rocky outcrops or scattered partially buried rocks. Is commonly found beneath small, partially embedded rocks and appear to spend considerable time in burrows below these rocks; the burrows have been constructed by and are often still inhabited by small black ants and termites. Feeds on the larvae and eggs of the ants with which it shares its burrows.	No	There is no suitable habitat in the form of rocky outcrops or partially buried rocks within the Subject Site	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
<i>Apus pacificus</i>	Fork-tailed Swift		M	The Fork-tailed Swift is recorded in all regions of NSW. Habitat is riparian woodland, swamps, low scrub, heathland, saltmarsh, grassland, spinifex sandplains, open farmland and inland and coastal sand-dunes	Unlikely	There is no suitable habitat in the form of Riparian woodland within the Subject Site.	No
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V		The Dusky Woodswallow is widespread in eastern, southern and south western Australia. The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. They primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and groundcover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland.	Likely	Habitat in the form of dry open eucalypt woodlands is present within the Subject Site.	Yes
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	The Australasian Bittern is found over most of NSW except for the far north-west. Habitat is permanent freshwater wetlands with tall dense vegetation, particularly <i>Typha</i> spp. (bulrushes) and <i>Eleocharis</i> spp. (spikerushes).	No	There is no suitable habitat in the form of permanent freshwater wetlands within the Subject Site.	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
<i>Burhinus grallarius</i>	Bush Stone-curlew	E		In NSW, the Bush Stone-curlew is found sporadically in coastal areas, and west of the divide throughout the sheep-wheat belt. It occurs in lowland grassy woodland and open forest. It forages nocturnally in irrigated paddocks, grasslands, woodlands, domestic gardens, saltmarsh, mangroves, and playing fields. Feeds on a wide variety of invertebrates, seeds, small fruit, crustaceans, molluscs, frogs, lizards, snakes and mice. It roosts during the day in or near woodland remnants amongst fallen timber or ground litter. The nest site is typically in or near the edge of open grassy woodland or within a cleared paddock, and the breeding season is between spring and early summer.	Potential	Habitat in the form of grassy woodland and fallen timber is present within the Subject Site	Yes
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		M	The Sharp-tailed Sandpiper is a summer migrant to Australia. It is widespread in most regions of NSW, especially coastal areas, but is sparse in the south-central Western Plain and east Lower Western Regions. Habitat is shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	No	There is no suitable habitat in the form of wetlands present within the Subject Site.	No
<i>Calidris ferruginea</i>	Curlew Sandpiper	E	CE	The Curlew Sandpiper occurs along the entire coast of NSW, and sometimes in freshwater wetlands in the Murray-Darling Basin. Occurs in littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	No	There is no suitable habitat in the form of wetlands present within the Subject Site.	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
<i>Calidris melanotos</i>	Pectoral Sandpiper		M	<p>The Pectoral Sandpiper is a summer migrant to Australia. It is widespread but scattered in NSW. East of the Great Divide has been recorded from Casino and Ballina, south to Ulladulla. West of the Great Divide is widespread in the Riverina and Lower Western regions.</p> <p>Habitat is shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.</p>	No	There is no suitable habitat in the form of wetlands present within the Subject Site.	No
<i>Calyptorhynchus lathamii</i>	Glossy Black-Cockatoo	V		<p>In NSW, the Glossy Black-Cockatoo is widespread along coast and inland to the southern tablelands and central western plains, with a small population in the Riverina.</p> <p>It occurs in open forest and woodlands of the coast and the Great Dividing Range where stands of Sheoak occur. Feeds almost exclusively on the seeds of several species of she-oak (Casuarina and Allocasuarina species), shredding the cones with the massive bill.</p> <p>Dependent on large hollow-bearing eucalypts for nest sites. A single egg is laid between March and May.</p>	Likely	Foraging habitat in the form of <i>Casuarina</i> , and breeding habitat in the form of large hollow-bearing trees are present within the Subject Site	Yes
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	<p>The Large-eared Pied Bat has been recorded from Rockhampton in QLD south to Ulladulla in NSW. The largest concentrations of populations occur in the sandstone escarpments of the Sydney basin and the NSW north-west slopes.</p> <p>Habitat is wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country. Roosts in caves, rock overhangs and disused mine shafts and as such is usually associated with rock outcrops and cliff faces. It also possibly roosts in the hollows of trees.</p>	Potential	Potential foraging habitat occurs within the Subject Site.	Yes

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
<i>Chalinolobus nigrogriseus</i>	Hoary Wattled Bat	V		In north east NSW the Hoary Wattled Bat reaches the lower Clarence and Richmond River areas, extending from near Murwillumbah in the north, south to between Grafton and Coffs Harbour. In NSW the Hoary Wattled Bat occurs in dry open eucalypt forests, favouring forests dominated by Spotted Gum, boxes and ironbark's, and heathy coastal forests where Red Bloodwood and Scribbly Gum are common. Because it flies fast below the canopy level, forests with naturally sparse understorey layers may provide the best habitat.	Unlikely	No recent records for this species within the region.	No
<i>Chalinolobus picatus</i>	Little Pied Bat	V		The Little Pied Bat occurs in inland Qld and NSW (including Western Plains and slopes) extending slightly into SA and Victoria. Habitat is dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest and mallee and Bimbil box woodlands. Roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings. Can tolerate high temperatures and dryness but need access to nearby open water. Feeds on moths and possibly other flying invertebrates.	Potential	Foraging habitat is present within the Study Area	Yes
<i>Chthonicola sagittata</i>	Speckled Warbler	V		The Speckled Warbler occurs from south-eastern Qld, the eastern half of NSW and into Victoria, as far west as the Grampians, mostly on hills and tablelands of the Great Dividing Range and rarely on coast. Habitat is Eucalyptus-dominated communities with a grassy understorey and sparse shrub layer, often on rocky ridges or in gullies.	Likely	Habitat for this species is present within the Study Area	Yes
<i>Circus assimilis</i>	Spotted Harrier	V		Spotted Harrier are found throughout the Australian mainland, except in densely forested or wooded habitats, and rarely in Tasmania. Habitat is grassy open woodland, inland riparian woodland, grassland, shrub steppe, agricultural land and edges of inland wetlands.	Likely	Habitat for this species is present within the Study Area	Yes

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V		Brown Treecreeper (eastern subspecies) occurs from eastern through central NSW, west to Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell. Habitat is Eucalypt woodlands and dry open forest. Hollows in standing dead or live trees and tree stumps are essential for nesting.	Likely	Foraging and breeding habitat for this species is present within the Study Area	Yes
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V		Distribution in NSW of the Varied Sittella is nearly continuous from the coast to the far west. Inhabits eucalypt forests and woodlands, mallee and Acacia woodland.	Likely	Habitat for this species is present within the Study Area	Yes
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	The Spotted-tailed Quoll is found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Qld. Habitat is rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	Potential	Habitat for this species is present within the Study Area. There is also a recent record for this species within the Study Area	Yes
<i>Delma impar</i>	Striped Legless Lizard	V	V	In NSW, the Stiped Legless Lizard occurs in the Southern Tablelands, the South West Slopes and possibly on the Riverina. Habitat is natural Temperate Grassland, secondary and modified grassland, and open Box-Gum Woodland. Shelters in tussock-forming grasses or under surface rocks.	Unlikely	There are no records for this species within the locality	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
<i>Epthianura albifrons</i>	White-fronted Chat	V		The White-fronted Chat occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state. Habitat is saltmarsh vegetation, open grasslands and sometimes low shrubs bordering wetland areas. Have been observed breeding from late July through to early March, with 'open-cup' nests built in low vegetation or mangroves.	Unlikely	No habitat in the form of saltmarsh or wetland areas within the Study Area	No
<i>Falco hypoleucos</i>	Grey Falcon	E	V	The Grey Falcon occurs in arid and semi-arid zones. In NSW it is found chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Habitat is shrubland, grassland and wooded watercourses, occasionally in open woodlands near the coast and near wetlands.	Unlikely	There is no habitat in the form of watercourses present within the Subject Site.	No
<i>Falco subniger</i>	Black Falcon	V		The Black Falcon is sparsely distributed in NSW, occurring mostly in inland regions. Habitat is woodland, shrubland and grassland, especially riparian woodland and agricultural land. Often associated with streams or wetlands.	Potential	Habitat for this species is present within the Study Area	Yes
<i>Gallinago hardwickii</i>	Latham's Snipe		M	The Latham's Snipe is a migrant to the east coast of Australia, extending inland west of the Great Dividing Range in NSW. Habitat is freshwater, saline or brackish wetlands up to 2000 m above sea-level; usually freshwater swamps, flooded grasslands or heathlands.	Unlikely	There is no habitat in the form of wetlands present within the Subject Site.	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
<i>Glossopsitta pusilla</i>	Little Lorikeet	V		In NSW, the Little Lorikeet is found from the coast westward as far as Dubbo and Albury. Habitat is dry, open eucalypt forests and woodlands, including remnant woodland patches and roadside vegetation. Roosts in treetops, often distant from feeding areas. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts.	Likely	Habitat for this species is present within the Study Area	Yes
<i>Grantiella picta</i>	Painted Honeyeater	V	V	The Painted Honeyeater is widely distributed in NSW, predominantly on the inland side of the Great Dividing Range but avoiding arid areas. Habitat is Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. Prefers mistletoes of the genus <i>Amyema</i> . Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.	Potential	Habitat is present within the Study Area	Yes
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V		The White-bellied Sea-Eagle is distributed along the coastline of mainland Australia and Tasmania, extending inland along some of the larger waterways, especially in eastern Australia. Habitat is freshwater swamps, rivers, lakes, reservoirs, billabongs, saltmarsh and sewage ponds and coastal waters. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest and urban areas.	Potential	Foraging habitat only available	Yes
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	V		The Black-breasted Buzzard occurs in areas receiving less than 500 mm rainfall from north-western NSW and north-eastern SA to the east coast at about Rockhampton, then across northern Australia south almost to Perth. Occupies inland habitats, including timbered watercourses, grasslands and sparsely timbered woodlands.	Potential	Habitat is present within the Study Area	Yes

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
<i>Hieraetus morphnoides</i>	Little Eagle	V		<p>Little Eagle occurs throughout the Australian mainland, with the exception of the most densely forested parts of the Dividing Range escarpment.</p> <p>Habitat is open eucalypt forest, woodland or open woodland, including Sheoak or Acacia woodlands and riparian woodlands of interior NSW. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.</p>	Potential	Habitat is present within the Study Area	Yes
<i>Hirundapus caudacutus</i>	White-throated Needletail		V	<p>The White-throated Needletail occurs in all coastal regions of NSW, inland to the western slopes and inland plains of the Great Divide.</p> <p>Occur most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland. It almost always forages aerially. Recorded roosting in trees in forests and woodlands, both among dense foliage in the canopy or in hollows.</p>	Likely	Foraging habitat only present	Yes
<i>Hoplocephalus bitorquatus</i>	Pale-headed Snake	V		<p>In NSW, the Pale-headed snake occurs from the coast to the western side of the Great Divide as far south as Tuggerah. Historically recorded west to Mungindi and Quambone on the Darling Riverine Plains, across the North West Slopes, and the New England Tablelands.</p> <p>It occurs in dry eucalypt forests and woodlands, cypress forest, rainforest and moist eucalypt forest. The Pale-headed Snake is a highly cryptic species that can spend weeks at a time hidden in tree hollows. In drier environments, it appears to favour habitats close to riparian areas. Shelter during the day between loose bark and tree-trunks, or in hollow trunks and limbs of dead trees. The main prey is tree frogs although lizards and small mammals are also taken. The Pale-headed Snake is well-adapted to climbing trees.</p>	Potential	Habitat is present within the Study Area	Yes

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
<i>Lathamus discolor</i>	Swift Parrot	E	CE	<p>The Swift Parrot migrates from Tasmania to mainland in Autumn-Winter. In NSW, the species mostly occurs on the coast and south west slopes.</p> <p>Habitat is Box-ironbark forests and woodlands. Favoured feed trees include winter flowering species such as Eucalyptus robusta (Swamp Mahogany), Corymbia maculata (Spotted Gum), C. gummifera (Red Bloodwood), E. sideroxylon (Mugga Ironbark), and E. albens (White Box).</p> <p>Commonly used lerp infested trees include E. microcarpa (Inland Grey Box), E. moluccana (Grey Box) and E. pilularis (Blackbutt).</p>	Likely	Habitat is present within the Study Area	Yes
<i>Leipoa ocellata</i>	Malleefowl	E	V	<p>The Malleefowl occurs in arid and semi-arid zones. In NSW, populations occur in the south west mallee centred on Mallee Cliffs National Park and extending east to near Balranald; in the Scotia mallee west of the Darling River; and in the Goonoo forest near Dubbo. Recorded less recently in the Pilliga forests, around Cobar and Goulburn River National Park.</p> <p>Habitat is predominantly mallee communities. Less frequently found in other eucalypt woodlands, such as Inland Grey Box, Ironbark or Bimble Box Woodlands, or other woodlands dominated by Mulga or native Cypress Pine species.</p>	Unlikely	Although potential habitat occurs within the Subject Site, there have been no recent records of this species within the Locality.	No
<i>Lophoictinia isura</i>	Square-tailed Kite	V		<p>In NSW, the Square-tailed Kite is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast.</p> <p>Occupies timbered habitats including dry woodlands and open forests, particularly timbered watercourses.</p>	Potential	Foraging habitat present within the Study Area	Yes

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
<i>Macropus dorsalis</i>	Black-striped Wallaby	E		<p>The Black-striped Wallaby occurs on both sides of the Great Divide in northern NSW. On the north west slopes, it occurs in Brigalow remnants to south of Narrabri. On the north coast it is confined to the upper catchments of the Clarence and Richmond Rivers.</p> <p>On the north west slopes, uses brigalow, ooline and semi-evergreen vine thicket. On the north coast, uses dry rainforest and moist eucalypt forest with a rainforest understorey or a dense shrub layer.</p>	Unlikely	No habitat in the form of dry rainforest or moist eucalypt forest present within the Study Area	No
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	V		<p>The Black-chinned Honeyeater (eastern subspecies) is widespread in NSW from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. Also, Richmond and Clarence River areas and a few scattered sites in the Hunter, Central Coast and Illawarra regions.</p> <p>Open forests or woodlands dominated by box and ironbark eucalypts, or by smooth-barked gums, stringybarks, river Sheoak and tea-trees.</p>	Potential	Habitat present within the Study Area	Yes
<i>Motacilla flava</i>	Yellow Wagtail		M	<p>The Yellow Wagtail is a regular summer migrant to mostly coastal NSW. In NSW recorded Sydney to Newcastle, the Hawkesbury and inland in the Bogan LGA.</p> <p>Habitat is swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land and lawns.</p>	No	There is no habitat present within the Subject Site and no recent records.	No
<i>Myiagra cyanoleuca</i>	Satin Flycatcher		M	<p>In NSW the Satin Flycatcher is widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains.</p> <p>Habitat is Eucalypt-dominated forests, especially near wetlands, watercourses and heavily vegetated gullies.</p>	Unlikely	There is no habitat in the form of wetlands present within the Subject Site.	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
<i>Neophema pulchella</i>	Turquoise Parrot	V		<p>The Turquoise Parrot occurs along the length of NSW from the coastal plains to the western slopes of the Great Dividing Range.</p> <p>Eucalypt and cypress pine open forests and woodlands, ecotones between woodland and grassland, or coastal forest and heath.</p>	Likely	Habitat present within the Study Area	Yes
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V	V	<p>The Corben's Long-eared Bat distribution coincides approximately with the Murray Darling Basin; the Pilliga Scrub region is the distinct stronghold for this species.</p> <p>Occurs in Mallee, Allocasuarina luehmannii (bulloke) and box eucalypt- dominated communities, especially box/ironbark/cypress-pine vegetation. Roosts in tree hollows, crevices, and under loose bark.</p> <p>Slow flying agile bat, utilising the understorey to hunt non-flying prey - especially caterpillars and beetles - and will even hunt on the ground.</p>	Potential	Habitat is present within the Study Area	Yes
<i>Oxyura australis</i>	Blue-billed Duck	V		<p>The Blue-billed Duck is widespread in NSW but is most concentrated in the southern Murray-Darling Basin area.</p> <p>Occurs in coastal and inland wetlands and swamps. Blue-billed Ducks usually nest solitarily in Cumbungi over deep water between September and February. Young birds disperse in April-May from their breeding swamps in inland NSW to non-breeding areas on the Murray River system and coastal lakes. They feed on the bottom of swamps eating seeds, buds, stems, leaves, fruit and small aquatic insects such as the larvae of midges, caddisflies and dragonflies.</p>	Unlikely	Habitat in the form of wetlands and swamps is not present within the Study Area	No
<i>Petaurus norfolcensis</i>	Squirrel Glider	V		<p>The Squirrel Glider is widely though sparsely distributed on both sides of the Great Dividing Range in eastern Australia, from northern Qld to western Victoria.</p> <p>Occurs in mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas.</p>	Unlikely	Habitat in the form of mature or old growth woodland is not present within the Study Area	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E	V	In NSW the Brush-tailed Rock-wallaby occurs from the QLD border in the north to the Shoalhaven in the south, with the population in Warrumbungle Ranges being the western limit. Habitat is rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges.	No	There is no habitat in the form of rocky escarpments present within the Subject Site.	No
<i>Phascolarctos cinereus</i>	Koala	V	V	In NSW the Koala mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. There are sparse and possibly disjunct populations in the Bega District, and at several sites on the southern tablelands. Occurs in Eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Inactive for most of the day, feeding and moving mostly at night. Spend most of their time in trees, but will descend and traverse open ground to move between trees. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size. Females breed at two years of age, with mating occurring between September and February.	Yes	Species was recorded during the field survey	Yes
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V		In NSW, the Grey-crowned Babbler (eastern subspecies) occurs on the western slopes of the Great Dividing Range, and as far as Louth and Balranald on the western plains. Also occurs in woodlands in the Hunter Valley and in some locations on the north coast. Habitat is open woodland habitats; favours Box-gum woodlands on the slopes and Box-cypress and open Box woodlands on alluvial plains.	Likely	Habitat is present within the Study Area	Yes

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	The Grey-headed Flying-fox occurs along the eastern coast of Australia, from Bundaberg in Qld to Melbourne in Victoria. Habitat is subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Can travel up to 50 km from the camp to forage. Feed on the nectar and pollen of Eucalyptus, Melaleuca and Banksia species, and fruits of rainforest trees and vines. Also forage in cultivated gardens and fruit crops.	Potential	Foraging habitat present only	Yes
<i>Rhipidura rufifrons</i>	Rufous Fantail		M	The Rufous Fantail occurs in coastal and near coastal districts of northern and eastern Australia, including on and east of the Great Divide in NSW. Habitat is wet sclerophyll forests, subtropical and temperate rainforests. Sometimes occurs in drier sclerophyll forests and woodlands.	Unlikely	There is no habitat in the form of wet forests present within the Subject Site	No
<i>Rostratula australis</i>	Australian Painted Snipe	E	E	In NSW, most records of the Australian Painted Snipe are from the Murray-Darling Basin. Other recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Habitat is swamps, dams and nearby marshy areas.	No	There is no habitat in the form of swamps or dams present within the Subject Site	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V		<p>There are scattered records of Yellow-bellied Sheath-tail-bat across the New England Tablelands and North West Slopes. Rare visitor in late summer and autumn to south-western NSW.</p> <p>Occurs in almost all habitats, including wet and dry sclerophyll forest, open woodland, open country, mallee, rainforests, heathland and waterbodies. It forages for insects above the canopy in eucalypt forests, and closer to the ground in more open country. It is dependent on suitable hollow-bearing trees to provide roost sites. The species has also been recorded using caves and abandoned sugar glider nests as roost sites. Breeding occurs between December and mid-march.</p>	Potential	Habitat is present within the Study Area	Yes
<i>Stagonopleura guttata</i>	Diamond Firetail	V		<p>The Diamond Firetail is widely distributed in NSW, mainly recorded in the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina, and less commonly found in coastal areas and further inland.</p> <p>Habitat is grassy eucalypt woodlands, open forest, mallee, Natural Temperate Grassland, secondary derived grassland, riparian areas and lightly wooded farmland.</p>	Likely	Habitat is present within the Study Area	Yes
<i>Stictonetta naevosa</i>	Freckled Duck	V		<p>Freckled Duck occurs in inland river systems, occurring as far as coastal NSW in times of drought.</p> <p>Habitat is freshwater swamps and creeks, lakes, reservoirs, farm dams and sewage ponds. Generally, rest in dense cover during the day, usually in deep water. Feed at dawn and dusk and at night on algae, seeds and vegetative parts of aquatic grasses and sedges and small invertebrates. Nests are usually located in dense vegetation at or near water level.</p>	Unlikely	No habitat in the form of water systems present within the Study Area	No
<i>Tyto novaehollandiae</i>	Masked Owl	V		<p>The Masked Owl is recorded over approximately 90% of NSW, excluding the most arid north-western corner. Most abundant on the coast but extends to the western plains.</p> <p>Habitat is dry eucalypt forests and woodlands from sea level to 1100 m. Often hunts along the edges of forests, including roadsides.</p>	Likely	Habitat is present within the Study Area	Yes

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
<i>Uvidicolus sphyurus</i>	Border Thick-tailed Gecko	V	V	<p>The Border Thick-tailed Gecko is found only on the tablelands and slopes of northern NSW and southern QLD, reaching south to Tamworth and west to Moree. Is most common in the granite country of New England Tablelands. Occurs at sites ranging from 500 to 1100 m elevation.</p> <p>Often occurs on steep rocky or scree slopes, especially granite. Favours forest and woodland areas with boulders, rock slabs, fallen timber and deep leaf litter. Occupied sites often have a dense tree canopy that helps create a sparse understorey. Is active at night and shelter by day under rock slabs, in or under logs, and under the bark of standing trees.</p>	Unlikely	There is no habitat in the form of steep rocky or scree slopes present within the Subject Site, and there have been no recent records within the Locality.	No
<i>Vespadelus troughtoni</i>	Eastern Cave Bat	V		<p>The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range south to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. The western limit appears to be the Warrumbungle Range, and there is a single record from southern NSW, east of the ACT.</p> <p>Habitat is dry open forest and woodland, near cliffs or rocky overhangs, cliff-lines in wet eucalypt forest and rainforest.</p>	Unlikely	No habitat in the form of cliffs or rocky overhangs present within the Study Area	No

