Santos Ltd
ACN [redacted]
Santos Centre
[redacted]
Telephone: [redacted]
Facsimile: [redacted]
www.santos.com

22 March 2021

Santos Reference: CB20-38

Attention: [redacted]
Energy, Extractive and SWQ Compliance
Department of Environment and Science
GPO Box 2453
BRISBANE QLD 4001

Dear [redacted],

Site-specific application for a new environmental authority for a resource activity – Petroleum Lease (PL) 1055

Santos Limited (Santos), on behalf of Delhi Petroleum Pty Ltd, Beach Energy (Operations) Limited, Vamgas Pty Ltd and Santos Australian Hydrocarbons Pty Ltd, has prepared the attached *'Site-specific application for a new environmental authority for a resource activity'* in accordance with Section 125 and Section 126 of the *Environmental Protection Act 1994* (EP Act). The application seeks to authorise petroleum activities within Petroleum Lease (PL) 1055 in the Cooper Basin.

PL 1055 will replace 22 blocks of ATP 1189, currently authorised by EPPG03518215. The following information is attached in the support of the application:

- Attachment 1 – Site-specific application for a new environmental authority for a resource activity; and
- Attachment 2 – Supporting Information.

Please note: this application is supported by a) the 2020 Underground Water Impact Report (UWIR) for Santos' Cooper Basin Oil and Gas Fields in South-West Queensland, and b) the Santos Hydraulic Fracturing Risk Assessment (HFRA). These reports have been previously provided to DES in support of other Santos applications, and have not been included with this application due to file size restrictions. If DES requires these reports Santos can provide them upon request.

The prescribed fee for the application is $887.30 ($677.00 + $210.3 (30% annual fee)), which has been paid at lodgement via credit card.

Please contact [redacted] on [redacted] or [redacted] should you have any further enquiries.

Yours sincerely,

Santos Limited

Santos

ATTACHMENT 1 – Site-specific application for a new environmental authority for a resource activity

Site-specific application for a new environmental authority for a resource activity

This is the approved form to make a site-specific application for an environmental authority under sections 124, 125, 126 and 126A of the Environmental Protection Act 1994 *(EP Act) for an environmentally relevant activity (ERA) which is a resource activity.*

It is recommended that you read the information on what to provide with an application, prior to making an application. This information is located on the Business Queensland website at www.business.qld.gov.au (use the search term "environmental licence"). This website also has a diagnostic tool called a "Forms and fees finder" which will take you through a series of questions and provide a customised result which will identify any forms, fees and supporting information you need to make an application.

Only use this application form if you are applying for a new environmental authority (EA) where:

☑ The ERA/s being applied for is/are a resource activity/activities, which involves: (a) a geothermal activity, (b) a greenhouse gas (GHG) storage activity, (c) a mining activity or (d) a petroleum activity. Note a resource activity is taken to include ancillary activities (prescribed ERAs) and other activities carried out under the authority as a resource activity.

☑ An application for a relevant resource tenure has been made or will be made at the same time as this application.

☑ The applicant/s for the resource tenure are exactly the same as the applicant/s for this EA application.

☑ The ERA/s being applied for will not form part of an ERA project under an existing EA.

☑ If more than one ERA is being applied for:

- the ERAs being applied for will be carried out under the day to day management of a single responsible person (e.g. a site manager or operations manager); and
- all of the ERAs are operationally interrelated, that is, the operation cannot function without all of the ERAs. Separate applications will need to be made for the ERAs that cannot be carried out as a single integrated operation; and
- the ERA/s are, or will be, carried out at one or more places; and
- the places where the ERAs will be carried out are close enough to make the integrated day to day management of the activities feasible.

OR

☑