Table A - 2: Likelihood of occurrence table - flora

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
<i>Cadellia pentastylis</i>	Ooline	V	V	<p>In NSW, <i>Cadellia pentastylis</i> is found along the western edge of the North West Slopes from north of Gunnedah to west of Tenterfield.</p> <p>Occurs in dry rainforest, semi-evergreen vine thickets and sclerophyll</p>	No	Species was not detected in the field	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
				communities. Usually on low- to medium-nutrient soils of sandy clay or clayey consistencies. Appears to flower spasmodically, during a general flowering period of October to January. Dispersal of fruit and seed is probably by “passive fall” or by birds. Has the capacity to resprout from rootstock and coppice vigorously from stumps, a feature which may be critical for the species survival in a fire-prone environment.			
<i>Commersonia procumbens</i>		V	V	<i>Commersonia procumbens</i> is endemic to NSW, found in the Dubbo-Mendooran-Gilgandra region, the Pilliga and Nymagee areas, the Upper Hunter region, and in Goonoo SCA. Occurs in Sandy sites, disturbed habitats such as roadsides, quarry edges and gravel stockpiles. Often found in Eucalyptus dealbata- E. sideroxylon woodland, Melaleuca uncinata scrub, and mallee with Calytrix tetragona understorey. Fruiting period is summer to autumn. Flowers from August to December. Appears to produce seed which persists for some time in the seed bank. Large numbers of seedlings have been observed germinating after fire at sites where the species was not apparent above ground before the fires. Clusters of individuals may be clonal. The species is often found as a pioneer species of disturbed habitats.	Unlikely	No habitat present within the Subject Site	No
<i>Dichanthium setosum</i>	Bluegrass	V	V	In NSW, <i>Dichanthium setosum</i> is found on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes. Cleared woodland, grassy roadside remnants and highly disturbed pasture, on heavy basaltic black soils and red-brown loams with clay subsoil. Associated species include <i>Eucalyptus albens</i> , <i>Eucalyptus melanophloia</i> , <i>Eucalyptus melliodora</i> , <i>Eucalyptus viminalis</i> , <i>Myoporum debile</i> , <i>Aristida ramosa</i> , <i>Themeda triandra</i> , <i>Poa sieberiana</i> , <i>Bothriochloa ambigua</i> , <i>Medicago minima</i> , <i>Leptorhynchus squamatus</i> , <i>Lomandra aff. longifolia</i> , <i>Ajuga australis</i> , <i>Calotis hispidula</i> and <i>Austrodanthonia</i> , <i>Dichopogon</i> , <i>Brachyscome</i> ,	Potential	Habitat is present within the Study Area	Yes

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
				<i>Vittadinia</i> , <i>Wahlenbergia</i> and <i>Psoralea</i> species. Flowering time is mostly in summer.			
<i>Digitaria porrecta</i>	Finger Panic Grass	E		In NSW <i>Digitaria porrecta</i> is found on the North West Slopes and Plains, from near Moree south to Tambar Springs and from Tamworth to Coonabarabran. Occurs in native grassland, woodlands or open forest with a grassy understorey, on richer soils. Most frequently recorded in association with <i>Eucalyptus albens</i> and <i>Acacia pendula</i> . Common associated grasses and forbs in NSW sites include <i>Austrostipa aristiglumis</i> , <i>Enteropogon acicularis</i> , <i>Cyperus bifax</i> , <i>Hibiscus trionum</i> and <i>Neptunia gracilis</i> . Flowering season is summer or late summer from mid-January to late February, with seeds maturing and falling from the plant soon after. Often found along roadsides and travelling stock routes where there is light grazing and occasional fire.	Potential	Habitat present within the Study Area	Yes
<i>Euphrasia arguta</i>		E	CE	In NSW, <i>Euphrasia arguta</i> has been recently recorded only from Nundle area of the north western slopes and tablelands, from near the Hastings River and from the Barrington Tops. Habitat is eucalypt forest with a mixed grass and shrub understorey, disturbed areas and along roadsides. Is of annual habitat and has been observed to die off over the winter months, with active growth and flowering occurring between January and April.	Unlikely	No records within the Locality	No
<i>Prasophyllum Wybong</i>	<i>sp.</i> a leek-orchid		CE	Endemic to NSW, <i>Prasophyllum sp. Wybong</i> is known from near Ilford, Premer, Muswellbrook, Wybong, Yeoval, Inverell, Tenterfield, Currabubula and the Pilliga area. Most populations are small, although the Wybong population contains by far the largest number of individuals. Is a perennial orchid, appearing as a single leaf over winter and spring. Flowers in spring and dies back to a dormant tuber over	Unlikely	No records within the locality	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
				summer and autumn. Is known to occur in open eucalypt woodland and grassland.			
<i>Swainsona murrayana</i>	Slender Darling Pea	V	V	<p><i>Swainsona murrayana</i> has been recorded in the Jerilderie and Deniliquin areas of the southern riverine plain, the Hay plain as far north as Willandra National Park, near Broken Hill and in various localities between Dubbo and Moree.</p> <p>Occurs in Bladder saltbush, black box and grassland communities, remnant native grasslands or grassy woodlands on heavy clay-based soils, on level plains, floodplains and depressions. Plants produce winter-spring growth, flower in spring to early summer and then die back after flowering. They re-shoot readily and often carpet the landscape after good cool-season rains. The species may require some disturbance and has been known to occur in paddocks that have been moderately grazed or occasionally cultivated.</p>	Potential	Habitat present within the Study Area	Yes
<i>Tylophora linearis</i>		V	E	<p>In NSW, <i>Tylophora linearis</i> is found in the Barraba, Mendooran, Temora and West Wyalong districts in the northern and central western slopes. Records include Crow Mountain near Barraba, Goonoo, Pilliga West, Cumbil, and Eura State Forests, Coolbaggie Nature Reserve, Goobang National Park, and Beni Conservation Area.</p> <p>Occurs in Dry scrub, open forest, dry woodlands of <i>Eucalyptus fibrosa</i>, <i>Eucalyptus sideroxylon</i>, <i>Eucalyptus albens</i>, <i>Callitris endlicheri</i>, <i>Callitris glaucophylla</i> and <i>Allocasuarina luehmannii</i>. Also grows in association with <i>Acacia hakeoides</i>, <i>Acacia lineata</i>, <i>Melaleuca uncinata</i>, <i>Myoporum</i> species and <i>Casuarina</i> species. Flowers in spring, with flowers recorded in November or May with fruiting probably 2 to 3 months later.</p>	Potential	Habitat present within the Study Area	Yes

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
<i>Thesium australe</i>	Austral Toadflax	V	V	In eastern NSW, <i>Thesium australe</i> is found in very small populations scattered along the coast, and from the Northern to Southern Tablelands. Habitat is grassland on coastal heathlands, or grassland and grassy woodland away from the coast. Is often found in association with <i>Themeda australis</i> (Kangaroo Grass). Flowers in spring.	Unlikely	No records of this species within the Locality	No

Table A - 3: Likelihood of occurrence - threatened ecological communities

Vegetation Community	BC Act Status	EPBC Act Status	Description	Likelihood of Occurrence	Impact assessment required
Artesian Springs Ecological Community in the Great Artesian Basin	E	E	The vegetation within the community frequently consists of sedges or similar vegetation; however, trees and shrubs may be adjacent to the springs or nearby. Restricted to the artesian springs of the Great Artesian Basin, including the Mulga Lands, Darling Riverine Plains and Cobar Peneplain Bioregions of NSW. Habitat includes Artesian springs; these are characterised by mounds of sediment and salts deposited as water evaporates, or they may be depressions.	No	No
Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions	E	E	A low woodland or forest community dominated by <i>Acacia harpophylla</i> (Brigalow), with pockets of <i>Casuarina cristata</i> (Belah) and <i>Eucalyptus populnea subsp. bimbil</i> (Poplar Box). The canopy tends to be quite dense and the understorey and ground cover are only sparse. Scattered remnants on the North West Slopes and Plains and Darling River Plains in NSW; also, in Queensland. Usually occurs on heavy clay soils.	No	No

Vegetation Community	BC Act Status	EPBC Act Status	Description	Likelihood of Occurrence	Impact assessment required
Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions	E		<p>Carex Sedgelands are fens dominated by sedges, grasses and semi-aquatic herbs. Dominant species are <i>Carex appressa</i>, <i>Stellaria angustifolia</i>, <i>Scirpus polystachyus</i>, <i>Carex gaudichaudiana</i>, <i>Carex sp. Bendemeer</i>, <i>Carex tereticaulis</i> and <i>Isachne globosa</i>, either as single species or in combinations.</p> <p>Mostly found at higher altitudes on tablelands but extends onto the slopes. The community has been recorded from the local government areas of Armidale Dumaresq, Warrumbungle, Glen Innes Severn, Guyra, Gwydir, Inverell, Liverpool Plains, Tamworth Regional, Uralla and Walcha.</p> <p>Drainage depressions in valley floors, frost hollows, and undulating terrain, on a variety of lithologies including granite, basalt, metasediments, acid volcanics, sandstone and Aeolian sands.</p>	No	No
Fuzzy Box Woodland on alluvial soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	E		<p>Tall woodland or open forest dominated by <i>Eucalyptus conica</i> (Fuzzy Box), often with <i>Eucalyptus microcarpa</i> (Grey Box), <i>Eucalyptus melliodora</i> (Yellow Box), or <i>Brachychiton populneus</i> (Kurrajong). <i>Allocasuarina luehmannii</i> (Buloke) is common in places. Shrubs are generally sparse, and the groundcover moderately dense, although this will vary with season. Alluvial soils of the South West Slopes, Brigalow Belt South and Darling Riverine Plains Bioregions. Mainly in the Dubbo-Narromine-Parkes-Forbes area. Brown loam or clay, alluvial or colluvial soils on prior streams and abandoned channels or slight depressions on undulating plains or flats of the western slopes.</p>	No	No
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penepplain, Nandewar and Brigalow Belt South Bioregions	E	E	<p>Includes those woodlands in which the most characteristic tree species, <i>Eucalyptus microcarpa</i> (Inland Grey Box), is often found in association with <i>E. populnea subsp. bimbil</i> (Bimble or Poplar Box), <i>Callitris glaucophylla</i> (White Cypress Pine), <i>Brachychiton populneus</i> (Kurrajong), <i>Allocasuarina luehmannii</i> (Bulloak) or <i>E. melliodora</i> (Yellow Box), and sometimes with <i>E. albens</i> (White Box). Shrubs are typically sparse or absent, although this component can be diverse and may be locally common, especially in drier western portions of the community. A variable ground layer of grass and herbaceous species is present at most sites. At severely disturbed sites the ground layer may be absent. The community generally occurs as an open woodland 15–25 m tall but in some locations the overstorey may be absent as a result of past clearing or thinning, leaving only an understorey. Predominately within the Riverina and South West Slopes regions of NSW down to the Victorian</p>	Yes (EEC Act)	Yes (BC)

Vegetation Community	BC Act Status	EPBC Act Status	Description	Likelihood of Occurrence	Impact assessment required
			border (including Albury to the east and may extend out west towards Hay). Also extends across the slopes and plains in Central and Northern NSW up to the Queensland Border. This includes Yetman and Inverell in the North, Molong to the east of the Central Slopes and plains and out towards Nymagee to the west. Fertile soils, often of Tertiary and Quaternary alluvial origin. Generally, occurs where average annual rainfall is 375- 800 mm and the mean maximum annual temperature is 22- 26°C.		
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	E	E	The structure of the community varies from low woodland and low open woodland to low sparse woodland or open shrubland. The tree layer grows up to a height of about 10 metres and invariably includes <i>Acacia pendula</i> (Weeping Myall or Boree) as one of the dominant species or the only tree species present. The understorey includes an open layer of chenopod shrubs and other woody plant species and an open to continuous groundcover of grasses and herbs. The structure and composition of the community varies, particularly with latitude, as chenopod shrubs are more prominent south of the Lachlan River district, while other woody species and summer grasses are more common further north. In some areas the shrub and canopy stratum may have been reduced or eliminated by clearing or heavy grazing, leaving derived grassland that may still constitute this community. Scattered across the eastern parts of the alluvial plains of the Murray-Darling river system. Known from parts of the Local Government Areas of Berrigan, Bland, Bogan, Carrathool, Conargo, Coolamon, Coonamble, Corowa, Forbes, Gilgandra, Griffith, Gwydir, Inverell, Jerilderie, Lachlan, Leeton, Lockhart, Moree Plains, Murray, Murrumbidgee, Narrabri, Narrandera, Narromine, Parkes, Urana, Wagga Wagga and Warren. Typically, it occurs on red-brown earths and heavy textured grey and brown alluvial soils within a climatic belt receiving between 375 and 500 mm mean annual rainfall.	No	No
Native Vegetation on Cracking Clay Soils of the Liverpool Plains	E	CE	Mainly a native grassland community which includes a range of small forb and herb species. The main grass species include <i>Austrostipa aristiglumis</i> (Plains Grass), <i>Dichanthium sericeum</i> (Queensland Bluegrass) and <i>Panicum queenslandicum</i> (Coolibah Grass). It also contains scattered and patchy shrubs and trees, including <i>Acacia pendula</i> (Boree), <i>Angophora floribunda</i> (Rough-barked Apple), <i>Eucalyptus conica</i> (Fuzzy Box), <i>E. populnea</i> (Bimble Box) and <i>E. melliodora</i> (Yellow Box). In wetter locations rushes and sedges are common. Located around Coonabarabran, Gunnedah, Murrurundi, Narrabri, Tamworth and Quirindi, on	Yes (EEC BC Act)	Yes

Vegetation Community	BC Act Status	EPBC Act Status	Description	Likelihood of Occurrence	Impact assessment required
Pilliga Outwash Ephemeral Wetlands in the Brigalow Belt South Bioregion	E		<p>the North West Slopes and Plains of NSW. Highly fertile cracking clay soils of the Liverpool Plains.</p> <p>Generally associated with ephemeral creeks and waterways. Three types of vegetation communities are observed in the Pilliga Outwash Ephemeral Wetlands. Community one consists of <i>Cyperus gunnii</i> subsp.<i>gunnii</i>–<i>Nymphoides crenata</i> sedgeland/herbfield. Dominated by tall sedge “<i>Cyperus gunnii</i> subsp.<i>gunnii</i>, sometimes <i>Nymphoides crenata</i> found in the deepest part of basin. Ruderal species appears on the damp mud as water recedes. Community two consists of <i>Eleocharis pusilla</i> – <i>Myriophyllum simulans</i>– <i>Nymphoides crenata</i>– <i>Marsilea hirsutza</i>–<i>Pseudoraphis spinescens</i> herbfield/sedgeland with an ephemeral part dominated by <i>Goodenia gracilis</i>–<i>Centipeda minima</i> ubsp.<i>minima</i>–<i>Gratiola pedunculata</i>–<i>Alternanthera denticulata</i>. This community is more species rich than community one. Community three is mainly <i>Diplachne fusca</i> grassland and has a low species richness and lacks floating leaved and submerged species. the Pilliga wetlands are described as tank gilgais because they are formed on cracking, clay, alluvial soils and they form a chain of ponds. Most of these wetlands are under one hectare in size. Morphologically they can be divided into two types, tank and shallow basin wetlands. The water of tank wetlands is more turbid and permanent than in shallow basin wetlands. Tank wetlands are unevenly circular to irregularly oblong basins with distinctive lip to 30 cm high. They have higher clay content in the soil. The shallow basin wetland soil has a higher sand content at the margin Found in a small area of Pilliga scrub. Pilliga Outwash Ephemeral Wetlands have a very restricted geographic distribution. It is estimated that these wetlands are 2,342 km² in extent, one third is located within conservation reserves such as Pilliga National Park and Pilliga State Conservation Area; they may also occur in the Pilliga West State Conservation Area. South west of Narrabri some ephemeral wetlands are found in the Pilliga forest which do not conform to the basic type of this community. Species richness is variable with deeper areas showing lower richness and damp soil showing very high richness. Water is slightly acidic to slightly alkaline. This community is dominated by <i>Allocasuarina luehmannii</i>, <i>Eucalyptus pilligaensis</i>, <i>E. sideroxylon</i>, <i>E. chloroclada</i> and <i>Melaleuca densispicata</i>. They commonly occur on the Pilliga outwash within a mosaic of woodlands and shrublands, or formerly wooded areas.</p>	No	No

Vegetation Community	BC Act Status	EPBC Act Status	Description	Likelihood of Occurrence	Impact assessment required
Semi-evergreen Vine Thicket in the Brigalow Belt South and Nandewar Bioregions	E	E	A low, dense form of dry rainforest generally less than 10 m high, made up of vines and rainforest trees as well as some shrubs. The main canopy is dominated by rainforest species such as <i>Cassine australis</i> var. <i>angustifolia</i> (Red Olive Plum), <i>Geijera parvifolia</i> (Wilga), <i>Notelaea microcarpa</i> var. <i>microcarpa</i> (Native Olive) and <i>Ehretia membranifolia</i> (Peach Bush), with taller eucalypts and cypress pines from surrounding woodland vegetation emerging above the main canopy. <i>Carissa ovata</i> (Currant Bush) is often present and typical vines include <i>Parsonsia eucalyptophylla</i> (Gargaloo) and <i>Pandorea pandorana</i> (Wonga Vine). Scattered distribution near Gunnedah, Barraba, Bingara and north of Warialda on the NSW North West Slopes and Plains, and also in Queensland. Rocky hills, in deep, loamy, high nutrient soils derived from basalt or other volcanic rocks, in areas which are sheltered from frequent fire.	No	No
White Box Yellow Box Blakely's Red Gum Woodland	E	CE	Open woodland community (sometimes occurring as a forest formation), in which the most obvious species are one or more of the following: <i>Eucalyptus albens</i> (White Box), <i>E. melliodora</i> (Yellow Box) and <i>E. blakelyi</i> (Blakely's Red Gum). Intact sites contain a high diversity of plant species, including the main tree species, additional tree species, some shrub species, several climbing plant species, many grasses and a very high diversity of herbs. Modified sites include areas where the main tree species are present ranging from an open woodland formation to a forest structure, and the ground layer is predominantly composed of exotic species; and sites where the trees have been removed and only the grassy ground layer and some herbs remain. Tablelands and western slopes of NSW. Relatively fertile soils.	Yes	Yes

Appendix B – Test of Significance (BC Act 2016)

Under Section 7.3 of the NSW BC Act, the test of significance is to be considered for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. This test has been applied to ecological communities and species listed under the BC Act that are considered to be potentially impacted by the proposal.

Species that have been assessed against the test of significance were identified through the development of the Likelihood of Occurrence (**Appendix A**). The following species were assessed below:

- *Anthochaera phrygia* (Regent Honeyeater)
- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow (eastern subspecies))
- *Burhinus grallarius* (Bush Stone-curlew)
- *Calyptorhynchus lathami* (Glossy Black Cockatoo)
- *Chalinolobus dwyeri* (Large-eared Pied Bat)
- *Chalinolobus picatus* (Little Pied Bat)
- *Chthonicola sagittata* (Speckled Warbler)
- *Circus assimilis* (Spotted Harrier)
- *Climacteris picumnus victoriae* (Brown Treecreeper (eastern subspecies))
- *Daphoenositta chrysoptera* (Varied Sittella)
- *Dasyurus maculatus* (Spotted-tailed Quoll)
- *Dichanthium setosum* (Bluegrass)
- *Digitaria porrecta* (Finger Panic Grass)
- *Falco subniger* (Black Falcon)
- *Glossopsitta pusilla* (Little Lorikeet)
- *Grantiella picta* (Painted Honeyeater)
- *Haliaeetus leucogaster* (White-bellied Sea-Eagle)
- *Hamirostra melanosternon* (Black-breasted Buzzard)
- *Hieraaetus morphnoides* (Little Eagle)
- *Hoplocephalus bitorquatus* (Pale-headed Snake)
- *Lathamus discolor* (Swift Parrot)
- *Lophoictinia isura* (Square-tailed Kite)
- *Melithreptus gularis gularis* (Black-chinned Honeyeater (eastern subspecies))
- *Neophema pulchella* (Turquoise parrot)
- *Nyctophilus corbeni* (Corben's Long-eared Bat)
- *Phascolarctos cinereus* (Koala)
- *Pomatostomus temporalis temporalis* (Grey-crowned babbler (eastern subspecies))
- *Pteropus poliocephalus* (Grey-headed Flying Fox)
- *Saccolaimus flaviventris* (Yellow-bellied Sheath-tailed Bat)
- *Stagonopleura guttata* (Diamond Firetail)
- *Swainsona murrayana* (Slender Darling Pea)
- *Tylophora linearis*

- *Tyto novaehollandiae* (Masked Owl)

The following questions are to be considered for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened flora and fauna, ecological communities, or their habitats:

- a. In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction
- b. In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:
 - i Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
 - ii Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction, in relation to the habitat of a threatened species or ecological community.
- c. In relation to the habitat of a threatened species or ecological community:
 - i The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
 - ii Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
 - iii The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,
- d. Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)
- e. Whether the proposed development or activity is or is part of a key threatened process or is likely to increase the impact of a key threatening process.

Table B - 1: BC Act Test of Significance. Columns 'a' - 'e' refer to questions 'a' - 'e' listed above

Species / Community	A	B	C	D	E	Conclusion
Threatened ecological communities						
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	N/A	The proposed disturbance is approximately 4.30 ha of this community. Disturbance will involve potential slashing and minor vegetation removal (pruning of overhead branches). The disturbance will be of a temporary nature. Based on the extent of the impacts associated with the proposal, it is considered unlikely that there will be an adverse effect on the extent of the ecological community such that is local occurrence would be placed at risk of extinction.	Approximately 4.30 ha of the Inland Grey Box Woodland EEC will be disturbed as a result of the proposed activity. The habitat availability for this EEC will not change as a result of the proposed activities. Due to the linear nature of the Subject Site, with the disturbance occurring primarily within the road corridor, it is unlikely the ecological community will be fragmented or isolated from other areas of habitat.	N/A	The proposed activity could potentially contribute to the key threatened process including competition of native understorey with invasive grasses and other weeds and vegetation clearing. Due to the temporary nature of the proposed disturbance, it is unlikely that the impact will be significant. Implementation of mitigation measures (including biosecurity measures) identified within the impact assessment will minimise the impact of these processes.	No significant impacts on the threatened ecological community present.
Native Vegetation on Cracking Clay Soils of the Liverpool Plains	N/A	The proposed disturbance is approximately 15.71 ha of this community. Disturbance will involve potential slashing. The disturbance will be of a temporary nature.	Approximately 15.71 ha of the Native Vegetation on Cracking Clay Soils EEC will be disturbed as a result of the proposed activity. The habitat availability for this EEC will not change as a	N/A	The proposed activity could potentially contribute to the key threatened process including incremental clearing and invasion and establishment of weed species. Due to	

Species / Community	A	B	C	D	E	Conclusion
		<p>Based on the extent of the impacts associated with the proposal, it is considered unlikely that there will be an adverse effect on the extent of the ecological community such that is local occurrence would be placed at risk of extinction.</p>	<p>result of the proposed activities. Due to the linear nature of the Subject Site, with the disturbance occurring primarily within the road corridor, it is unlikely the ecological community will be fragmented or isolated from other areas of habitat.</p>		<p>the temporary nature of the proposed disturbance, it is unlikely that the impact will be significant. Implementation of mitigation measures (including biosecurity measures) identified within the impact assessment will minimise the impact of these processes.</p>	
<p>White Box Yellow Box Blakely's Red Gum Woodland</p>	<p>N/A</p>	<p>The proposed disturbance is approximately 55.54 ha of this community. Disturbance will involve potential slashing and minor vegetation removal (pruning of overhead branches). The disturbance will be of a temporary nature. Based on the extent of the impacts associated with the proposal, it is considered unlikely that there will be an adverse effect on the extent of the ecological community such that is local occurrence would</p>	<p>Approximately 55.54 ha of the Box Gum Woodland EEC will be disturbed as a result of the proposed activity. The habitat availability for this EEC will not change as a result of the proposed activities. Due to the linear nature of the Subject Site, with the disturbance occurring primarily within the road corridor, it is unlikely the ecological community will be fragmented or isolated from other areas of habitat.</p>	<p>N/A</p>	<p>The proposed activity could potentially contribute to the key threatened process including habitat degradation. Due to the temporary nature of the proposed disturbance, it is unlikely that the impact will be significant. Implementation of mitigation measures (including biosecurity measures) identified within the impact assessment will minimise the impact of these processes.</p>	

Species / Community	A	B	C	D	E	Conclusion
		be placed at risk of extinction.				
Threatened fauna						
Regent Honeyeater Dusky Woodswallow Speckled Warbler Brown Treecreeper (eastern subspecies) Varied Sittella Painted Honeyeater Black-chinned Honeyeater (eastern subspecies) Grey-crowned Babbler (eastern subspecies) Diamond Firetail	The Study Area provides potential habitat for nesting woodland birds including the Speckled warbler, Brown treecreeper, Varied Sittella, Painted Honeyeater, Black-Chinned Honeyeater Grey-crowned Babbler, and Diamond Firetail. There will be no clearing of trees from the proposed activity, other than potential removal of branches. Due to this, and the suitable habitat present outside of the proposed disturbance area, it is unlikely that the proposed activity will impact upon habitat that is important to the long-term survival of this species.	N/A	There will be no clearing of trees during the proposed activity. Due to the linear nature of the proposed activity, and the mobile nature of these species, the proposed activity will not result in habitat fragmentation. These species will likely continue to utilise areas of higher quality habitat present in areas surrounding the proposed Study Area.	No declared area of outstanding biodiversity value is currently present in the Study Area	The proposed activity constitutes one key threatened process relevant to these species, disturbance of ground litter. Due to the temporary nature of the proposed activity, it is unlikely that the proposed activity will increase the impact of this key threatened process on these species.	Overall, it has been determined that the activity is unlikely to have a significant impact on the bird species assessed.
Bush Stone Curlew	The Study Area provides potential habitat in the form of fallen timber for	N/A	The majority of works will occur within the road corridor, and	No declared area of outstanding biodiversity value is currently	The proposed activity constitutes one key threatening process	Overall, it has been determined that the activity is unlikely to

Species / Community	A	B	C	D	E	Conclusion
	<p>the Bush Stone Curlew. There will be no clearing of trees during the proposed activity, and potential slashing of ground vegetation. There is suitable habitat outside the proposed disturbance area. It is unlikely that the proposed activity will impact upon habitat that is important to the long-term survival of these species.</p>		<p>therefore there will be no removal of fallen timber associated with the proposed activity. Due to the linear nature of the works, the proposed activity will not result in habitat nature. This species will likely continue to utilise areas of higher quality habitat present in areas surrounding the proposed Study Area.</p>	<p>present in the Study Area</p>	<p>relevant to these species, degradation of native vegetation, through potential slashing of ground layer vegetation. Due to the temporary nature of the proposed activity, it is unlikely that the proposed activity will increase the impact of this key threatened process on these species.</p>	<p>have a significant impact on this species.</p>
<p>Glossy Black Cockatoo Little Lorikeet Swift Parrot Turquoise Parrot Masked Owl</p>	<p>The Study Area provides potential habitat for hollow dependant birds nesting woodland birds including the Glossy Black Cockatoo, Little Lorikeet, Swift Parrot, Turquoise Parrot, and Masked Owl. There will be no clearing of trees during the proposed activity. Due to this and the suitable habitat present outside of the proposed disturbance area, it is unlikely that the proposed activity will impact upon habitat</p>	<p>N/A</p>	<p>There will be no clearing of trees during the proposed activity, other than potential pruning of branches. Due to the linear nature of the works, and the mobile nature of these species, the proposed activity will not result in habitat fragmentation. This species will likely continue to utilise areas of higher quality habitat present in areas surrounding the proposed Study Area.</p>	<p>No declared area of outstanding biodiversity value is currently present in the Study Area</p>	<p>The proposed activity constitutes one key threatening process relevant to these species, degradation of native vegetation, through potential slashing of ground layer vegetation. Due to the temporary nature of the proposed activity, it is unlikely that the proposed activity will increase the impact of this key threatened process on these species.</p>	<p>Overall, it has been determined that the activity is unlikely to have a significant impact on the bird species assessed.</p>

Species / Community	A	B	C	D	E	Conclusion
	that is important to the long-term survival of these species.					
Little Pied Bat Corben’s Long-eared Bat Yellow-bellied Sheath-tail Bat Large-eared Pied Bat	The Study Area provides potential habitat for the Little Pied Bat, Corben’s Long-eared Bat and the Yellow-bellied Sheath-tailed bat. There will be no clearing of hollow-bearing trees during the proposed activity, and as such, only potential foraging habitat will be impacted. Given the small scale and temporary nature of the disturbance, it is highly unlikely that it will result in any adverse impacts to these species such that a viable local population is be placed at risk of extinction	N/A	There will be no clearing of hollow-bearing trees during the proposed activity, with the potential of small-scale slashing of native vegetation. Due to the linear nature of the clearing and the mobile nature of these species, the proposed activity will not result in habitat fragmentation. These species will likely continue to utilise areas of higher quality habitat present in areas surrounding the proposed Study Area	No declared area of outstanding biodiversity value is currently present in the Study Area	The proposed activity constitutes one key threatened process relevant to these species; modification of habitat. Due to the temporary nature of the proposed activity, it is unlikely that the proposed activity will increase the impact of this key threatened process on these species.	Overall, it has been determined that the activity is unlikely to have a significant impact on the bat species assessed.
Spotted-tailed Quoll Koala	The Study Area provides potential habitat for the Spotted-tailed Quoll and Koala. There will be no clearing of trees during the proposed activity. Given the temporary nature of the disturbance, it is highly	N/A	There will be no clearing of woodland vegetation, other than potential pruning of branches, during the proposed activity. Due to this, the proposed activity will not result in habitat fragmentation. These	No declared area of outstanding biodiversity value is currently present in the Study Area	The proposed activity is likely to result in one key threatening process; modification of native vegetation. Given the temporary nature of the disturbance, it is highly unlikely that the proposed activity will	Overall, it has been determined that the activity is unlikely to have a significant impact on the mammal species assessed.

Species / Community	A	B	C	D	E	Conclusion
	unlikely that it will result in any adverse impacts to this species such that a viable local population is be placed at risk of extinction.		species will likely continue to utilise areas of higher quality habitat present in areas surrounding the proposed Study Area.		increase the impact of this key threatening process on these species.	
Spotted Harrier Black Falcon White-bellied Sea-eagle Black-breasted Buzzard Little Eagle Square-tail Kite	The Study Area provides potential habitat for Raptor species the Spotted Harrier, Black Falcon, White-bellied Sea Eagle, Black-breasted Buzzard, Little Eagle and Square-tail Kite. There will be small scale slashing of native ground layer vegetation associated with the proposed activity. Given the small scale and temporary nature of the disturbance, it is highly unlikely that it will result in any adverse impacts to these species such that a viable local population is be placed at risk of extinction.	N/A	There will be no clearing of potential nesting habitat, and small-scale slashing of potential foraging habitat for these species. Due to the linear nature of these works and the mobile nature of these species, the proposed activity will not result in habitat fragmentation. These species will likely continue to utilise areas of higher quality habitat present in areas surrounding the Study Area.	No declared area of outstanding biodiversity value is currently present in the Study Area	The proposed activity constitutes one key threatening process relevant to these species, degradation of foraging habitat. Due to the temporary nature of the proposed activity, it is unlikely that the proposed activity will increase the impact of this key threatened process on these species.	Overall, it has been determined that the activity is unlikely to have a significant impact on the bird species assessed.
Grey headed Flying Fox	The Study Area provides potential foraging habitat for the Grey headed Flying Fox. There will be no clearing	N/A	There will be no clearing of potential foraging habitat for this species, other than potential pruning of branches,	No declared area of outstanding biodiversity value is currently	The proposed activity will not result in key threatening processes relevant to this species.	Overall, it has been determined that the activity is unlikely to

Species / Community	A	B	C	D	E	Conclusion
	of trees during the proposed activity. Given the temporary nature of the disturbance, it is highly unlikely that it will result in any adverse impacts to this species such that a viable local population is be placed at risk of extinction.		during the proposed activity. Due to this, the proposed activity will not result in habitat fragmentation. These species will likely continue to utilise areas of higher quality habitat present in areas surrounding the proposed Study Area.	present in the Study Area		have a significant impact on this species.
Pale Headed Snake	The Study Area provides potential habitat for the Pale Headed Snake. There will be no clearing of trees during the proposed activity, other than potential pruning of branches. Given the temporary nature of the disturbance, it is highly unlikely that it will result in any adverse impacts to this species such that a viable local population is be placed at risk of extinction.	N/A	There will be no clearing of woodland vegetation, other than potential pruning of branches, during the proposed activity. Due to this, the proposed activity will not result in habitat fragmentation. This species will likely continue to utilise areas of higher quality habitat present in areas surrounding the proposed Study Area.	No declared area of outstanding biodiversity present in the Study Area	The proposed activity will not result in key threatening processes relevant to this species.	Overall, it has been determined that the activity is unlikely to have a significant impact on this species.
Threatened flora						
Dichanthium setosum Digitaria porrecta Swainsona murrayana	Disturbance to threatened flora and habitat caused by the proposed seismic	N/A	The proposed activity will potentially result in the slashing of vegetation of potential	No declared area of outstanding biodiversity value is currently	The proposed activity constitutes one key threatened process relevant to these	Overall, it has been determined that the proposed activity is unlikely to have a

Species / Community	A	B	C	D	E	Conclusion
Tylophora linearis	<p>exploration will be only temporary, with slashing occurring where required. The soil seed bank will remain largely intact. Low quality habitat is present for these species within most of the Subject Site.</p> <p>No threatened flora was identified during the field survey; however, due to timing restrictions, targeted surveys were unable to be undertaken during the field survey. Whilst habitat for these species exists within the project area, impacts are expected to be temporary.</p> <p>Due to the absence of records of these species within the Subject Site, it is unlikely that the proposed activity will adversely affect the life cycles of these species such that local populations are likely to be placed at risk of extinction.</p>		<p>habitat for these species.</p> <p>Due to the small extent of the proposed Subject Site and the temporary nature of the disturbance, the proposed activity is unlikely to result in habitat fragmentation detrimental to the long-term survival of these species in the locality.</p> <p>The Subject Site provides low quality habitat, with higher quality habitat present in areas surrounding the Subject Site. Additionally, the absence of records from the Subject Site indicates that the removal of this habitat is unlikely to affect the long-term survival of these species in the locality.</p>	present in the Study Area.	<p>species; clearing of native vegetation.</p> <p>Due to the small scale and low quality of potential habitat for these species, it is unlikely that the proposed activity will increase the impact of this key threatened process on these species.</p>	significant impact on the threatened flora species assessed.

Appendix C – EPBC Act Significant Impact Guidelines

The EPBC Act Administrative Guidelines on Significance set out ‘**Significant Impact Criteria**’ that are to be used to assist in determining whether a proposed action is likely to have a significant impact on matters of national environmental significance. Matters listed under the EPBC Act as being of national environmental significance include:

- Listed threatened species and ecological communities
- Listed migratory species
- Wetlands of International Importance
- The Commonwealth marine environment
- World Heritage properties
- National Heritage places
- Nuclear actions

Specific ‘**Significant Impact Criteria**’ are provided for each matter of national environmental significance except for threatened species and ecological communities in which case separate criteria are provided for species listed as endangered and vulnerable under the EPBC Act.

The relevant Significant Impact Criteria have been applied to the following communities and species:

- *Anthochaera phrygia* (Regent Honeyeater) – listed as critically endangered under the EPBC Act
- *Chalinolobus dwyeri* (Large-eared Pied Bat) – listed as vulnerable under the EPBC Act
- *Dasyurus maculatus* (Spotted-tailed Quoll) – listed as critically endangered under the EPBC Act
- *Dichanthium setosum* (Bluegrass) – listed as vulnerable under the EPBC Act
- *Grantiella picta* (Painted Honeyeater) – listed as vulnerable under the EPBC Act
- *Hirundapus caudacutus* (White-throated Needletail) – listed as vulnerable under the EPBC Act
- *Lathamus discolor* (Swift Parrot) – listed as critically endangered under the EPBC Act
- *Nyctophilus corbeni* (Corben’s Long-eared Bat) – listed as vulnerable under the EPBC Act
- *Phascolarctos cinereus* (Koala) – listed as vulnerable under the EPBC Act
- *Pteropus poliocephalus* (Grey-headed Flying Fox) – listed as vulnerable under the EPBC Act
- *Swainsona murrayana* (Slender Darling Pea) – listed as vulnerable under the EPBC Act
- *Tylophora linearis* – listed as endangered under the EPBC Act
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC

Anthochaera phrygia (Regent Honeyeater)

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

Lead to a long-term decrease in the size of a population

The proposed slashing and minor vegetation removal (including potential pruning of overhead branches), will only impact a small area of potential habitat. Given this, and the areas of alternate habitat surrounding the Subject Site, the proposed activity is unlikely to lead to a long-term decrease in the size of a population of the species.

Reduce the area of occupancy of the species

The proposed activity will impact a small area of potential habitat for the species. Areas of undisturbed and higher quality potential habitat for this species will remain outside the Subject Site, in order to support the continuation of the population.

Fragment an existing population into two or more populations

The proposed activity is of a linear nature and will occur along an already disturbed road corridor. Given this, the proposed activity will not increase fragmentation of the existing population into two or more populations.

Adversely affect habitat critical to the survival of a species

Habitat critical to the survival of this species includes:

- Any breeding or foraging areas where the species is likely to occur
- Any newly discovered breeding or foraging locations.

The proposed activity will involve slashing and minor vegetation removal (including pruning of overhead branches). Due to the highly disturbed nature of the vegetation within the Subject Site, the surrounding areas of potential high-quality habitat that will remain undisturbed, and the highly mobile nature of this species, the proposed activity is unlikely to adversely affect habitat critical to the survival of this species.

Disrupt the breeding cycle of a population

There are no known breeding pairs within the Study Area. Due to the species being highly mobile, it is unlikely that the proposed activity will disrupt the breeding cycle of a population.

Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposed slashing and minor vegetation removal (including pruning of overhead branches) will impact upon only a small area of potential foraging habitat for this species. Due to this and the species being highly mobile, it is unlikely the proposed activity will modify, destroy, remove or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Areas of intact, higher quality habitat will remain outside of the Subject Site, undisturbed by the works.

Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

The proposed slashing and minor vegetation removal (including pruning overhead branches) will not result in invasive species that are harmful to this species becoming established in the species' habitat.

Introduce disease that may cause the species to decline, or

The proposed activity is not likely to introduce a disease that may cause the species to decline or interfere substantially with the recovery of the species.

Interfere with the recovery of the species

The objectives of the Regent Honeyeater recovery plan are to:

- Reverse the long-term population trend of decline and increase the numbers of regent honeyeaters to a level where there is a viable, wild breeding population, even in poor breeding years; and to
- Enhance the condition of habitat across the regent honeyeaters range to maximise survival and reproductive success and provide refugia during periods of extreme environmental fluctuation.

Strategies to achieve this includes improving the extent and quality of habitat. Most of the Study Area is in a modified, degraded and fragmented state. The proposed clearing will impact upon only a small area of potential foraging habitat for this species. Due to this, it is unlikely that the scale of clearing for the proposed activity will interfere substantially with the recovery of this species.

Is a significant impact on the species likely to result?

After considering the above statements, the proposed action is unlikely to have a significant impact on the Regent Honeyeater.

Chalinolobus dwyeri (Large-eared Pied Bat)

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

Lead to a long-term decrease in the size of an important population of a species

The proposed activity involves temporary disturbance of potential foraging habitat for this species. Large-eared Pied Bat is a mobile species which is likely to utilise surrounding areas which contain higher quality habitat to that which exists in the Subject Site.

Given the relatively small scale of disturbance associated with the proposed activity and the availability of alternative habitat outside of the Subject Site, it is unlikely that the proposed activity will lead to a long-term decrease in the size of an important population of this species. No caves or rocky outcrops will be impacted during the proposed activity.

Reduce the area of occupancy of an important population

There are no records for this species within the Study Area, and the small scale of disturbance associated with the proposed activity, and the availability of alternative habitat outside the Subject Site means that it is unlikely that the area of occupancy of an important population is likely to be reduced.

Fragment an existing important population into two or more populations

Due to the small scale of disturbance associated with the proposed activity, and the mobility of this species, it is unlikely that an existing important population is split into two or more populations. As the Subject Site is primarily within the road corridor, the movement of bats will not be impacted.

Adversely affect habitat critical to the survival of a species

The woodland areas within the Subject Site are likely to constitute foraging habitat for this species. Given the small scale of disturbance associated with the proposed activity and the availability of alternative habitat outside of the Subject Site, it is unlikely that the proposed activity will adversely impact upon the survival of this species.

Disrupt the breeding cycle of an important population

There are no caves, rocky outcrops, or known maternity roosts within the Subject Site. Given that there is higher quality habitat within the wider landscape, it is unlikely that the breeding cycle of an important population will be disrupted.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Given the current highly degraded state of much of the Subject Site, the small scale of disturbance associated with the proposed activity and the availability of alternative habitat outside the Subject Site, it is unlikely that the proposed activity will affect habitat for this species to the extent that it is likely to decline.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

No harmful invasive species are expected to become established in areas of potential habitat for this species as a result of the proposed activity.

Introduce disease that may cause the species to decline, or

No disease that may cause this species to decline is likely to be introduced by the proposed activity.

Interfere substantially with the recovery of the species.

The overall objective of the Recovery Plan for this species is to ensure the persistence of viable populations throughout its geographical range, primarily through identifying priority roost and maternity sites, and protecting these and their associated foraging habitat. There are no known priority roosts or maternity sites within the Locality. Due to this, it is unlikely that the proposed activity will interfere with the recovery of this species.

Is a significant impact on the species likely to result?

After considering the above statements, the proposed action is unlikely to have a significant impact on the Large-eared Pied Bat.

Dasyurus maculatus (Spotted-tailed Quoll)

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

Lead to a long-term decrease in the size of a population

The proposed slashing and minor vegetation removal (including potential pruning of overhead branches), will only impact a small area of potential habitat. There will be no hollow-bearing trees removed as a result of the proposed activity. Given this, and the areas of alternate habitat surrounding the Subject Site, the proposed activity are unlikely to lead to a long-term decrease in the size of an important population of the species.

Reduce the area of occupancy of the species

The proposed activity will impact a small area of potential habitat for the species. Areas of undisturbed and higher quality potential habitat for this species will remain outside the Subject Site, in order to support the continuation of the population.

Fragment an existing population into two or more populations

The proposed activity is of a linear nature and will occur along an already disturbed road corridor. Given this, the proposed activity will not increase fragmentation of the existing population into two or more populations.

Adversely affect habitat critical to the survival of a species

Habitat critical to the survival of this species includes:

- Large patches of forest with adequate denning resources and relatively high densities of medium-sized mammalian prey
- Areas that contain critical habitat resources including trees with hollows, hollow logs or rock or burrow den sites.

The proposed activity will involve slashing and minor vegetation removal (including pruning of overhead branches). Due to the highly disturbed nature of the vegetation within the Subject Site, and the surrounding areas of potential high-quality habitat that will remain undisturbed, the proposed activity is unlikely to adversely affect habitat critical to the survival of this species.

Disrupt the breeding cycle of a population

The proposed activity will not remove any hollow bearing trees or disturb any rock or burrow den sites. Due to this, it is unlikely that the proposed activity will disrupt the breeding cycle of a population.

Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposed slashing and minor vegetation removal (including pruning of overhead branches) will impact upon only a small area of potential foraging habitat for this species. Due to this, it is unlikely the proposed activity will modify, destroy, remove or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Areas of intact, higher quality habitat will remain outside of the Subject Site, undisturbed by the works.

Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

Invasive species that are harmful to this species include cats and foxes. As the proposed activity will be primarily undertaken within an already disturbed road corridor, the proposed activity will not result in these invasive species becoming further established in the species' habitat.

Introduce disease that may cause the species to decline, or

The proposed activity is not likely to introduce a disease that may cause the species to decline or interfere substantially with the recovery of the species.

Interfere with the recovery of the species

The overall objective of the Recovery Plan for this species is to reduce the rate of decline and ensure that viable populations remain throughout its current range in eastern Australia. As the proposed activity will not result in additional vegetation clearing, other than slashing and minor pruning of overhead branches, it is unlikely that it will interfere with the recovery of this species.

Is a significant impact on the species likely to result?

After considering the above statements, the proposed action is unlikely to have a significant impact on the Spotted-tailed Quoll.

Dichanthium setosum (Bluegrass)

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

Lead to a long-term decrease in the size of an important population of a species

Due to the absence of records and the low quality of potential habitat within the Subject Site, combined with the presence of higher quality habitat in the surrounding area, it is unlikely that the proposed activity will lead to a long-term decrease in the size of an important population of *Dichanthium setosum*.

Reduce the area of occupancy of an important population

Given the absence of records and low quality of potential habitat within the Subject Site, combined with the small-scale temporary nature of the proposed activity, it is unlikely that the area of occupancy of an important population will be reduced.

Fragment an existing important population into two or more populations

The Subject Site provides low quality potential habitat with higher quality habitat present in areas surrounding the Subject Site. Additionally, the absence of records from the Subject Site indicates that the temporary disturbance of this habitat is unlikely to affect the long-term survival of these species in the locality. Due to this, and the already disjunct nature of the potential habitat, it is unlikely that an existing important population will be split into two or more populations.

Adversely affect habitat critical to the survival of a species

No habitat critical to the survival of this species has been declared. Given the absence of records and the low quality of potential habitat within the Subject Site, combined with the small scale of the disturbance, it is unlikely that the proposed activity will adversely impact upon the survival of this species.

Disrupt the breeding cycle of an important population

Given the absence of records and the low quality of potential habitat within the Subject Site, combined with the small scale of the Subject Site, it is unlikely that the proposed activity will disrupt the breeding cycle of an important population.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Given the absence of records and the low quality of potential habitat within the Subject Site, combined with the small scale and temporary nature of the disturbance, and the presence of higher quality habitat in the surrounding areas, it is unlikely that the proposed activity will result in a decline of the species.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Much of the area within the Subject Site is highly degraded with a high proportion of weeds. Vehicle wash down procedures have been recommended to reduce the further spread of weeds. Given this, it is unlikely that harmful invasive species will become established in areas of potential habitat for this species as a result of the proposed activity.

Introduce disease that may cause the species to decline, or

No disease that may cause this species to decline is likely to be introduced by the proposed activity.

Interfere substantially with the recovery of the species.

Key threats to this species include clearing of habitat and the potential of inappropriate slashing routines to interrupt reproduction. There is the potential for minor slashing to occur during the proposed activity, however these works will be temporary and minor. Due to this, and the lack of records within the Subject Site, the proposed activity is unlikely to interfere substantially with the recovery of the species.

Is a significant impact on the species likely to result?

After considering the above statements, the proposed action is unlikely to have a significant impact on the *Dichanthium setosum*.

Grantiella picta (Painted Honeyeater)

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

Lead to a long-term decrease in the size of an important population of a species

The proposed slashing and minor vegetation removal (including pruning of overhead branches), will only impact a small area of potential habitat. Given this, and the areas of alternate higher quality habitat surrounding the Subject Site and the high mobility of the species, the proposed activity are unlikely to lead to a long-term decrease in the size of an important population of the species.

Reduce the area of occupancy of an important population

The proposed activity will impact a small area of potential habitat for this species. As the proposed Subject Site is primarily within the road corridor, the area of occupancy for any potential important populations that may occur within the area will not be reduced. Areas of undisturbed potential habitat for this species will remain outside the proposed Subject Site, in order to support the continuation of the population.

Fragment an existing important population into two or more populations

As the proposed activity will occur primarily within the road corridor, and given the linear nature of the activity, as well as the mobility of the species, the proposed activity will not increase fragmentation of any potential existing important populations into two or more populations.

Adversely affect habitat critical to the survival of a species

Habitat critical to the survival of this species includes:

- Any breeding or foraging habitat in areas where the species is likely to occur
- Any newly discovered breeding or foraging locations.

The proposed activity will impact a small area of potential habitat and will only involve potential pruning of overhead branches. Due to the mobile nature of this species, and the surrounding areas of potential foraging habitat that will remain undisturbed, the proposed activity is unlikely to adversely affect habitat critical to the survival of this species.

Disrupt the breeding cycle of an important population

Due to the species being highly mobile, it is unlikely that temporary disturbance to the foraging habitat will disrupt the breeding cycle of a population.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposed slashing and minor vegetation removal (including pruning of overhead branches) will impact upon only a small area of potential foraging habitat for this species. Due to this species being

highly mobile, it is unlikely the clearing will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Areas of intact equivalent habitat will remain outside of the Subject Site, undisturbed by the works.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Invasive species that are harmful to this species include weeds such as invasive grasses becoming established within the habitat. Much of the Subject Site is in a degraded state, with a high level of exotic groundcover. Mitigation measures including washing down vehicles have been recommended to reduce the likelihood of weeds becoming further established within the Subject Site. As such, the proposed activity is unlikely to result in invasive species that are harmful to this species becoming further established within the species' habitat.

Introduce disease that may cause the species to decline, or

The proposed activity is not likely to introduce a disease that may cause the species to decline or interfere substantially with the recovery of the species.

Interfere substantially with the recovery of the species

There is currently no Recovery Plan for this species. A key threatening process for this species is habitat loss or degradation at a landscape scale. As much of the Subject Site is in a modified, degraded and fragmented state, it is unlikely that the proposed activity will interfere substantially with the recovery of this species.

Is a significant impact likely to result?

After considering the above statements, the proposed activity is unlikely to have a significant impact on the Painted Honeyeater.

Hirundapus caudacutus (White-throated Needletail)

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

Lead to a long-term decrease in the size of an important population of a species

Given the small scale of disturbance associated with the proposed activity and the availability of alternative habitat outside the Subject Site for this highly mobile species, it is unlikely that the proposed activity will lead to a long-term decrease in the size of an important population of this species.

Reduce the area of occupancy of an important population

The proposed activity will impact a small area of potential habitat for this species. As the proposed Subject Site is primarily within the road corridor, the area of occupancy for any potential important populations that may occur within the area will not be reduced. Areas of undisturbed potential habitat for this species will remain outside the proposed Subject Site, in order to support the continuation of the population.

Fragment an existing important population into two or more populations

The small scale of the disturbance associated with the proposed activity, combined with its linear nature and the high mobility of this species means that it is unlikely that an existing important population will be split into two or more populations.

Adversely affect habitat critical to the survival of a species

No critical habitat has been declared for this species, and given the small scale of the disturbance associated with the proposed activity, the degraded state of the habitat within the Subject Site, and the availability of alternative habitat outside the Subject Site, it is unlikely that the proposed activity will adversely impact upon habitat critical to the survival of this species.

Disrupt the breeding cycle of an important population

This species is a non-breeding migratory visitor to Australia, and as such, the proposed activity will not disrupt the breeding cycle of this species.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Given the small scale of the disturbance associated with the proposed activity and the availability of alternative habitat outside the Subject Site, it is unlikely that the proposed activity will affect habitat for this highly mobile species to the extent that it is likely to decline.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

No harmful invasive species are expected to become established in areas of potential habitat for this species as a result of the proposed activity.

Introduce disease that may cause the species to decline, or

The proposed activity is not likely to introduce a disease that may cause the species to decline or interfere substantially with the recovery of this species.

interfere substantially with the recovery of the species.

There is currently no Recovery Plan for this species. A key threatening process for this species is the loss of roosting sites, as well as loss of forest and woodland habitat resulting in the reduction of invertebrate prey. As much of the Subject Site is in a modified, degraded and fragmented state, it is unlikely that the proposed activity will interfere substantially with the recovery of this species.

Is a significant impact likely to result?

After considering the above statements, the proposed activity is unlikely to have a significant impact on the White-throated Needletail.

Lathamus discolor (Swift Parrot)

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

Lead to a long-term decrease in the size of a population

The proposed slashing and minor vegetation removal (including potential pruning of overhead branches), will only impact a small area of potential habitat. Given this, and the areas of alternate habitat surrounding the Subject Site, the proposed activity is unlikely to lead to a long-term decrease in the size of a population of the species.

Reduce the area of occupancy of the species

The proposed activity will impact a small area of potential habitat for the species. Areas of undisturbed and higher quality potential habitat for this species will remain outside the Subject Site, in order to support the continuation of the population.

Fragment an existing population into two or more populations

The proposed activity is of a linear nature and will occur along an already disturbed road corridor. Given this, the proposed activity will not increase fragmentation of the existing population into two or more populations.

Adversely affect habitat critical to the survival of a species

Habitat critical to the survival of this species includes habitats which are used:

- For nesting
- By large proportions of the Swift Parrot population
- Repeatedly between seasons (site fidelity), or
- For prolonged periods of time (site persistence)

The proposed activity will involve slashing and minor vegetation removal (including pruning of overhead branches). Due to the highly disturbed nature of the vegetation within the Subject Site, the surrounding areas of potential high-quality habitat that will remain undisturbed, and the highly mobile nature of this species, the proposed activity is unlikely to adversely affect habitat critical to the survival of this species.

Disrupt the breeding cycle of a population

There are no known records of this species within the Subject Site. Due to the small scale of the disturbance, and the species being highly mobile, it is unlikely that the proposed activity will disrupt the breeding cycle of a population.

There are no known breeding pairs within the Study Area. Due to the species being highly mobile, it is unlikely that the proposed activity will disrupt the breeding cycle of a population.

Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposed slashing and minor vegetation removal (including pruning of overhead branches) will impact upon only a small area of potential foraging habitat for this species. Due to this and the species being highly mobile, it is unlikely the proposed activity will modify, destroy, remove or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Areas of intact, higher quality habitat will remain outside of the Subject Site, undisturbed by the works.

Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

The proposed slashing and minor vegetation removal (including pruning overhead branches) will not result in invasive species that are harmful to this species becoming established in the species' habitat.

Introduce disease that may cause the species to decline, or

The proposed activity is not likely to introduce a disease that may cause the species to decline or interfere substantially with the recovery of the species.

Interfere with the recovery of the species

The objectives of the Swift Parrot recovery plan are to:

- Prevent further population decline of the Swift Parrot; and
- Achieve a demonstratable sustained improvement in the quality and quantity of Swift Parrot habitat to increase carrying capacity.

Most of the Study Area is in a modified, degraded and fragmented state. The proposed clearing will impact upon only a small area of potential foraging habitat for this species. Due to this, it is unlikely that the scale of disturbance for the proposed activity will interfere substantially with the recovery of this species.

Is a significant impact on the species likely to result?

After considering the above statements, the proposed action is unlikely to have a significant impact on the Swift Parrot.

Nyctophilus corbeni (Corben's Long-eared Bat)

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

Lead to a long-term decrease in the size of an important population of a species

The proposed activity involves the temporary disturbance of potential habitat for this species. Corben's Long-eared Bat is a mobile species which is likely to utilise surrounding areas which contain comparable habitat to that which exists in the Subject Site. Given the small scale of disturbance associated with the proposed activity and the availability of alternative habitat outside of the Subject Site, it is unlikely that the proposed activity will lead to a long-term decrease in the size of an important population of this species.

Reduce the area of occupancy of an important population

There have been records for this species within the Locality. Given the small scale of disturbance associated with the proposed activity, and the availability of alternative habitat outside the Subject Site means that it is unlikely that the area of occupancy of an important population is likely to be reduced.

Fragment an existing important population into two or more populations

Due to the small scale of disturbance associated with the proposed activity, and the mobility of this species, it is unlikely that an existing important population is split into two or more populations. As the Subject Site is primarily within the road corridor, the movement of bats will not be impacted.

Adversely affect habitat critical to the survival of a species

The woodland areas within the Subject Site are likely to constitute foraging habitat for this species. Given the small scale of disturbance associated with the proposed activity and the availability of alternative habitat outside of the Subject Site, it is unlikely that the proposed activity will adversely impact upon the survival of this species.

Disrupt the breeding cycle of an important population

Hollow-bearing trees are present within the Subject Site, however there will be more removal of these trees. Given that there is higher quality habitat within the wider landscape, it is unlikely that the breeding cycle of an important population will be disrupted.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Given the current highly degraded state of much of the Subject Site, the small scale of disturbance associated with the proposed activity and the availability of alternative habitat outside the Subject Site, it is unlikely that the proposed activity will affect habitat for this species to the extent that it is likely to decline.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

No harmful invasive species are expected to become established in areas of potential habitat for this species as a result of the proposed activity.

Introduce disease that may cause the species to decline, or

No disease that may cause this species to decline is likely to be introduced by the proposed activity.

Interfere substantially with the recovery of the species.

There is currently no Recovery Plan for this species. A key threatened process for this species is the loss, fragmentation and degradation of habitat. Much of the Subject Site is in a modified, degraded and/or fragmented state, therefore it is unlikely that the proposed activity will interfere substantially with the recovery of this species.

Is a significant impact on the species likely to result?

After considering the above statements, the proposed action is unlikely to have a significant impact on the Corben’s Long-eared Bat.

Phascolarctos cinereus (Koala)

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

Lead to a long-term decrease in the size of an important population of a species

One Koala was recorded within the Subject Site during the field survey, and there have been a high quantity of historical records within the Locality. The proposed activity will involve minor vegetation removal (including potential pruning of branches). Given the small scale and temporary nature of the disturbance, and the availability of habitat within the surrounding area, it is unlikely that the proposed activity will lead to a long-term decrease in the size of an important population of this species.

Reduce the area of occupancy of an important population

The proposed activity will not result in removal of habitat, other than potential minor pruning of branches. Due to this, and the availability of habitat outside the Subject Site, it is unlikely that the area of occupancy of an important population is likely to be reduced.

Fragment an existing important population into two or more populations

There will be no removal of habitat, other than potential minor pruning of branches. The works will take place primarily within the road corridor, in a linear nature. Due to this, it is unlikely that the proposed activity will result in an existing important population being split into two or more populations.

Adversely affect habitat critical to the survival of a species

An assessment was undertaken using the Koala habitat assessment tool, within the EPBC Act referral guidelines for the vulnerable koala (DoE 2014), which determined that the Subject Site contains habitat critical to the survival of the koala (**Table C - 1**). However, given the small scale and temporary nature of the disturbance, and the availability of alternative habitat outside the Subject Site, it is unlikely that the proposed activity will adversely impact upon this habitat critical to the survival of this species.

Table C - 1: Koala habitat assessment tool (DoE 2014)

Attribute	Score	Justification
Koala occurrence	+2 (high)	There were two koalas observed during the field survey in November 2020
Vegetation composition	+2 (high)	There was woodland with two or more known koala food tree species across the Subject Site
Habitat connectivity	+2 (high)	Sections of the Subject Site occur within an area of contiguous landscape ≥ 1000 ha
Key existing threats	+1 (medium)	There is evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present, as per the BioNet records (OEH 2020a)
Recovery value	0 (low)	As the Subject Site is within a degraded landscape, with the majority along the road edge, the habitat is considered unlikely to be important to achieving the interim recovery objectives as per the inland objectives contained in

Attribute	Score	Justification
		Table 1 in the EPBC Act referral guidelines for the vulnerable koala (DoE 2014).
Final score	7 – area contains habitat critical to the survival of the koala	

Disrupt the breeding cycle of an important population

There will be no removal of habitat, other than potential minor pruning of branches. As such, it is unlikely that the proposed activity will disrupt the breeding cycle of an important population.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposed slashing and minor vegetation removal (including pruning of small (<10cm diameter) overhead branches) will impact upon only a small area of potential habitat for this species. Due to this, it is unlikely the proposed activity will modify, destroy, remove or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Areas of intact, higher quality habitat will remain outside of the Subject Site, undisturbed by the works.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species’ habitat

No harmful invasive species are expected to become established in areas of habitat for this species as a result of the proposed activity.

Introduce disease that may cause the species to decline, or

No disease that may cause this species to decline is likely to be introduced by the proposed activity.

Interfere substantially with the recovery of the species.

The objectives of the Koala recovery plan within NSW are to:

- Reverse the decline of the Koala in NSW
- Ensure adequate protection, management and restoration of Koala habitat, and
- Maintain healthy breeding populations of Koalas throughout their current range.

Most of the Study Area is in a modified, degraded and fragmented state. The proposed clearing will impact upon only a small area of potential habitat for this species. Due to this, it is unlikely that the scale disturbance for the proposed activity will interfere substantially with the recovery of this species.

Is a significant impact on the species likely to result?

After considering the above statements, the proposed action is unlikely to have a significant impact on the Koala.

Pteropus poliocephalus (Grey-headed Flying Fox)

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

Lead to a long-term decrease in the size of an important population of a species

The proposed activity involves temporary disturbance of potential foraging habitat for this species. Grey-headed Flying Fox is a mobile species which is likely to utilise surrounding areas which contain higher quality habitat to that which exists in the Subject Site.

Given the relatively small scale of disturbance associated with the proposed activity and the availability of alternative habitat outside of the Subject Site, it is unlikely that the proposed activity will lead to a long-term decrease in the size of an important population of this species. No known roosting sites will be impacted by the proposed activity

Reduce the area of occupancy of an important population

There are no records for this species within the Study Area, and the small scale of disturbance associated with the proposed activity, and the availability of alternative habitat outside the Subject Site means that it is unlikely that the area of occupancy of an important population is likely to be reduced.

Fragment an existing important population into two or more populations

Due to the small scale of disturbance associated with the proposed activity, and the mobility of this species, it is unlikely that an existing important population is split into two or more populations. As the Subject Site is primarily within the road corridor, the movement of bats will not be impacted.

Adversely affect habitat critical to the survival of a species

The woodland areas within the Subject Site are likely to constitute foraging habitat for this species. Given the small scale of disturbance associated with the proposed activity and the availability of alternative habitat outside of the Subject Site, it is unlikely that the proposed activity will adversely impact upon the survival of this species.

Disrupt the breeding cycle of an important population

There are known roosting sites within the Subject Site, with the Subject Site providing potential foraging habitat only. Given that there is higher quality habitat within the wider landscape, it is unlikely that the breeding cycle of an important population will be disrupted.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Given the current highly degraded state of much of the Subject Site, the small scale of disturbance associated with the proposed activity and the availability of alternative habitat outside the Subject Site, it is unlikely that the proposed activity will affect habitat for this species to the extent that it is likely to decline.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

No harmful invasive species are expected to become established in areas of potential habitat for this species as a result of the proposed activity.

Introduce disease that may cause the species to decline, or

No disease that may cause this species to decline is likely to be introduced by the proposed activity.

Interfere substantially with the recovery of the species.

Recovery actions for this species involve managing and securing key foraging and roosting habitats. There are no known roosting sites within the Subject Site, with the Subject Site providing potential foraging habitat only. As there is alternative foraging habitat within the surrounding landscape, it is unlikely that the proposed activity will interfere with the recovery of this species.

Is a significant impact on the species likely to result?

After considering the above statements, the proposed action is unlikely to have a significant impact on the Grey-headed Flying-Fox.

Swainsona murrayana (Slender Darling Pea)

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

Lead to a long-term decrease in the size of an important population of a species

Due to the absence of records and the low quality of potential habitat within the Subject Site, combined with the presence of higher quality habitat in the surrounding area, it is unlikely that the proposed activity will lead to a long-term decrease in the size of an important population of *Swainsona murrayana*.

Reduce the area of occupancy of an important population

Given the absence of records and low quality of potential habitat within the Subject Site, combined with the small-scale temporary nature of the proposed activity, it is unlikely that the area of occupancy of an important population will be reduced.

Fragment an existing important population into two or more populations

The Subject Site provides low quality potential habitat with higher quality habitat present in areas surrounding the Subject Site. Additionally, the absence of records from the Subject Site indicates that the temporary disturbance of this habitat is unlikely to affect the long-term survival of these species in the locality. Due to this, and the already disjunct nature of the potential habitat, it is unlikely that an existing important population will be split into two or more populations.

Adversely affect habitat critical to the survival of a species

No habitat critical to the survival of this species has been declared. Given the absence of records and the low quality of potential habitat within the Subject Site, combined with the small scale of the

disturbance, it is unlikely that the proposed activity will adversely impact upon the survival of this species.

Disrupt the breeding cycle of an important population

Given the absence of records and the low quality of potential habitat within the Subject Site, combined with the small scale of the Subject Site, it is unlikely that the proposed activity will disrupt the breeding cycle of an important population.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Given the absence of records and the low quality of potential habitat within the Subject Site, combined with the small scale and temporary nature of the disturbance, and the presence of higher quality habitat in the surrounding areas, it is unlikely that the proposed activity will result in a decline of the species.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Much of the area within the Subject Site is highly degraded with a high proportion of weeds. Vehicle wash down procedures have been recommended to reduce the further spread of weeds. Given this, it is unlikely that harmful invasive species will become established in areas of potential habitat for this species as a result of the proposed activity.

Introduce disease that may cause the species to decline, or

No disease that may cause this species to decline is likely to be introduced by the proposed activity.

Interfere substantially with the recovery of the species.

Key threats to this species include degradation of habitat due to ploughing or grazing. There is the potential for minor slashing to occur during the proposed activity, however these works will be temporary and minor. Due to this, and the lack of records within the Subject Site, the proposed activity is unlikely to interfere substantially with the recovery of the species.

Is a significant impact on the species likely to result?

After considering the above statements, the proposed action is unlikely to have a significant impact on the *Swainsona murrayana*.

Tylophora linearis

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

Lead to a long-term decrease in the size of a population

There will be no clearing of trees (other than potential pruning of overhead branches) or shrubs during the proposed activity. As such, the impact to areas of potential habitat of this species will be low. Given this, and the absence of records within the Subject Site, the proposed activity is unlikely to lead to a long-term decrease in the size of a population of *Tylophora linearis*.

Reduce the area of occupancy of the species

The proposed activity will impact a small area of potential habitat for this species. There will be no clearing of trees (other than potential pruning of overhead branches) or shrubs during the proposed activity. Given this, and the absence of records within the Subject Site, it is unlikely that the area of occupancy for this species will be reduced.

Fragment an existing population into two or more populations

The proposed activity is of a linear nature and will occur along an already disturbed road corridor. Given this, the proposed activity will not increase fragmentation of an existing population into two or more populations.

Adversely affect habitat critical to the survival of a species

Habitat for this species includes dry woodlands of *Eucalyptus fibrosa*, *Eucalyptus sideroxylon*, *Eucalyptus albens*, *Callitris endlicheri*, *Callitris glaucophylla* and *Allocasuarina luehmannii*. The proposed activity will involve slashing and minor vegetation removal (including pruning of overhead branches). Due to this, it is unlikely that the proposed activity will adversely impact upon habitat critical to the survival of this species.

Disrupt the breeding cycle of a population

There are no known records of this species within the Subject Site. Due to the small scale of the disturbance, it is unlikely that the proposed activity will disrupt the breeding cycle of a population.

Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposed slashing and minor vegetation removal (including pruning of overhead branches) will impact upon only a small area of potential habitat for this species. Due to this small scale disturbance, and the absence of records within the Subject Site, it is unlikely that the proposed activity will result in a modification of the quality of habitat to the extent that the species is likely to decline.

Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

The proposed slashing and minor vegetation removal (including pruning overhead branches) will not result in invasive species that are harmful to this species becoming established in the species' habitat.

Introduce disease that may cause the species to decline, or

The proposed activity is not likely to introduce a disease that may cause the species to decline or interfere substantially with the recovery of the species.

Interfere with the recovery of the species

Key threats to this species include track maintenance and forestry activities. The proposed activity will not result in a change in the road corridor, other than potential minor pruning of overhead branches.

Due to this, it is unlikely that the scale of disturbance for the proposed activity will interfere substantially with the recovery of this species.

Is a significant impact on the species likely to result?

After considering the above statements, the proposed action is unlikely to have a significant impact on the *Tylophora linearis*.

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

Reduce the extent of an ecological community

The proposed activity will involve temporary disturbance of this ecological community, including the potential for slashing and pruning of overhead branches. Other than this pruning, there will be no clearing of trees during the proposed activity. The Subject Site forms only a small proportion of the CEEC's extent in the locality with larger patches remaining within the surrounding area. Due to this, the proposed activity will not reduce the extent of this CEEC.

Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines

The CEEC within the Subject Area is primarily within a road corridor and is subsequently already isolated and fragmented from larger areas of the CEEC beyond the road corridor. The temporary disturbance from the proposed activity will not result in further fragmentation of this CEEC.

Adversely affect habitat critical to the survival of an ecological community

It is unlikely that the proposed activity will adversely affect habitat critical to the survival of the CEEC given the small-scale temporary nature of the disturbance, and the fragmented state the CEEC is currently in within the Subject Site. Larger, higher quality areas of the CEEC are directly adjacent and surrounding the Subject Site and will not be affected by the proposed activity.

Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns

The proposed activity may require slashing of understorey vegetation, which could temporarily alter surface water runoff. However, these potential impacts will be short term. It is therefore unlikely that any disturbance will modify abiotic factors necessary for the survival of the CEEC.

Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting

The proposed activity will temporarily disturb a small area of the CEEC; however, it would not significantly change the species composition of the total CEEC occurrence within the surrounding area.

It is unlikely that the extent of the disturbance will cause a substantial change or significant decline of the CEEC.

Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:

- **assisting invasive species, that are harmful to the listed ecological community, to become established, or**
- **causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or**
- The CEEC occurs in an already modified landscape. Vegetation slashing and vehicle movements associated with the proposed activity may promote the spread of weeds and mobilisation of pollutants. These potential impacts will be minimised through effective management (e.g. wash down procedures) and as such, are unlikely to result in a substantial reduction in the quality and integrity of the CEEC.

Interfere with the recovery of an ecological community

Given the small scale of the disturbance, the local abundance of the CEEC and the proposed management measures, it is unlikely that the proposed activity will interfere with the overall recovery of the CEEC.

Appendix D – Flora species list

Family	Species	Common Name	Form	Native/Exotic
Malvaceae	<i>Abutilon oxycarpum</i>	Straggly Lantern-bush	Shrub	Native
Fabaceae (Subfamily Mimosoideae)	<i>Acacia deanei</i> subsp. <i>deanei</i>	Deane's Wattle	Shrub	Native
Fabaceae (Subfamily Mimosoideae)	<i>Acacia doratoxylon</i>	Currawang	Tree	Native
Fabaceae (Subfamily Mimosoideae)	<i>Acacia</i> spp.		Shrub	Native
Lamiaceae	<i>Ajuga australis</i>	Austral bugle	Forb	Native
Sapindaceae	<i>Alectryon oleifolius</i> subsp. <i>elongatus</i>	Western Rosewood	Tree	Native
Amaranthaceae	<i>Alternanthera</i> spp.		Forb	Native/exotic
Asteraceae	<i>Ambrosia</i> spp.		Forb	Exotic
Poaceae	<i>Anthosachne scabra</i>	Wheatgrass	Grass & grasslike	Native
Poaceae	<i>Aristida caput-medusae</i>	Many-headed Wiregrass	Grass & grasslike	Native
Poaceae	<i>Aristida ramosa</i>	Purple Wiregrass	Grass & grasslike	Native
Poaceae	<i>Aristida vagans</i>	Threeawn Speargrass	Grass & grasslike	Native
Anthericaceae	<i>Arthropodium milleflorum</i>	Pale Vanilla-lily	Forb	Native
Anthericaceae	<i>Arthropodium minus</i>		Forb	Native
Rubiaceae	<i>Asperula conferta</i>	Common Woodruff	Forb	Native
Chenopodiaceae	<i>Atriplex semibaccata</i>	Creeping Saltbush	Shrub	Native
Poaceae	<i>Austrostipa aristiglumis</i>	Plains Grass	Grass & grasslike	Native
Poaceae	<i>Austrostipa scabra</i> subsp. <i>scabra</i>	Speargrass	Grass & grasslike	Native
Poaceae	<i>Austrostipa verticillata</i>	Slender Bamboo Grass	Grass & grasslike	Native
Poaceae	<i>Avena barbata</i>	Bearded Oats	Grass & grasslike	Exotic
Nyctaginaceae	<i>Boerhavia dominii</i>	Tarvine	Forb	Native
Malvaceae	<i>Brachychiton populneus</i> subsp. <i>populneus</i>	Kurrajong	Tree	Native
Poaceae	<i>Bromus catharticus</i>	Prairie Grass	Grass & grasslike	Exotic
Acanthaceae	<i>Brunoniella australis</i>	Blue Trumpet	Forb	Native
Asphodelaceae	<i>Bulbine alata</i>	Bulbine Lily	Forb	Native
Asphodelaceae	<i>Bulbine bulbosa</i>	Native Leek	Forb	Native
Asphodelaceae	<i>Bulbine semibarbata</i>	Native Leek	Forb	Native
Pittosporaceae	<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	Blackthorn	Shrub	Native

Family	Species	Common Name	Form	Native/Exotic
Cupressaceae	<i>Callitris glaucophylla</i>	White Cypress Pine	Tree	Native
Asteraceae	<i>Calotis cuneifolia</i>	Purple Burr-daisy	Forb	Native
Asteraceae	<i>Calotis lappulacea</i>	Yellow Burr-daisy	Forb	Native
Cyperaceae	<i>Carex inversa</i>		Grass & grasslike	Native
Asteraceae	<i>Carthamus lanatus</i>	Saffron Thistle	Forb	Exotic
Asteraceae	<i>Cassinia sifton</i>	Sifton Bush	Shrub	Native
Asteraceae	<i>Centaurea melitensis</i>	Maltese Cockspur	Forb	Exotic
Pteridaceae	<i>Cheilanthes distans</i>	Bristly Cloak Fern	Fern	Native
Pteridaceae	<i>Cheilanthes sieberi subsp. sieberi</i>	Poison Rock Fern	Fern	Native
Poaceae	<i>Chloris truncata</i>	Windmill Grass	Grass & grasslike	Native
Asteraceae	<i>Cichorium intybus</i>	Chicory	Forb	Exotic
Ranunculaceae	<i>Clematis microphylla</i>	Small-leaved Clematis	Climber	Native
Asteraceae	<i>Conyza bonariensis</i>	Flaxleaf Fleabane	Forb	Exotic
Asteraceae	<i>Craspedia canens</i>	Grey Billy-buttons	Forb	Native
Crassulaceae	<i>Crassula sieberiana</i>	Australian Stonecrop	Forb	Native
Poaceae	<i>Cymbopogon refractus</i>	Barbed Wire Grass	Grass & grasslike	Native
Cyperaceae	<i>Cyperus gracilis</i>	Slender Flat-sedge	Grass & grasslike	Native
Cyperaceae	<i>Cyperus spp.</i>		Grass & grasslike	Native/exotic
Apiaceae	<i>Daucus glochidiatus</i>	Native Carrot	Forb	Native
Fabaceae (Subfamily Faboideae)	<i>Desmodium brachypodium</i>	Large Tick-trefoil	Forb	Native
Fabaceae (Subfamily Faboideae)	<i>Desmodium varians</i>	Slender Tick-trefoil	Forb	Native
Phormiaceae	<i>Dianella longifolia var. longifolia</i>		Forb	Native
Poaceae	<i>Dichelachne micrantha</i>	Shorthair Plumegrass	Grass & grasslike	Native
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed	Forb	Native
Poaceae	<i>Digitaria spp.</i>		Grass & grasslike	Native/exotic
Sapindaceae	<i>Dodonaea viscosa subsp. angustifolia</i>	Sticky Hop-bush	Shrub	Native
Chenopodiaceae	<i>Dysphania carinata</i>	Keeled Goosefoot	Forb	Native
Chenopodiaceae	<i>Einadia hastata</i>	Berry Saltbush	Forb	Native
Chenopodiaceae	<i>Einadia polygonoides</i>		Forb	Native
Chenopodiaceae	<i>Einadia trigonos subsp. leiocarpa</i>	Fishweed	Forb	Native
Cyperaceae	<i>Eleocharis acuta</i>		Grass & grasslike	Native
Chenopodiaceae	<i>Enchylaena tomentosa</i>	Ruby Saltbush	Shrub	Native

Family	Species	Common Name	Form	Native/Exotic
Poaceae	<i>Enteropogon acicularis</i>		Grass & grasslike	Native
Poaceae	<i>Eragrostis brownii</i>	Brown's Lovegrass	Grass & grasslike	Native
Scrophulariaceae	<i>Eremophila debilis</i>	Winter Apple	Shrub	Native
Poaceae	<i>Eriochloa pseudoacrotricha</i>	Early Spring Grass	Grass & grasslike	Native
Myrtaceae	<i>Eucalyptus albens</i>	White Box	Tree	Native
Myrtaceae	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	Tree	Native
Myrtaceae	<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark	Tree	Native
Myrtaceae	<i>Eucalyptus microcarpa</i>	Grey Box	Tree	Native
Myrtaceae	<i>Eucalyptus populnea</i> subsp. <i>bimbil</i>	Bimble Box	Tree	Native
Asteraceae	<i>Euchiton involucratus</i>	Star Cudweed	Forb	Native
Asteraceae	<i>Euchiton sphaericus</i>		Forb	Native
Asteraceae	<i>Euchiton spp.</i>		Forb	Native
Euphorbiaceae	<i>Euphorbia drummondii</i>	Caustic Weed	Forb	Native
Cyperaceae	<i>Fimbristylis spp.</i>		Grass & grasslike	Native/exotic
Rubiaceae	<i>Galium gaudichaudii</i> subsp. <i>gaudichaudii</i>		Forb	Native
Rutaceae	<i>Geijera parviflora</i>	Wilga	Shrub	Native
Geraniaceae	<i>Geranium retrorsum</i>	Common Cranesbill	Forb	Native
Geraniaceae	<i>Geranium solanderi</i> var. <i>solanderi</i>	Austral Cranesbill	Forb	Native
Fabaceae (Subfamily Faboideae)	<i>Glycine clandestina</i>		Forb	Native
Fabaceae (Subfamily Faboideae)	<i>Glycine tabacina</i>		Forb	Native
Haloragaceae	<i>Gonocarpus elatus</i>		Forb	Native
Asteraceae	<i>Hypochaeris radicata</i>	Catsear	Forb	Exotic
Asteraceae	<i>Hypochaeris spp.</i>		Forb	Exotic
Asteraceae	<i>Hypochaeris albiflora</i>	White Flatweed	Forb	Exotic
Oleaceae	<i>Jasminum suavissimum</i>		Other	Native
Juncaceae	<i>Juncus remotiflorus</i>		Grass & grasslike	Native
Juncaceae	<i>Juncus vaginatus</i>		Grass & grasslike	Native
Poaceae	<i>Lachnagrostis filiformis</i>		Grass & grasslike	Native
Asteraceae	<i>Lactuca serriola</i>	Prickly Lettuce	Forb	Exotic
Anthericaceae	<i>Laxmannia gracilis</i>	Slender Wire Lily	Forb	Native
Asteraceae	<i>Leontodon rhagadioloides</i>	Cretan Weed	Forb	Exotic

Family	Species	Common Name	Form	Native/Exotic
Brassicaceae	<i>Lepidium africanum</i>		Forb	Exotic
Brassicaceae	<i>Lepidium bonariense</i>		Forb	Exotic
Asteraceae	<i>Leptorhynchos panaetioides</i>	Woolly Buttons	Forb	Native
Poaceae	<i>Lolium perenne</i>	Perennial Ryegrass	Grass & grasslike	Exotic
Poaceae	<i>Lolium rigidum</i>	Wimmera Ryegrass	Grass & grasslike	Exotic
Lomandraceae	<i>Lomandra filiformis</i> subsp. <i>coriacea</i>		Grass & grasslike	Native
Lomandraceae	<i>Lomandra filiformis</i> subsp. <i>filiformis</i>	Wattle Mat-rush	Grass & grasslike	Native
Lomandraceae	<i>Lomandra multiflora</i> subsp. <i>multiflora</i>	Many-flowered Mat-rush	Grass & grasslike	Native
Primulaceae	<i>Lysimachia arvensis</i>	Scarlet Pimpernel	Forb	Exotic
Chenopodiaceae	<i>Maireana enchylaenoides</i>	Wingless Bluebush	Forb	Native
Chenopodiaceae	<i>Maireana microphylla</i>	Small-leaf Bluebush	Shrub	Native
Malvaceae	<i>Malva neglecta</i>	Dwarf Mallow	Forb	Exotic
Marsileaceae	<i>Marsilea drummondii</i>	Common Nardoo	Fern	Native
Fabaceae (Subfamily Faboideae)	<i>Medicago minima</i>	Woolly Burr Medic	Forb	Exotic
Fabaceae (Subfamily Faboideae)	<i>Medicago polymorpha</i>	Burr Medic	Forb	Exotic
Fabaceae (Subfamily Faboideae)	<i>Melilotus albus</i>	Bokhara	Forb	Exotic
Fabaceae (Subfamily Faboideae)	<i>Melilotus indicus</i>	Hexham Scent	Forb	Exotic
Poaceae	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass	Grass & grasslike	Native
Scrophulariaceae	<i>Myoporum montanum</i>	Western Boobiolla	Shrub	Native
Oleaceae	<i>Notelaea microcarpa</i> var. <i>microcarpa</i>	Velvet Mock Olive	Tree	Native
Lamiaceae	<i>Oncinocalyx betchei</i>		Forb	Native
Cactaceae	<i>Opuntia aurantiaca</i>	Tiger Pear	Forb	Exotic
Cactaceae	<i>Opuntia tomentosa</i>	Velvet Tree Pear	Shrub	Exotic
Oxalidaceae	<i>Oxalis perennans</i>		Forb	Native
Poaceae	<i>Paspalidium constrictum</i>	Knottybutt Grass	Grass & grasslike	Native
Poaceae	<i>Paspalum</i> spp.		Grass & grasslike	Native/exotic
Polygonaceae	<i>Persicaria</i> spp.		Forb	Native/exotic
Caryophyllaceae	<i>Petrorhagia dubia</i>		Forb	Exotic
Poaceae	<i>Phalaris aquatica</i>	Phalaris	Grass & grasslike	Exotic

Family	Species	Common Name	Form	Native/Exotic
Thymelaeaceae	<i>Pimelea neo-anglica</i>	Poison Pimelea	Shrub	Native
Thymelaeaceae	<i>Pimelea curviflora</i> <i>subspecies divergens.</i>		Shrub	Native
Plantaginaceae	<i>Plantago cunninghamii</i>		Forb	Native
Plantaginaceae	<i>Plantago debilis</i>		Forb	Native
Poaceae	<i>Poa sieberiana</i> var. <i>sieberiana</i>	Snowgrass	Grass & grasslike	Native
Rubiaceae	<i>Pomax umbellata</i>		Forb	Native
Portulacaceae	<i>Portulaca oleracea</i>	Pigweed	Forb	Native
Ranunculaceae	<i>Ranunculus meristus</i>		Forb	Native
Acanthaceae	<i>Rostellularia adscendens</i> var. <i>adscendens</i>		Forb	Native
Polygonaceae	<i>Rumex brownii</i>	Swamp Dock	Forb	Native
Polygonaceae	<i>Rumex crispus</i>	Curled Dock	Forb	Exotic
Polygonaceae	<i>Rumex spp.</i>		Forb	Native/exotic
Poaceae	<i>Rytidosperma bipartitum</i>	Wallaby Grass	Grass & grasslike	Native
Poaceae	<i>Rytidosperma racemosum</i> var. <i>obtusatum</i>		Grass & grasslike	Native
Poaceae	<i>Rytidosperma spp.</i>		Grass & grasslike	Native
Chenopodiaceae	<i>Salsola australis</i>		Shrub	Native
Chenopodiaceae	<i>Sclerolaena birchii</i>	Galvanized Burr	Shrub	Native
Chenopodiaceae	<i>Sclerolaena muricata</i> var. <i>muricata</i>	Black Rolypoly	Shrub	Native
Asteraceae	<i>Senecio microbasis</i>		Forb	Native
Asteraceae	<i>Senecio tuberculatus</i>		Forb	Native
Asteraceae	<i>Senecio spp.</i>		Forb	Native
Malvaceae	<i>Sida corrugata</i>	Currugated Sida	Forb	Native
Malvaceae	<i>Sida cunninghamii</i>	Ridged Sida	Forb	Native
Malvaceae	<i>Sida rhombifolia</i>	Paddy's Lucerne	Forb	Exotic
Malvaceae	<i>Sida spinosa</i>		Forb	Exotic
Malvaceae	<i>Sida filiformis</i>	Fine Sida	Forb	Native
Brassicaceae	<i>Sisymbrium irio</i>	London Rocket	Forb	Exotic
Solanaceae	<i>Solanum chenopodioides</i>	Whitetip Nightshade	Shrub	Exotic
Solanaceae	<i>Solanum ferocissimum</i>	Spiny Potato Bush	Shrub	Native
Solanaceae	<i>Solanum nigrum</i>	Black-berry Nightshade	Shrub	Exotic
Solanaceae	<i>Solanum parvifolium</i> subsp. <i>parvifolium</i>		Shrub	Native

Family	Species	Common Name	Form	Native/Exotic
Asteraceae	<i>Solenogyne bellioides</i>		Forb	Native
Asteraceae	<i>Solenogyne spp.</i>		Forb	Native
Asteraceae	<i>Soliva sessilis</i>	Jo-jo	Forb	Exotic
Asteraceae	<i>Sonchus oleraceus</i>	Common Sowthistle	Forb	Exotic
Fabaceae (Subfamily Faboideae)	<i>Swainsona galegifolia</i>	Smooth Darling-pea	Forb	Native
Asteraceae	<i>Taraxacum officinale</i>	Dandelion	Forb	Exotic
Poaceae	<i>Themeda triandra</i>	Kangaroo Grass	Grass & grasslike	Native
Zygophyllaceae	<i>Tribulus micrococcus</i>	Yellow Vine	Forb	Native
Zygophyllaceae	<i>Tribulus minutus</i>		Forb	Native
Fabaceae (Subfamily Faboideae)	<i>Trifolium arvense</i>	Haresfoot Clover	Forb	Exotic
Scrophulariaceae	<i>Verbascum virgatum</i>	Twiggy Mullein	Forb	Exotic
Verbenaceae	<i>Verbena spp.</i>		Forb	Native/exotic
Plantaginaceae	<i>Veronica plebeia</i>	Trailing Speedwell	Forb	Native
Fabaceae (Subfamily Faboideae)	<i>Vicia sativa subsp. nigra</i>	Narrow-leaved Vetch	Forb	Exotic
Fabaceae (Subfamily Faboideae)	<i>Vicia sativa subsp. sativa</i>	Common Vetch	Forb	Exotic
Violaceae	<i>Viola spp.</i>		Forb	Native/exotic
Asteraceae	<i>Vittadinia cuneata var. cuneata</i>		Forb	Native
Poaceae	<i>Vulpia bromoides</i>	Squirrel Tail Fescue	Grass & grasslike	Exotic
Campanulaceae	<i>Wahlenbergia communis</i>	Tufted Bluebell	Forb	Native
Campanulaceae	<i>Wahlenbergia gracilis</i>	Sprawling Bluebell	Forb	Native
Campanulaceae	<i>Wahlenbergia luteola</i>		Forb	Native
Campanulaceae	<i>Wahlenbergia spp.</i>		Forb	Native/exotic
Poaceae	<i>Walwhalleya prolata</i>		Grass & grasslike	Native
Asteraceae	<i>Xerochrysum bracteatum</i>	Golden Everlasting	Forb	Native

Appendix E – Fauna species list

Common Name	Scientific Name	BC Act	EPBC Act
Apostlebird	<i>Struthidea cinerea</i>		
Australian Magpie	<i>Gymnorhina tibicen</i>		
Australian Raven	<i>Corvus coronoides</i>		
Australian Wood Duck	<i>Chenonetta jubata</i>		
Cockatiel	<i>Nymphicus hollandicus</i>		
Crested Pigeon	<i>Ocyphaps lophotes</i>		
Crimson Rosella	<i>Platycercus elegans</i>		
Eastern Bearded Dragon	<i>Pogona barbata</i>		
Eastern Rosella	<i>Platycercus eximius</i>		
Galah	<i>Eolophus roseicapilla</i>		
Grey Butcherbird	<i>Cracticus torquatus</i>		
Grey Fantail	<i>Rhipidura albiscapa</i>		
Koala	<i>Phascolarctos cinereus</i>	Vulnerable	Vulnerable
Laughing Kookaburra	<i>Dacelo novaeguineae</i>		
Magpie-lark	<i>Grallina cyanoleuca</i>		
Noisy Miner	<i>Manorina melanocephala</i>		
Olive Backed Oriole	<i>Oriolus sagittatus</i>		
Red-rumped Parrot	<i>Psephotus haematonotus</i>		
Rufous Songlark	<i>Megalurus mathewsi</i>		
Rufous Whistler	<i>Pachycephala rufiventris</i>		
Spotted Pardalote	<i>Pardalotus punctatus</i>		
Straw-necked Ibis	<i>Threskiornis spinicollis</i>		
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>		
White-throated Treecreeper	<i>Cormobates leucophaea</i>		
White-winged Chough	<i>Corcorax melanorhamphos</i>		
Willie Wagtail	<i>Rhipidura leucophrys</i>		



APPENDIX C FACTORS FOR CONSIDERATION UNDER SECTION 171

Section 171 of the *Environmental Planning and Assessment Regulation 2021* identifies factors that must be taken into consideration in assessing an activity under Part 5 of the EP&A Act. An assessment of the Section 171 factors is provided in the table below.

Factor	Impact
Any environmental impact on a community	Minor There would be some temporary impacts to the community resulting from traffic, noise and generation of dust during the activity.
Any transformation of a locality	Nil There will be no transformation of a locality.
Any environmental impact on the ecosystems of the locality.	Negligible The activity would require vegetation slashing up to three metres from the roads detailed in this REF. The Flora and Fauna Assessment prepared to support this REF indicates that impacts to ecosystems would not be significant.
Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality.	Nil There will be no reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality.
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.	Negligible With the implementation of proposed mitigation methods, the activity would be unlikely to impact upon Aboriginal cultural heritage, as identified in Appendix D .
Any impact on the habitat of protected fauna (within the meaning of the <i>National Parks and Wildlife Act 1974</i>)	Negligible The activity would require vegetation slashing up to three metres from the roads detailed in this REF. The Flora and Fauna Assessment prepared to support this REF indicates that impacts to fauna habitat would not be significant.
Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air.	Negligible The activity would require vegetation slashing up to three metres from the roads detailed in this REF. The Flora and Fauna Assessment prepared to support this REF indicates that impacts to flora and fauna would not be significant.
Any long-term effects on the environment	Nil There will be no long-term effects on the environment.
Any degradation of the quality of the environment	Nil There will be no degradation of the quality of the environment.
Any risk to the safety of the environment	Nil There would be no risk to the safety of the environment
Any reduction in the range of beneficial uses of the environment	Nil There will be no reduction in the range of beneficial uses of the environment.
Any pollution of the environment	Negligible There will be no significant pollution of the environment. During construction minor noise and dust impacts would be managed.
Any environmental problems associated with the disposal of waste	Nil There would be no environmental problems associated with the disposal of waste associated with the activity.

Factor	Impact
Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply	Negligible The activity will consume minor quantities of non-renewable resources which are not, or likely to not become, in short supply.
Are there any applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1	Nil There are no applicable strategic planning instruments which would likely be impacted because of the activity.
Are there any other relevant environmental factors	Nil There are no other relevant environmental impacts considered.

APPENDIX D ABORIGINAL DUE DILLIGENCE ASSESSMENT



View northeast of a portion of the study area on Milroy Road.

ABORIGINAL HERITAGE DUE DILIGENCE ASSESSMENT REPORT

GUNNEDAH WORK PROGRAM

GUNNEDAH SHIRE COUNCIL LOCAL GOVERNMENT AREA (LGA), NSW.

MAY 2022

Report prepared by
OzArk Environment & Heritage
for Santos (QNT) Pty Ltd

The OzArk logo is located in the top right corner of the page. It features the word "OzArk" in a white, sans-serif font against a dark blue background. The letter "O" is stylized with a green leaf inside it, and the letter "A" is stylized with a yellow and orange flame-like shape inside it.

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Acknowledgement

OzArk acknowledge the traditional custodians of the area on which this assessment took place and pay respect to their beliefs, cultural heritage, and continuing connection with the land. We also acknowledge and pay respect to the post-contact experiences of Aboriginal people with attachment to the area and to the Elders, past and present, as the next generation of role models and vessels for memories, traditions, culture and hopes of local Aboriginal people.

EXECUTIVE SUMMARY

OzArk Environment & Heritage (OzArk) has been engaged by Santos Pty Ltd (Santos) to complete an Aboriginal due diligence heritage assessment for the Gunnedah Works Program (the proposal). The proposal is in the Gunnedah Shire Council Local Government Area (LGA).

The visual inspection of the study areas was undertaken by OzArk Director, on 29 and 30 March 2022. No members of the local Aboriginal Community were present during the visual inspection.

No Aboriginal objects were recorded because of this assessment, although four previously recorded Aboriginal sites, all modified trees, were located. Of these, only two are within five metres (m) of the proposed seismic line and will require the implementation of management measures to ensure they are protected.

The undertaking of the due diligence process resulted in the conclusion that the proposed works will have an impact on the ground surface, however, no Aboriginal objects or intact archaeological deposits will be harmed by the proposal. This moves the proposal to the following outcome:

Aboriginal Heritage Impact Permit (AHIP) application not necessary. Proceed with caution. If any Aboriginal objects are found, stop work, and notify Heritage NSW (02 9873 8500; heritagemailbox@environment.nsw.gov.au). If human remains are found, stop work, secure the site, and notify NSW Police and Heritage NSW.

To ensure the greatest possible protection to the area's Aboriginal cultural heritage values, the following recommendations are made:

- 1) The proposed work may proceed at the Gunnedah Works Programs project without further archaeological investigation under the following conditions:
 - a) All land and ground disturbance activities must be confined to within the study areas, as this will eliminate the risk of harm to Aboriginal objects in adjacent landforms. Should the parameters of the proposal extend beyond the assessed areas, then further archaeological assessment may be required.
 - b) All staff and contractors involved in the proposed work should be made aware of the legislative protection requirements for all Aboriginal sites and objects.
- 2) This assessment has concluded that there is a low likelihood that the proposed work will adversely harm Aboriginal cultural heritage items or sites. If during works, however, Aboriginal artefacts or skeletal material are noted, all work should cease and the procedures in the *Unanticipated Finds Protocol* (**Appendix 2**) should be followed.
- 3) AHIMS sites 29-1-0113 and 29-1-0117, both modified trees, are within 5 m of the proposed seismic line (coordinates provided in **Table 3-2**). These modified trees should

be temporarily fenced off with appropriate signage to indicate a no access area during the seismic work.

- 4) The work crew should be provided with the location of these AHIMS sites, and the sites must be avoided.
- 5) Inductions for work crews should include a cultural heritage awareness procedure to ensure they recognise Aboriginal artefacts (see **Appendix 3**) and are aware of the legislative protection of Aboriginal objects under the *National Parks and Wildlife Act 1974* and the contents of the *Unanticipated Finds Protocol*.
- 6) The information presented here meets the requirements of the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*. It should be retained as shelf documentation for five years as it may be used to support a defence against prosecution in the event of unanticipated harm to Aboriginal objects.

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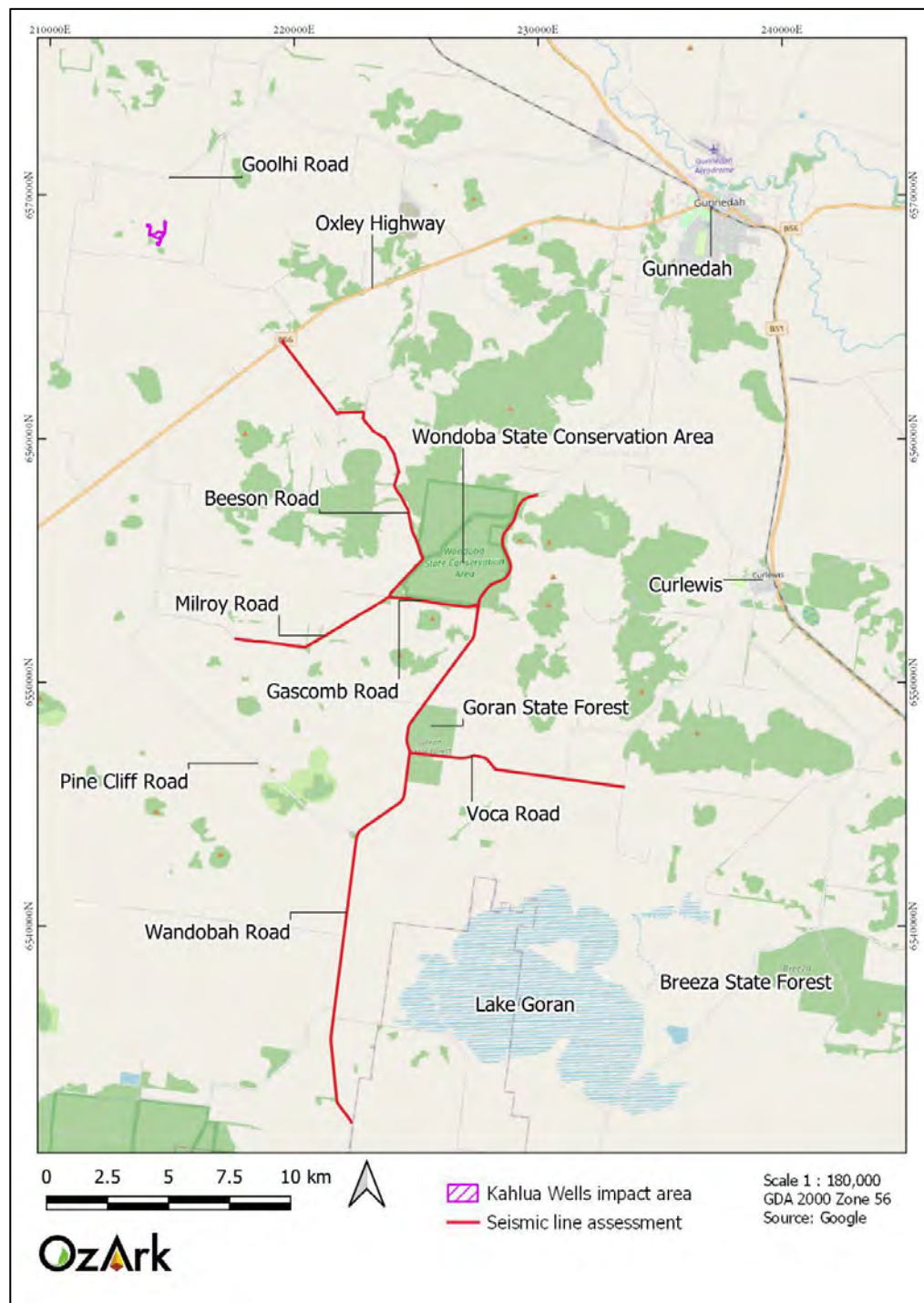
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1 INTRODUCTION

1.1 BRIEF DESCRIPTION OF THE PROPOSAL

OzArk Environment & Heritage (OzArk) has been engaged by Santos Pty Ltd (Santos) to complete an Aboriginal heritage due diligence assessment for the Gunnedah Works Program (the proposal). The proposal is in the Gunnedah Shire Council Local Government Area (LGA) at multiple locations to the west of Gunnedah, with the closest points being between 13 to 22 kilometres (km) from Gunnedah (**Figure 1-1**).

Figure 1-1. Map showing the location of the proposal.



1.2 STUDY AREAS

The proposal includes two work components, and as such, two study areas. The first is the study area for the Kahlua Wells impact area, located approximately 22 km west of Gunnedah and approximately 2 km northwest of the intersection of Marys Mount Road and Collygra Road. The second study area is for the seismic line and extends along multiple road corridors located to the southwest of Gunnedah bordered by the Oxley Highway and Kamilaroi Highway as seen in **Figure 1-1**. The study areas are shown in **Figure 1-2** for the Kahlua Wells impact area and in **Figure 1-3** for the seismic line assessment.

For the seismic line we have anticipated a potential impact width of five metres (m) from the centreline of the road / track along which the lines run, however, OzArk understands that mature vegetation will not be cleared.

1.3 ASSESSMENT APPROACH

Aboriginal cultural heritage

The desktop and visual inspection component for the study area follows the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (due diligence; DECCW 2010). The field inspection followed the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011).

Figure 1-2: Aerial showing the study area for the Kahlua Wells impact area.



Figure 1-3: Aerial showing the study area for the seismic line assessment.



2 ABORIGINAL DUE DILIGENCE ASSESSMENT

2.1 INTRODUCTION

Section 57 of the National Parks and Wildlife Regulation 2019 (NPW Regulation) made under the *National Parks and Wildlife Act 1974* (NPW Act) advocates a due diligence process to determining likely impacts on Aboriginal objects. Carrying out due diligence provides a defence to the offence of harming Aboriginal objects and is an important step in satisfying Aboriginal heritage obligations in NSW.

2.2 DEFENCES UNDER THE NPW REGULATION 2019

2.2.1 Low impact activities

The first step before application of the due diligence process itself is to determine whether the proposed activity is a “low impact activity” for which there is a defence in the NPW Regulation. The exemptions are listed in Section 58 of the NPW Regulation (DECCW 2010: 6).

The nature of the proposed work varies between the two study areas assessed in this report. The works being proposed for the Kahlua Wells study area involve the reactivation of the well site. A document provided by Santos providing a description of works which occur at well sites describes various earthworks, as well as civil and access works that could occur. As the Kahlua Wells site is a pre-existing site, works there could potentially involve the construction, upgrading and/or maintenance works for infrastructure such as roads, water bores, storage pads and / or traffic infrastructure. As such, the activities being undertaken by Santos at the Kahlua Wells impact area are not considered a ‘low impact activity’ for which there is a defence under Section 58 of the NPW Regulation and the due diligence process must be applied.

The seismic line assessment will be the subject of seismic survey work. This activity is considered a low impact activity under Section 58 of the NPW Regulation. However, a description of the works provided by Santos mentions the use of bulldozers or graders, which is not considered a low impact activity. In addition to this, this defence does not apply to situations where there is reason to suspect that an Aboriginal object may be present. As the proposed work is occurring in road corridors with known, previously recorded Aboriginal sites such as culturally modified trees nearby, the due diligence process must be applied.

2.2.2 Disturbed lands

Relevant to this process is the assessed levels of previous land-use disturbance.

The NPW Regulation Section 58 (DECCW 2010: 18) define disturbed land as follows:

Land is disturbed if it has been the subject of a human activity that has changed the land's surface, being changes that remain clear and observable.

Examples include ploughing, construction of rural infrastructure (such as dams and fences), construction of roads, trails and tracks (including fire trails and tracks and walking tracks), clearing vegetation, construction of buildings and the erection of other structures, construction or installation of utilities and other similar services (such as above or below ground electrical infrastructure, water or sewerage pipelines, stormwater drainage and other similar infrastructure) and construction of earthworks.

As the work occurring at the Kahlua Wells study area is over an established pre-existing well site, portions of the study area are considered disturbed. However, since some proposed work may not be in areas where the land's surface has been changed in a clear and observable manner, the due diligence process must be applied.

The works occurring in the study area for the seismic line assessment are along approximately 50 km of existing roads and access tracks. While the actual road corridors and tracks are clearly disturbed, activities may be in less disturbed land, including vegetated corridors along roads, and consequently the due diligence process must be applied.

In summary, it is determined that the proposal must be assessed under the Due Diligence Code. The reasoning for this determination is set out in **Table 2-1**.

Table 2-1: Determination of whether Due Diligence Code applies.

Item	Reasoning	Answer
Is the activity to be assessed under Division 4.7 (state significant development) or Division 5.2 (state significant infrastructure) of the EP&A Act?	The proposal will be assessed under Part 4 of the EP&A Act.	No
Is the activity exempt from the NPW Act or NPW Regulation?	The proposal is not exempt under this Act or Regulation.	No
Do either or both apply: Is the activity in an Aboriginal place? Have previous investigations that meet the requirements of this Code identified Aboriginal objects?	The activity will not occur in an Aboriginal place. No previous investigations have been undertaken for this proposal.	No
Is the activity a low impact one for which there is a defence in the NPW Regulation?	The proposal is not a low impact activity for which there is a defence in the NPW Regulation.	No
Is the activity occurring entirely within areas that are assessed as 'disturbed lands'?	The proposal is not entirely within areas of high modification.	No
Due Diligence Code of Practice assessment is required		

2.3 APPLICATION OF THE DUE DILIGENCE CODE OF PRACTICE TO THE PROPOSAL

To follow the generic due diligence process, a series of steps in a question/answer flowchart format (DECCW 2010: 10) are applied to the proposed impacts and the study area, and the responses documented.

2.3.1 Step 1

Will the activity disturb the ground surface or any culturally modified trees?

Yes, the proposal will impact the ground surface and may impact culturally modified trees.

The works at Kahlua Wells study area may involve earth works and/or the construction of infrastructure necessary to running the facility. These works would require actions that impact the ground surface. From a desktop level it also appears that there are several trees in this study area. Since it cannot be determined if they are mature and/or native from the desktop review, it is possible they may be both, and could potentially be culturally modified. As such it is possible that culturally modified trees may be impacted by the proposal.

The works involved with the seismic line assessment will be occurring in road corridors and access tracks, including those bordering or within the Wondoba State Conservation Area. As such, it is possible that direct or indirect impact could occur to culturally modified trees as there is an abundance of mature, native vegetation in the area.

2.3.2 Step 2a

Are there any relevant confirmed site records or other associated landscape feature information on AHIMS?

There are no previously recorded sites within the Kahlua Wells study area, however, there are recorded sites within proximity of the proposed seismic line.

A search of the Aboriginal Heritage Information Management System (AHIMS) on 24 March 2022 was undertaken over Eastings 206000–235000 and Northings 6529600–6571600 (GDA Zone 56) covering an approximate area of 29 km by 42 km centred on the study areas. The search returned 65 previously registered Aboriginal sites within the search area.

Artefact scatters represent the most frequent site type in the search area, accounting for 29 of the 65 results (44.6%). The next most frequent site type, which accounts for 25 of the 65 registered sites, are culturally modified trees (38.5%). When accounting for sites with multiple site features, these counts become 30 (46.15%) for artefact scatters and 26 for culturally modified trees (40%). Other site types registered in this area include grinding grooves (four sites; 6.2%) and isolated finds (three sites; 4.6%). Three other site types are registered to be within the search area including an artefact site (unspecified quantity), a site with both a burial and a stone arrangement, and a site recorded as a resource and gathering site. Each of these site types account for 1 of the 65 returned results (each accounting for 1.5% of sites).

Figure 2-1 shows all previously recorded sites in relation to the study area and **Table 2-2** shows the types of sites that are close to the study area.

While there are no previously recorded sites registered on the AHIMS database that are located directly within either of the study areas, there are six sites close to the seismic study area to warrant ground-truthing to ensure that they are not going to be at risk of harm from the proposal (AHIMS sites 29-1-0119, 29-1-0122, 29-1-0117, 29-1-0116, 29-1-0114, and 29-1-0113).

Table 2-2: Site types and frequencies of AHIMS sites near the study area.

Site Type	Number	% Frequency
Artefact site (unspecified quantity)	1	1.5
Artefact scatter	29	44.6
Artefacts scatter & culturally modified tree	1	1.5
Burial & stone arrangement	1	1.5
Grinding grooves	4	6.2
Isolated find	3	4.6
Culturally modified tree	25	38.5
Resource & gathering	1	1.5
Total	65	100

Based on the available data, the most likely site type for previously unrecorded Aboriginal sites and objects would be artefact scatters or culturally modified trees. Due to the nature of isolated finds, these are also a likely site type despite their low frequency in the AHIMS search results. If present, isolated finds and artefact scatters are likely to be located on flat or plains landforms, while modified trees may be present where mature native remnant vegetation is located. The likelihood of finding unrecorded culturally modified trees is higher within the study area for the seismic assessment as it is occurring near a conservation area with a high density of native mature vegetation.

Figure 2-1: Previously recorded sites in relation to the study areas.



2.3.3 Step 2b

Are there any other sources of information of which a person is already aware?

No, there are no other sources of information that would indicate the presence of Aboriginal objects in the study areas.

Ethno-Historic Information

According to Tindale (1974), the proposal falls within the limits of the lands occupied by the Gamilaraay (Kamilaroi) language group and the Namoi River landscape provided plentiful resources for the traditional owners.

The name Gunnedah is derived from an Aboriginal word, meaning 'place of many white stones' and in the past the town had a sizeable outcrop of white stone where the public school now stands in Bloomfield Street. At the end of the 18th century, the Gunn-e-darr people of the Kamilaroi tribe were led by a legendary warrior named Cumbo Gunnerah (Idriess 1953). He was also known as the 'Red Chief', who eventually became immortalised through being the subject of a 1953 novel by Ion Idriess.

Following Oxley's British 'discovery' of the Liverpool Plains in 1817, a runaway convict George Clarke ("The Barber") began the first European settlement of the Boggabri area. According to historical reports, Clarke made first contact with local Aboriginal people and was adopted into the Aboriginal community (Dunlop et al 1957 as cited in Hamm 2005).

In 1831 Mitchell's exploring party, following Clarke's route, came across the Leard Forest. Their native guide "Mr Brown" noticed axe markings called "Mogo" on a number of trees which he described as a sign 'to keep away' (O'Rourke 1995). For further information Michael O'Rourke details an account of Mitchell's crossing in *Raw Possum and Salted Port: Major Mitchell and the Kamilaroi* (O'Rourke 2005).

Previous archaeological assessments

The study areas have not been specifically previously assessed for the proposal, however the AHIMS search detailed in **Section 2.3.2** demonstrates that there has been previous heritage assessment work undertaken in the area of the proposed seismic lines. A selection of studies carried out in the region near to the study areas can provide a general understanding of the archaeological landscape and information on the previously recorded Aboriginal sites close to the seismic lines.

In 1981 the area known as 'Authorisation 138' at 'Springfield' was surveyed by Gorecki (1981). This study recorded three sites located approximately 6.2 km northeast of the north-eastern point of the seismic line study area. The number of artefacts at each site varied, with some locations containing single stone artefacts and others containing clusters of artefacts. All were recorded adjacent to Springfield Knob and relatively close to minor drainage features not unlike the one at

the study area. It is important to note that no artefacts were found either upslope in the surrounding hills or downslope on the plains. Gorecki argued that these artefacts were in secondary contexts as agriculture / pastoralism, erosion and construction of contour banks had disturbed their original locations (Gorecki 1981).

Haglund (1984a and 1984b) undertook two studies during 1984 in the vicinity of Gunnedah. The first study (Haglund 1984) consisted of a survey of the proposed Red Hill – Top Rocks – Trunk Road 72 coal haulage route. In this study, Haglund refers to sites previously located at Greenwood Creek (Thompson 1981) and Top Rocks (Haglund 1982), with particular emphasis on 20 axe grinding grooves and an extensive archaeological deposit at Top Rocks. The grinding grooves were situated in the vicinity of sandstone outcrops at the water's edge. The archaeological deposit consisted of stone tools and evidence of manufacturing. Haglund (1984) also examined the proposed location for a coal loader, situated between the north-western railway and Trunk Road 72, 3 km west of Gunnedah. This study, covering 87 ha of cultivated / cleared land, recorded no Aboriginal objects.

In 1985, Haglund conducted a survey of all previous studies relating to the area immediately north of Gunnedah and the Namoi River. This survey concluded that the archaeology of the area is concentrated along rivers and other permanent waterways. This concentration is a result of both prehistoric land use patterns, in which such locations arguably constituted more permanent camps, and historical land use patterns, such as agriculture, which may have disturbed and/or destroyed the archaeology present in areas away from these waterways (Haglund 1985).

Haglund returned to Gunnedah in 1986 to conduct two test excavations of sites requiring ground truthing (Haglund 1987). These sites were located on opposite sides of the Namoi River, and one was a portion of the extensive Namoi River site. Artefacts were recovered at these sites, however, Haglund noted that the artefacts were largely too dispersed to be considered archaeologically significant and were situated in secondary contexts created by vehicle movement and water flows (Haglund 1987).

The AHIMS database search summarised in **Section 2.3.2** and the associated site cards suggests a number of local studies have been conducted within the Wondoba State Conservation Area, which is located in the centre of the northern half of the seismic line study area, north of Goscombe Road. However, no reports are available for these assessments.

Among the studies in the Wondoba State Conservation Area, Red Chief Local Aboriginal Land Council (LALC) has recorded multiple sites, including an artefact scatter, grinding grooves and several culturally modified trees in the conservation area, as well as approximately 6 km south of the conservation area where a further two scarred trees and an artefact scatter were also recorded. Of these recordings, six are in proximity of the seismic line and are discussed further in **Section 3**.

The Walhallow LALC conducted a survey that recorded three culturally modified trees west of the seismic line, on the western side of Wandobah Road, approximately 4.8 km north of the southern extent of the study area.

Tom Griffiths has recorded a further two scarred trees in the same vicinity as part of his archaeological investigation for a Telecom easement (Griffiths 1993), with another survey by Peter Greenwood recorded two artefact scatters and a grinding groove site. These sites are well outside the seismic line easement.

The collective archaeological / scientific evidence from the region suggests that occupation during the late Holocene was centred on small family groups (10 to 15 people) making use of terraces, paleochannels and floodplains as temporary camps as they moved throughout the territory (Purcell 2000; Appleton 2008).

2.3.4 Step 2c

Are there any landscape features that are likely to indicate presence of Aboriginal objects?

Yes, portions of the study areas contain archaeologically sensitive landforms.

The Due Diligence Code (DECCW 2010) specifies a number of landscape features which are most associated with the likely presence of Aboriginal objects, and which therefore require further assessment if present. These are areas that are: within 200 m of waters; located within a sand dune system; located on a ridge top, ridge line or headland; located within 200 m below or above a cliff face; within 20 m of or in a cave, rock shelter, or a cave mouth.

Kahlua Wells study area

The Kahlua Wells study area is located entirely within a flat plain landform. The elevation of this study area is between 300 m and 350 m. The closest major watercourse to the Kahlua Wells study area is Coxs Creek, approximately 9.5 to 10 km west of the study area. There is a minor, unnamed, non-perennial watercourse along the western edge of the study area. Portions of this ephemeral watercourse are located within 100 m of the study area. However, this is a seasonal waterway and does not qualify as 'waters' as set out in the due diligence guidelines. As such, there are no landforms with identified archaeological sensitivity within the study area.

Seismic line assessment study area

Due to the size and expanse of the study area for the seismic line assessment, the proposal is within multiple landform ty[es. From a desktop level, it appears that the two main landforms are flat plains landforms, where the elevation change is more gradual or remains relatively the same over large areas, and slope landforms where there are rolling or undulating slopes and steeper elevation changes.

The seismic line assessment area is in an area of land between two major watercourses, Coxs Creek and Mooki River that are located approximately 14 and 13 km respectively from the study area at their closest points. Most of this study area is also within 100 to 200 m of watercourses of varying nature and permanence. The visual inspection will confirm if these are ephemeral or perennial in nature. As such, portions of this study area are within archaeologically sensitive landforms.

Figure 2-2: Watercourses associated with the study area of Kahlua Wells.

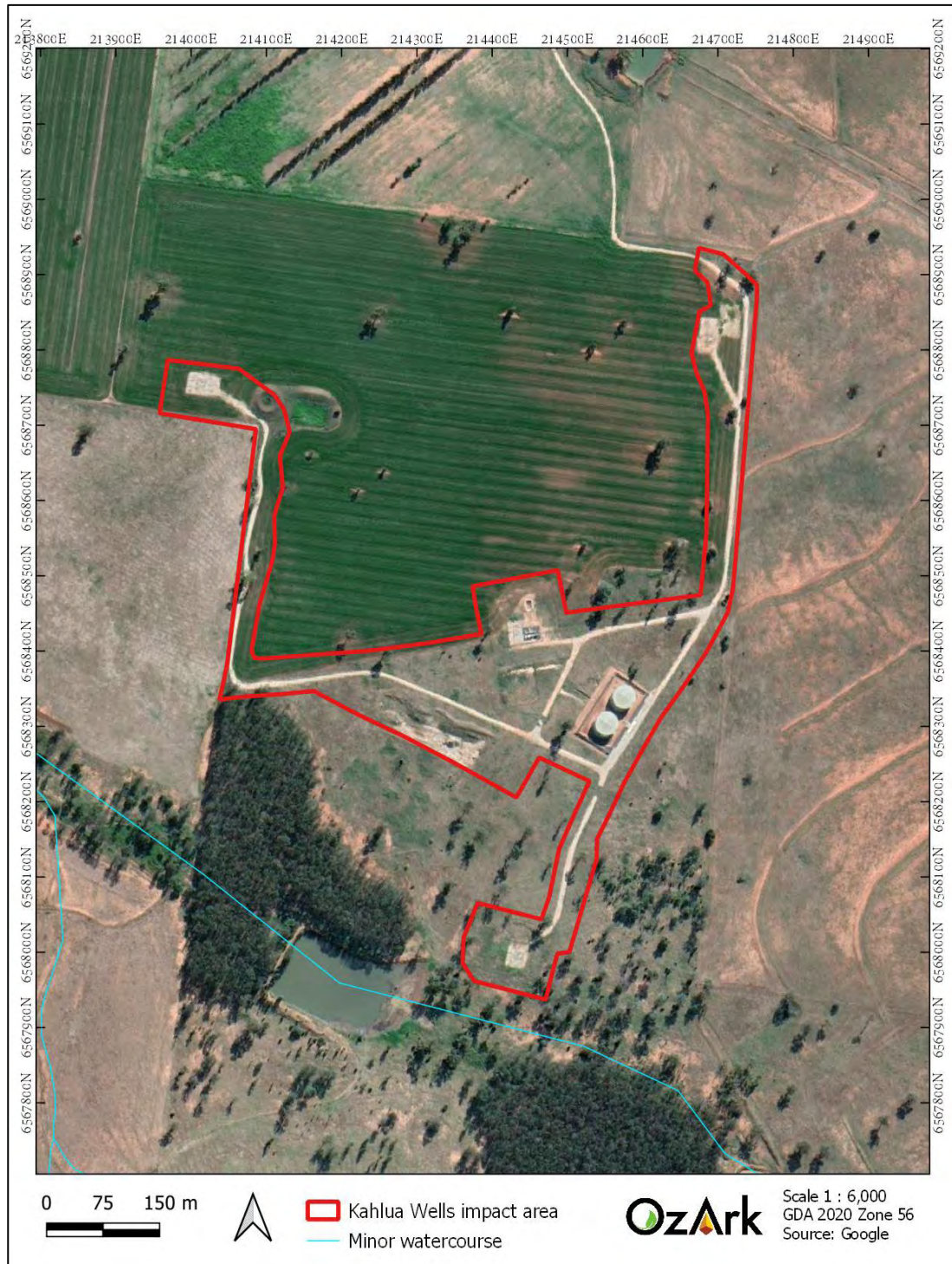
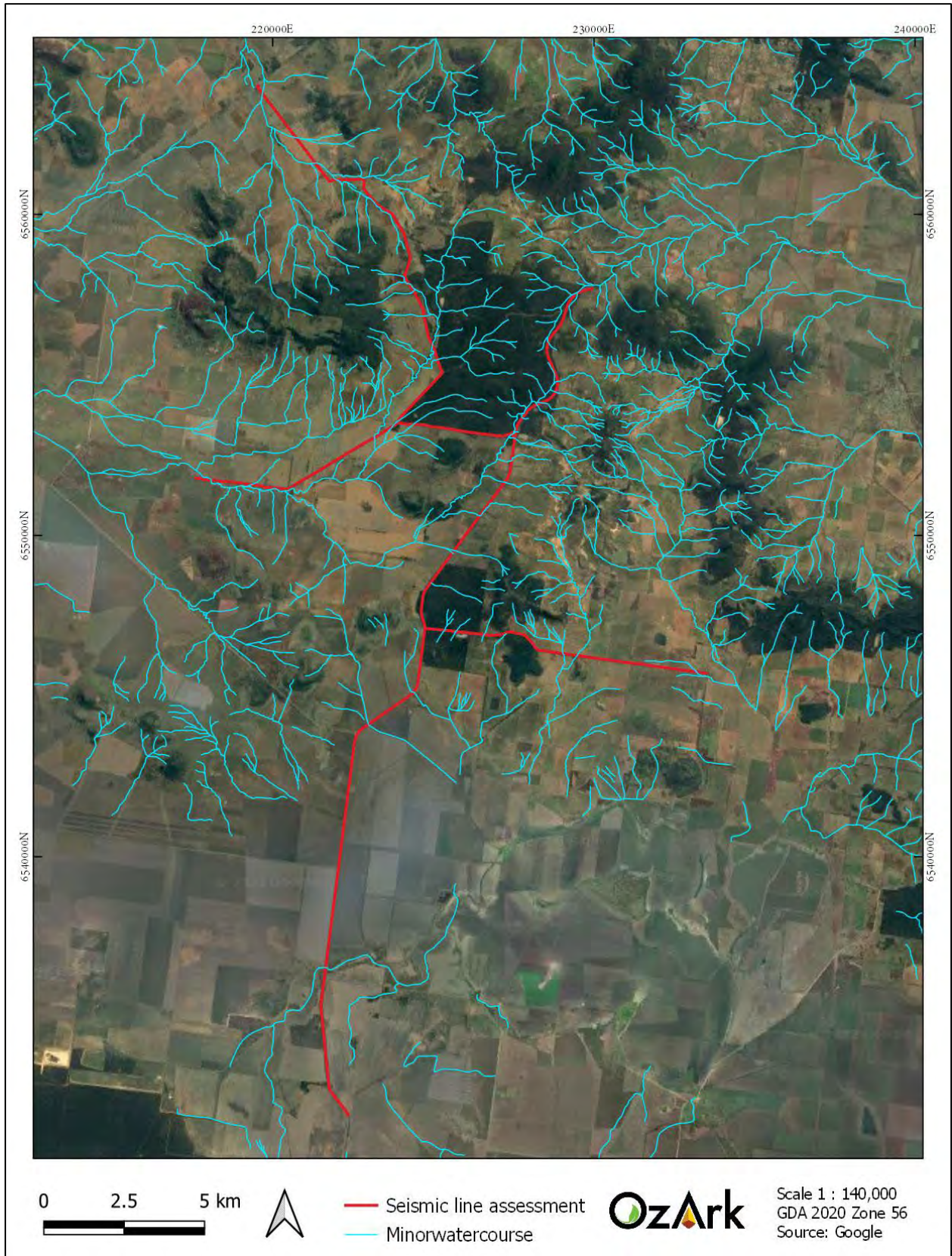


Figure 2-3: Watercourses associated with the study area of the seismic line assessment.



2.3.5 Step 3

Can harm to Aboriginal objects or disturbance of archaeologically sensitive landscape features be avoided?

No. Landforms with identified archaeological sensitivity may be impacted by the proposal.

Grading and the use of heavy machinery along the road corridors is likely to be part of the seismic survey and the ground surface of previously undisturbed portions of sensitive landforms may be impacted by the proposal.

2.3.6 Step 4

Does a desktop assessment and visual inspection confirm that there are Aboriginal objects or that they are likely?

Yes, there are Aboriginal sites or objects in close proximity of the seismic line study area.

The visual inspection of the study areas was undertaken by OzArk Director, Dr Jodie Benton, on 29 and 30 March 2022. No members of the local Aboriginal community were present during the visual inspection. The results for the visual inspection are provided below.

Kahlua Wells impact area

The Kahlua Wells area was assessed via pedestrian transects (**Figure 2-4**). The wells and access tracks are already extant, as is a large quarry area likely used to win the material used for access track establishment. Beyond these areas of high disturbance, the land was either ploughed or covered in chest high weeds / vegetation. It is also relevant that there was a lot of standing water at the time of the assessment, which precluded walking through some areas such as the ploughed paddocks.

This assessment revealed no Aboriginal sites/objects and a high level of prior land use disturbance.

Seismic line assessment area

Due to the relatively low ground impact anticipated for the seismic line survey and as the easement was comprised of formed roads (from formal bitumen roads to dirt tracks), an approach to the visual assessment was devised that included:

- Driving all seismic routes
- Stopping for visual inspections at all locations where previously recorded sites were located or where the road or track crossed a waterway.

In terms of limitations, it is noted that Goscombe Road (which runs along the southern edge of the Wandoba State Conservation Area), was unpassable due to wet conditions, so assessment

was made via pedestrian means from each end of the road, leaving the central portion unassessed (Figure 2-5).

Figure 2-4: Survey coverage within Kahlua Wells impact area study area.

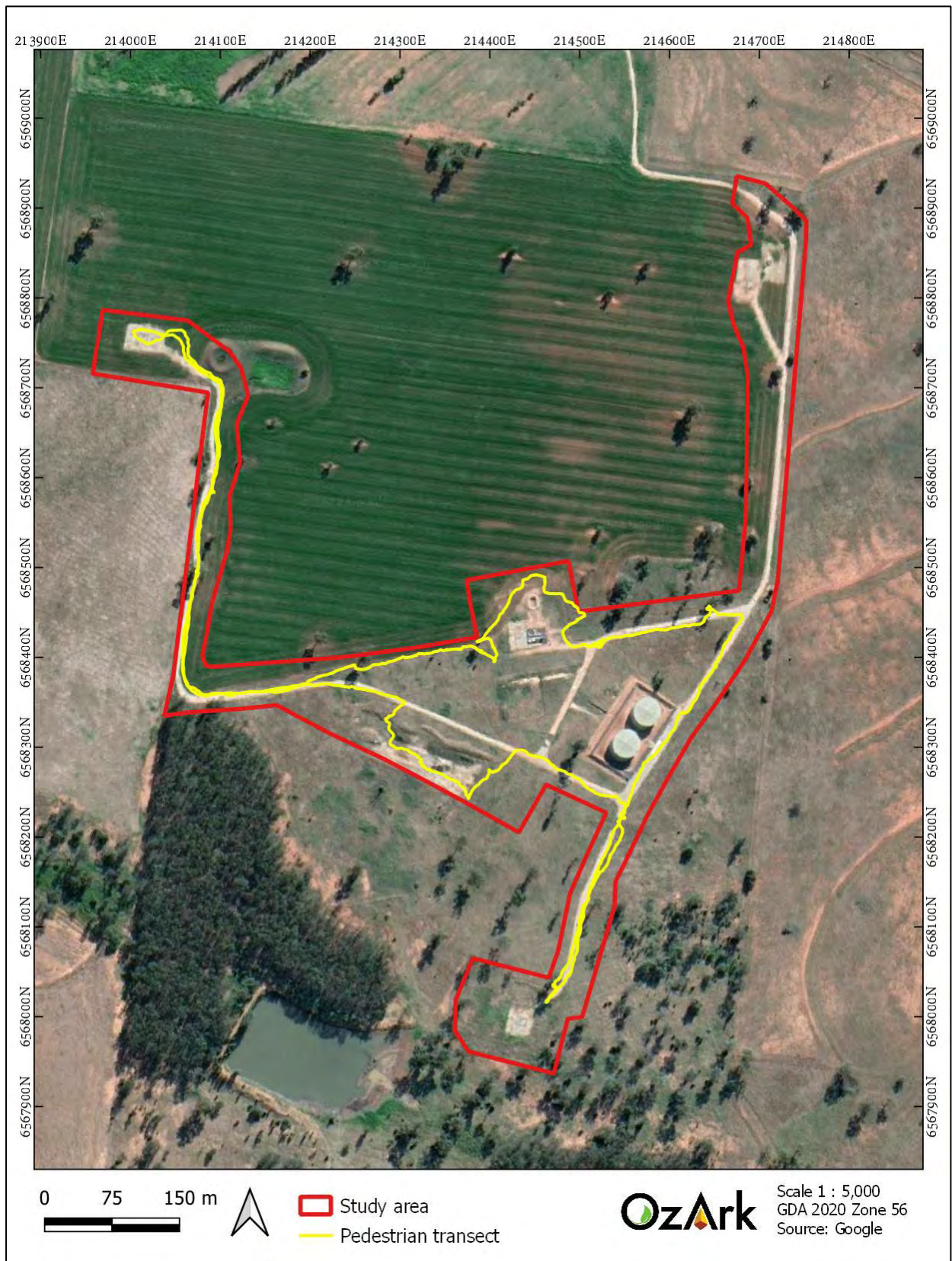
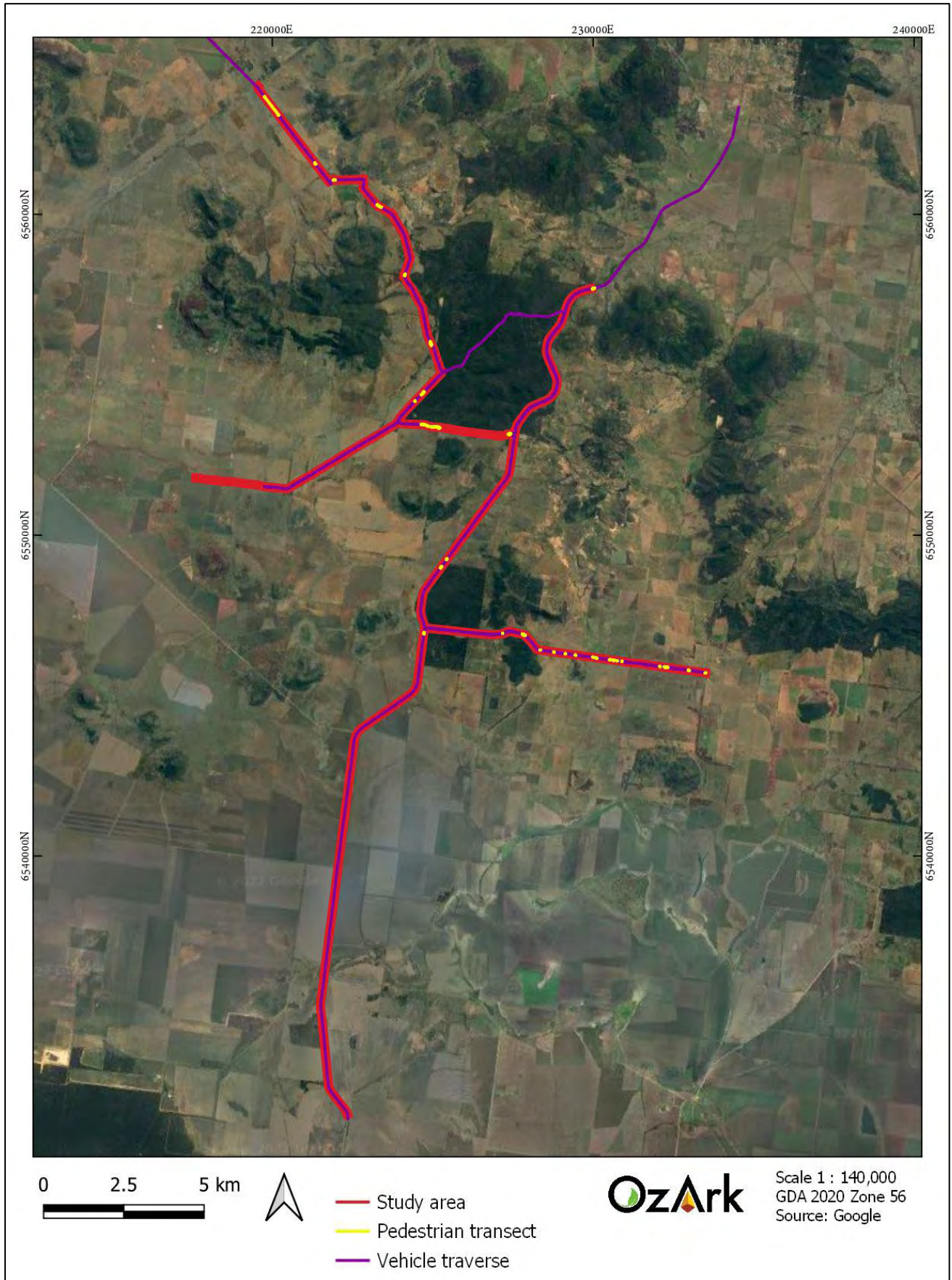


Figure 2-5: Survey coverage of the seismic line assessment study area.



Discussion

No Aboriginal objects were recorded during the assessment. Previously recorded Aboriginal sites along the seismic line can be protected from potential impacts through the implementation of management measures, specifically fencing and inductions as detailed in **Section 4**.

A 'no' answer for Step 4, results in the following outcome (DECCW 2010):

AHIP (Aboriginal Heritage Impact Permit) application not necessary. Proceed with caution. If any Aboriginal objects are found, stop work, and notify Heritage NSW (02) 9873 8500 (heritagemailbox@environment.nsw.gov.au). If human remains are found, stop work, secure the site, and notify NSW Police and Heritage NSW.

2.4 CONCLUSION

The due diligence process has resulted in the outcome that an Aboriginal Heritage Impact Permit (AHIP) is not required. The reasoning behind this determination is set out in **Table 2-3**.

Table 2-3: Due Diligence Code application.

Step	Reasoning	Answer
Step 1 Will the activity disturb the ground surface or any culturally modified trees?	The proposed works will disturb the ground surface through potential earthworks at the Kahlua Well site The proposal may impact mature, native vegetation and therefore has the potential to harm culturally modified trees.	Yes
If the answer to Step 1 is 'yes', proceed to Step 2		
Step 2a Are there any relevant records of Aboriginal heritage on AHIMS to indicate presence of Aboriginal objects?	AHIMS indicated that there are no Aboriginal sites within the Kahlua Wells study area, although there are some previously recorded Aboriginal sites nearby the seismic line easement. The previously recorded sites are modified trees and impact can be avoided through fencing and inductions and hence they will not be harmed by the proposal.	No
Step 2b Are there other sources of information to indicate presence of Aboriginal objects?	There are no other sources of information to indicate that Aboriginal objects are likely in the study area, although it is noted that there is a general likelihood for landforms in the region to contain Aboriginal objects.	No
Step 2c Will the activity impact landforms with archaeological sensitivity as defined by the Due Diligence Code?	Landforms with identified archaeological sensitivity are present as some seismic line sections are within 200 m of 'waters'.	Yes
If the answer to any stage of Step 2 is 'yes', proceed to Step 3		
Step 3 Can harm to Aboriginal objects listed on AHIMS or identified by other sources of information and/or can the carrying out of the activity at the relevant landscape features be avoided?	The proposal may impact landforms with archaeological sensitivity as identified in the Due Diligence Code: landforms within 200 m of 'waters'; and there are AHIMS sites nearby the seismic line.	No
If the answer to Step 3 is 'no', a visual inspection is required. Proceed to Step 4.		
Step 4 Does the visual inspection confirm that there are Aboriginal objects or that they are likely?	The visual inspection recorded no Aboriginal objects in the study area. Landforms that were identified at a desk-top level as having archaeological sensitivity were found during the inspection to not contain archaeological sites. Modified trees located adjacent to the seismic line can be protected from the proposed works through management measures such as fencing and inductions.	No
Conclusion		
AHIP not necessary. Proceed with caution.		



3 ABORIGINAL HERITAGE SITES RECORDED

No Aboriginal objects were recorded as a result of the visual assessment.

Attempts were made to locate any previously recorded Aboriginal site within 10 m of the seismic line. Six previously recorded Aboriginal sites were in this category, as shown on **Figure 3-1** and listed in **Table 3-1**. Of these, four were located and their coordinates checked, while two were unable to be located and are thought to have the wrong coordinates on AHIMS.

Table 3-1 lists these sites and provides updated coordinates for those that were located, as well as providing management measures to ensure the conservation of these sites in relation to the proposed works.

Table 3-1: AHIMS listed sites near the seismic line, assessment results, and management recommendations.

AHIMS No.	Site Name	Site type	Coordinates (AGD) From site card	New Coordinates (GDA) From 2022 field visit	Image	Management recommendations
29-1-0119	Wandoba Scar Tree 9	Modified Tree	224609E 6554266N	Could not be located at the AHIMS location. From the site card location sketch it is likely that this site is located far to the north of the study area, although this could not be verified.	Site not located	As this tree could not be located, there are no management recommendations. Unlikely that it is at risk from the proposal.
29-1-0117	Wandoba Scar Tree 7	Modified Tree	225084E 6553162N	225187E 6553367N		This tree is approximately 2 m south of Goscombe Rd. The tree should be temporarily fenced prior to seismic activity and crews inducted to ensure no inadvertent impacts occur.
29-1-0122	Wandoba Resource 1	Grass trees	225080E 6553165N	Could not be located at this location. From the site card location sketch it is likely that this site is located north of Goscombe Road within the Wandoba Conservation Area, although this could not be verified.	Site not located	As this tree could not be located, there are no management recommendations.. Unlikely that it is at risk from the proposal.
29-1-0116	Wandoba Scar Tree 6	Modified Tree	225112E 6553147N	225218E 6553350N		This tree is approximately 10 m south of Goscombe Rd. No management required.



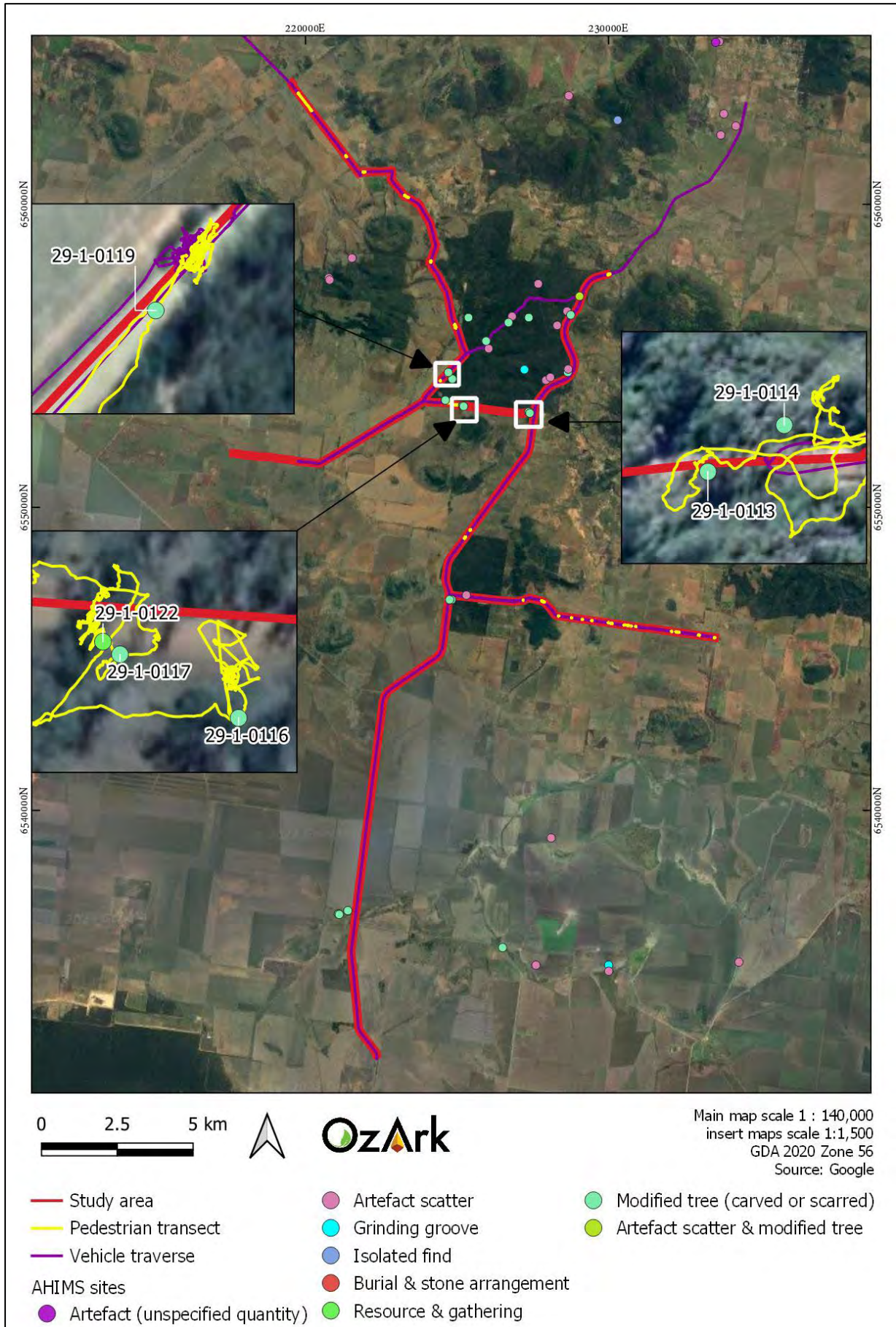
AHIMS No.	Site Name	Site type	Coordinates (AGD) From site card	New Coordinates (GDA) From 2022 field visit	Image	Management recommendations
29-1-0113	Wandoba Scar Tree 3	Modified Tree	227261E 6552958N	227368E 6553151N		<p>This tree is approximately 3 m south of Goscombe Rd. The tree should be temporarily fenced prior to seismic activity and crews inducted to ensure no inadvertent impacts occur.</p>
29-1-0114	Wandoba Scar Tree 4	Modified Tree	227279E 6552969N	227397E 6553166N		<p>This tree is approximately 10 m north of Goscombe Rd. No management required.</p>

Figure 3-1: Previously recorded sites within 10 m of seismic line



3.1 LIKELY IMPACTS TO ABORIGINAL HERITAGE FROM THE PROPOSAL

Table 3-2 presents a summary of potential impacts to Aboriginal cultural heritage associated with the proposal. These are based on the understanding that the two previously recorded modified trees within 5 m of the proposed seismic line will be fenced to ensure no inadvertent impacts and that work crew inductions will be undertaken as per the recommendations of this report.

Table 3-2: Aboriginal cultural heritage: impact assessment.

Site Name	Type of Harm (Direct/Indirect / None)	Degree of Harm (Total/Partial / None)	Consequence of Harm (Total/Partial/No Loss of Value)
29-1-0117	None	None	No Loss of value if appropriate management is undertaken
29-1-0116	None	None	No Loss of value
29-1-0113	None	None	No Loss of value if appropriate management is undertaken
29-1-0114	None	None	No Loss of value
29-1-0119 29-1-0122	Sites unable to be located during the survey but unlikely to be harmed by the proposal.		

4 MANAGEMENT RECOMMENDATIONS

The undertaking of the due diligence process resulted in the conclusion that the proposed works will have an impact on the ground surface, however, no Aboriginal objects or intact archaeological deposits will be harmed by the proposal. This moves the proposal to the following outcome:

AHIP application not necessary. Proceed with caution. If any Aboriginal objects are found, stop work, and notify Heritage NSW (02) 9873 8500 (heritagemailbox@environment.nsw.gov.au). If human remains are found, stop work, secure the site, and notify NSW Police and Heritage NSW.

To ensure the greatest possible protection to the area's Aboriginal cultural heritage values, the following recommendations are made:

- 1) The proposed work may proceed at the Gunnedah Works Programs project without further archaeological investigation under the following conditions:
 - a) All land and ground disturbance activities must be confined to within the study areas, as this will eliminate the risk of harm to Aboriginal objects in adjacent landforms. Should the parameters of the proposal extend beyond the assessed areas, then further archaeological assessment may be required.
 - b) All staff and contractors involved in the proposed work should be made aware of the legislative protection requirements for all Aboriginal sites and objects.
- 2) This assessment has concluded that there is a low likelihood that the proposed work will adversely harm Aboriginal cultural heritage items or sites. If during works, however, Aboriginal artefacts or skeletal material are noted, all work should cease and the procedures in the *Unanticipated Finds Protocol* (**Appendix 2**) should be followed.
- 3) AHIMS sites 29-1-0113 and 29-1-0117, both modified trees, are within 5 m of the proposed seismic line (coordinates provided in **Table 3-2**). These modified trees should be temporarily fenced off with appropriate signage to indicate a no access area during the seismic work.
- 4) The work crew should be provided with the location of these AHIMS sites, and the sites must be avoided.
- 5) Inductions for work crews should include a cultural heritage awareness procedure to ensure they recognise Aboriginal artefacts (see **Appendix 3**) and are aware of the legislative protection of Aboriginal objects under the NPW Act and the contents of the *Unanticipated Finds Protocol*.
- 6) The information presented here meets the requirements of the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*. It should be retained

as shelf documentation for five years as it may be used to support a defence against prosecution in the event of unanticipated harm to Aboriginal objects.

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APPENDIX 1: AHIMS SEARCH RESULTS

AHIMS Web Services (AWS)										Your Ref/PO Number : Gunnedah Santos Client Service ID : 670321	
Extensive search - Site list report											
SiteID	SiteName	Datum	Zone	Eastings	Northings	Context	Site Status **	SiteFeatures	SiteTypes	Reports	
29-2-0272	Wondoba Grinding Grooves 1 - Duplicate of 29-1-0092	AGD	56	227119	6554359	Open site	Valid	Grinding Groove : 3			
	Contact							Recorders Ms.Daphne Cobby			Permits
29-1-0124	Wondoba Artefact 7	AGD	56	228200	6555016	Open site	Valid	Artefact : 11			
	Contact Searle							Recorders Mr.Peter Beale			Permits
17-1-0049	Sunnyside AS2	GDA	56	224497	6567811	Open site	Valid	Artefact : 2			
	Contact							Recorders Mr.John Appleton,Doctor.Matthew Whincop,Doctor.Matthew Whincop,Whincop Ar			Permits
29-1-0122	Wondoba Resources 1	AGD	56	225080	6553165	Open site	Valid	Aboriginal Resource and Evidence : 10			
	Contact Searle							Recorders Mr.Peter Beale			Permits
29-1-0290	Goran Lake Scarred Tree	GDA	56	226505	6535471	Closed site	Valid	Modified Tree (Carved or Scarred) :			
	Contact							Recorders Mr.Wade Natty,Yawirrawiri Murri Gannur Descendant Aboriginal Corporation			Permits
29-1-0131	Wondoba Artefact 9	AGD	56	225938	6550552	Open site	Valid	Artefact : 32			
	Contact Searle							Recorders Mr.Peter Beale			Permits
20-4-0815	Sunnyside IA2	GDA	56	224223	6567538	Open site	Valid	Artefact : -			
	Contact							Recorders Doctor.Matthew Whincop,Whincop Archaeology Pty Ltd			Permits
29-1-0124	Wondoba Artefact 8	AGD	56	227929	6554109	Open site	Valid	Artefact : 7			
	Contact Searle							Recorders Mr.Trent Colley			Permits
29-1-0114	Wondoba Scar tree 4	AGD	56	227279	6552969	Open site	Valid	Modified Tree (Carved or Scarred) :			
	Contact Searle							Recorders Mr.Leonard Talbot			Permits
29-2-1274	Wondoba North Scar Tree 2	AGD	56	227263	6550755	Open site	Valid	Modified Tree (Carved or Scarred) :			
	Contact							Recorders Ms.Daphne Cobby			Permits
29-1-0080	BBS, Walkallow LALC, Red Hole 2	AGD	56	220989	6536401	Open site	Valid	Modified Tree (Carved or Scarred) :			99031
	Contact							Recorders Archaeological Surveys & Salvage, Walkallow LALC - BBS survey team			Permits
29-1-0009	Howes Hill	AGD	56	237500	6534700	Open site	Valid	Artefact : -	Open Camp Site		
	Contact							Recorders P.W Greenwood			Permits
29-1-0139	GDRF-DS1 with PAD	AGD	56	228583	6563399	Open site	Valid	Artefact : 2			101309
	Contact							Recorders Mr.Philip Cameron			Permits
29-1-0015	King Jack Mountain Springfield	AGD	56	233700	6562800	Open site	Destroyed	Artefact : -	Open Camp Site		142
	Contact							Recorders Paul Gorecki			Permits
20-4-0813	Sunnyside CG1	GDA	56	224458	6568219	Open site	Valid	Grinding Groove : -			
	Contact							Recorders Doctor.Matthew Whincop,Whincop Archaeology Pty Ltd			Permits

Report generated by AHIMS Web Service on 24/03/2022 for Jodie Benton for the following area at Datum :GDA, Zone :56, Eastings :206000.0 - 235000.0, Northings :6529600.0 - 6571600.0 with a Buffer of 0 meters. Number of Aboriginal sites and Aboriginal objects found is 65

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AHIMS Web Services (AWS)										Your Ref/PO Number : Gunnedah Santos Client Service ID : 670321	
Extensive search - Site list report											
SiteID	SiteName	Datum	Zone	Eastings	Northings	Context	Site Status **	SiteFeatures	SiteTypes	Reports	
29-1-0256	Marshmead?	AGD	56	233547	6565389	Open site	Valid	Artefact : -			
	Contact Ms.Tammy Bush							Recorders Mr.Patrick Gaylor			Permits
29-1-0113	Wondoba Scar Tree 3	AGD	56	227261	6552950	Open site	Valid	Modified Tree (Carved or Scarred) :			
	Contact Searle							Recorders Mr.Trent Colley			Permits
29-1-0026	Red Bull's Scarred Tree 3/BE 3	AGD	56	221290	6530190	Open site	Valid	Modified Tree (Carved or Scarred) :	Scarred Tree		2734
	Contact							Recorders Tom Griffiths			Permits
29-1-0011	Goran Hokey Pokey	AGD	56	229900	6534700	Open site	Valid	Grinding Groove : -	Axe Grinding Groove		344
	Contact							Recorders P.W Greenwood			Permits
29-1-0016	King Jack Mountain	AGD	56	234100	6562400	Open site	Destroyed	Artefact : -	Open Camp Site		142
	Contact							Recorders Paul Gorecki			Permits
29-1-0127	Wondoba Artefact 5	AGD	56	226712	6556115	Open site	Valid	Artefact : 14			
	Contact Searle							Recorders Mr.Peter Beale			Permits
29-1-0255	Marshmead?	AGD	56	233550	6565188	Open site	Valid	Artefact : -			
	Contact Ms.Tammy Bush							Recorders Mr.Patrick Gaylor			Permits
29-1-0088	BBS, Red Chief LALC, Goran SP 2	AGD	56	224716	6546763	Open site	Valid	Modified Tree (Carved or Scarred) :			99031
	Contact							Recorders Archaeological Surveys & Salvage, Red Chief LALC - BBS Survey Team			Permits
20-4-0814	Sunnyside IA1	GDA	56	224311	6567683	Open site	Valid	Artefact : -			
	Contact							Recorders Doctor.Matthew Whincop,Doctor.Matthew Whincop,Whincop Archaeology Pty Ltd			Permits
29-1-0123	Wondoba Artefact 1	AGD	56	227975	6551102	Open site	Valid	Artefact : 23			
	Contact Searle							Recorders Mr.Leonard Talbot			Permits
29-1-0128	Wondoba Artefact 6	AGD	56	228528	6556286	Open site	Valid	Artefact : 15			
	Contact Searle							Recorders Mr.Peter Beale			Permits
29-1-0089	BBS, Red Chief LALC, Goran SP ST 1	AGD	56	221650	6516763	Open site	Valid	Modified Tree (Carved or Scarred) :			99031
	Contact							Recorders Archaeological Surveys & Salvage, Red Chief LALC - BBS Survey Team			Permits
28-8-0030	Argyle/Korinyar	AGD	55	778000	6533000	Open site	Valid	Stone Arrangement : -	Burial/stone Arrangement		
	Contact							Recorders Paul Gorecki			Permits
29-1-0259	Mt Sommer AS2	GDA	56	220769	6557577	Open site	Valid	Artefact : -			
	Contact							Recorders Doctor.Matthew Whincop,Whincop Archaeology Pty Ltd			Permits
29-1-0010	Goran Lake	AGD	56	234200	6534800	Open site	Valid	Artefact : -	Open Camp Site		

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AHIMS Web Services (AWS)
Extensive search - Site list report

Your Ref/PO Number : Gunnedah Santos
Client Service ID : 670321

SiteID	SiteName	Datum	Zone	Eastings	Northings	Context	Site Status **	SiteFeatures	SiteTypes	Reports
29-1-0090	Contact BBS; Red Chief LALC; Goran SF 1	AGD	56	225202	6546912	Open site	Valid	Artefact : 3		99031
	Recorders Mr Peter Greenwood							Permits		
29-1-0061	Contact BBS; Waihalow LALC; Red Bobs 1	AGD	56	220976	6536487	Open site	Valid	Modified Tree (Carved or Scarred) : 1		98931
	Recorders Archaeological Surveys & Salvage, Red Chief LALC - BBS Survey Team							Permits		
29-1-0003	Contact Goran Lake;	AGD	56	228000	6538900	Open site	Valid	Artefact : -	Open Camp Site	
	Recorders Archaeological Surveys & Salvage, Waihalow LALC - BBS survey team							Permits		
29-1-0130	Contact Wondoba Artefact 8	AGD	56	228200	6555816	Open site	Valid	Artefact : 8		
	Recorders Quirindi District Historical Society							Permits		
29-1-0093	Contact BBS; Red Chief LALC; Wondoba SF 3	AGD	56	228948	6556779	Open site	Valid	Artefact : -; Modified Tree (Carved or Scarred) : -		99031
	Recorders Mr Peter Beale							Permits		
29-1-0208	Contact Marshmead 4	GDA	56	233540	6565352	Open site	Valid	Artefact : -		
	Recorders Archaeological Surveys & Salvage, Red Chief LALC - BBS Survey Team							Permits		
29-1-0111	Contact Wondoba Scar Tree 1	AGD	56	224737	6554048	Open site	Valid	Modified Tree (Carved or Scarred) : 2		
	Recorders PJ Gaynor [consultant], Mr Patrick Gaynor							Permits		
28-3-0096	Contact BBS; Waihalow LALC; Trinky Forest 3	AGD	56	782139	6529933	Open site	Valid	Artefact : 20		98931
	Recorders Archaeological Surveys & Salvage, Waihalow LALC - BBS survey team							Permits		
29-1-0289	Contact Sunnyside AS3	GDA	56	223976	6566869	Open site	Valid	Artefact : -		
	Recorders Doctor Matthew Whincop, Whincop Archaeology Pty Ltd							Permits		
29-1-0180	Contact GDRF; F1	AGD	56	230196	6562591	Open site	Valid	Artefact : 1		101909
	Recorders Mr Phillip Cameron							Permits		
29-1-0027	Contact Red Bob's Scarred tree 4; RB 4	AGD	56	221290	6536500	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	2731
	Recorders Tom Griffiths							Permits		
29-1-0260	Contact McSommer AS3	GDA	56	224533	6558230	Open site	Valid	Artefact : -		
	Recorders Doctor Matthew Whincop, Whincop Archaeology Pty Ltd							Permits		
29-1-0126	Contact Wondoba Artefact 4	AGD	56	228533	6554287	Open site	Valid	Artefact : 14		
	Recorders Mr Leonard Talbot							Permits		
29-1-0121	Contact Wondoba Scar tree 11	AGD	56	228550	6554268	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Recorders Mr Tom Colley							Permits		

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Extensive search - Site list report

Your Ref/PO Number : Gunnedah Santos
Client Service ID : 670321

SiteID	SiteName	Datum	Zone	Eastings	Northings	Context	Site Status **	SiteFeatures	SiteTypes	Reports
29-1-0125	Contact Wondoba Artefact 3	AGD	56	228565	6554374	Open site	Valid	Artefact : 14		
	Recorders Mr Leonard Talbot							Permits		
29-1-0091	Contact BBS; Red Chief LALC; Wondoba SF 1	AGD	56	220649	6536162	Open site	Valid	Modified Tree (Carved or Scarred) : 1		99031
	Recorders Archaeological Surveys & Salvage, Red Chief LALC - BBS Survey Team							Permits		
29-1-0119	Contact Wondoba Scar tree 9	AGD	56	224609	6554266	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Recorders Mr Peter Beale							Permits		
20-1-0977	Contact Sunnyside 051	GDA	56	221649	6567125	Open site	Valid	Artefact : -		
	Recorders Doctor Matthew Whincop, Whincop Archaeology Pty Ltd							Permits		
29-1-0117	Contact Wondoba Scar tree 7	AGD	56	225084	6553162	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Recorders Mr Peter Beale							Permits		
29-1-0120	Contact Wondoba Scar tree 10	AGD	56	226593	6550911	Open site	Valid	Modified Tree (Carved or Scarred) : 2		
	Recorders Mr Peter Beale							Permits		
28-3-0151	Contact Melville Hill ST1	GDA	56	789043	6562929	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Recorders Mr Patrick Gaynor							Permits		
29-1-0116	Contact Wondoba Scar tree 6	AGD	56	225112	6553147	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Recorders Mr Leonard Talbot, Mr Peter Beale							Permits		
29-2-0273	Contact Wondoba North Scar Tree 1	AGD	56	225272	6556075	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Recorders Ms Daphne Cobby							Permits		
29-2-0271	Contact Wondoba North Artefact 1	GDA	56	227682	6557379	Open site	Valid	Artefact : 14		
	Recorders Ms Daphne Cobby, Miss Lucy Blackton							Permits		
29-1-0083	Contact BBS; Waihalow LALC; Trinky Forest 13	AGD	56	216474	6529920	Open site	Valid	Modified Tree (Carved or Scarred) : 1		98931
	Recorders Archaeological Surveys & Salvage, Waihalow LALC - BBS survey team							Permits		
29-1-0079	Contact BBS; Waihalow LALC; Red Bobs 3	AGD	56	221000	6536373	Open site	Valid	Modified Tree (Carved or Scarred) : 1		98931
	Recorders Archaeological Surveys & Salvage, Waihalow LALC - BBS survey team							Permits		

Report generated by AHIMS Web Service on 24/03/2022 for Jodie Benton for the following area at Datum :GDA, Zone :56, Eastings :206000.0 - 235000.0, Northings :6529600.0 - 6571600.0 with a Buffer of 0 meters. Number of Aboriginal sites and Aboriginal objects found is 65

*This information is not guaranteed to be free from error omission. Heritage NSW and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.



AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Gunnedah Santos
Client Service ID : 670321

SiteID	SiteName	Datum	Zone	Eastings	Northings	Context	Site Status **	SiteFeatures	SiteTypes	Reports
29-1-0258	Contact Mt Sommer AS1	Recorders GDA	Archaeological Surveys & Salvage, Wailballyn J.A.L.C. - BBS survey team	56	220795	6557509	Open site	Valid	Artefact :-	Permits
29-1-0092	Contact HRS Red Chief LALC Wondoba St 2, duplicate of 29-02 41272	Recorders AGD	Doctor: Matthew Whincoop, Whincoop Archaeology Pty Ltd	56	227119	6554359	Open site	Valid	Grinding Irons - 10	99031
29-1-0012	Contact Hokey Pokey Lake Goran	Recorders AGD	Archaeological Surveys & Salvage, Red Chief LALC - BBS Survey Team	56	228900	6534500	Open site	Valid	Artefact :-	Open Camp Site 344
29-1-0118	Contact Wondoba Scar tree 8	Recorders AGD	Van Hoven	56	225854	6555301	Open site	Valid	Modified Tree (Carved or Scarred) :- 1	Permits
20-4-0538	Contact Torrens Road St 2	Recorders GDA	Mr.Peter Beale	56	234731	6571520	Open site	Valid	Modified Tree (Carved or Scarred) :-	Permits
29-1-0017	Contact Ms.Tanmy Bush Ring Jack Mountain Springfield	Recorders AGD	Mr.Patrick Gaynor	56	233600	6562100	Open site	Destroyed	Artefact :-	Open Camp Site 342
28-3-0029	Contact Quinella Dam	Recorders AGD	Paul Gorecki	55	783000	6534000	Open site	Valid	Artefact :-	Open Camp Site 344
29-1-0115	Contact Wondoba Scar tree 5	Recorders AGD	Paul Gorecki	56	224510	6583350	Open site	Valid	Modified Tree (Carved or Scarred) :- 1	Permits
29-1-0112	Contact Wondoba Scar Tree 2	Recorders AGD	Mr.Trent Collier	56	227298	6552922	Open site	Valid	Modified Tree (Carved or Scarred) :- 1	Permits
	Contact Seale	Recorders AGD	Mr.Peter Beale							Permits

** Site Status

Valid - The site has been recorded and accepted onto the system as valid

Destroyed - The site has been completely impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There is nothing left of the site on the ground but proponents should proceed with caution.

Partially Destroyed - The site has been only partially impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There might be parts or sections of the original site still present on the ground

Not a site - The site has been originally entered and accepted onto AHIMS as a valid site but after further investigations it was decided it is NOT an aboriginal site. Impact of this type of site does not require permit but Heritage NSW should be notified

Report generated by AHIMS Web Service on 24/03/2022 for Jodie Benton for the following area at Datum :GDA, Zone : 56, Eastings : 206000.0 - 235000.0, Northings : 6529600.0 - 6571600.0 with a Buffer of 0 meters. Number of Aboriginal sites and Aboriginal objects found is 65

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APPENDIX 2: ABORIGINAL HERITAGE: UNANTICIPATED FINDS PROTOCOL

An Aboriginal artefact is anything which is the result of past Aboriginal activity. This includes stone (artefacts, rock engravings etc.), plant (culturally scarred trees) and animal (if showing signs of modification; i.e. smoothing, use). Human bone (skeletal) remains may also be uncovered while onsite.

Cultural heritage significance is assessed by the Aboriginal community and is typically based on traditional and contemporary lore, spiritual values, and oral history, and may also consider scientific and educational value.

Protocol to be followed if previously unrecorded or unanticipated Aboriginal object(s) are encountered:

1. If any Aboriginal object is discovered and/or harmed in, or under the land, while undertaking the proposed development activities, the proponent must:
 - a. Not further harm the object
 - b. Immediately cease all work at the particular location
 - c. Secure the area to avoid further harm to the Aboriginal object
 - d. Notify Heritage NSW as soon as practical on (02) 9873 8500 (heritagemailbox@environment.nsw.gov.au), providing any details of the Aboriginal object and its location; and
 - e. Not recommence any work at the particular location unless authorised in writing by Heritage NSW.
2. If Aboriginal burials are unexpectedly encountered during the activity, work must stop immediately, the area secured to prevent unauthorised access and NSW Police and Heritage NSW contacted.
3. Cooperate with the appropriate authorities and relevant Aboriginal community representatives to facilitate:
 - a. The recording and assessment of the find(s)
 - b. The fulfilment of any legal constraints arising from the find(s), including complying with Heritage NSW directions
 - c. The development and implementation of appropriate management strategies, including consultation with stakeholders and the assessment of the significance of the find(s).
4. Where the find(s) are determined to be Aboriginal object(s), recommencement of work in the area of the find(s) can only occur in accordance with any consequential legal requirements and after gaining written approval from Heritage NSW (normally an Aboriginal Heritage Impact Permit).

APPENDIX 3: ABORIGINAL HERITAGE: ARTEFACT IDENTIFICATION

<p>A retouched silcrete flake</p>	<p>A quartz flake</p>
<p>Microliths (scale = 1 cm)</p>	<p>Volcanic flakes</p>
<p>Flake characteristics (scale = 1 cm)</p>	<p>A mudstone/tuff core from which flakes have been removed</p>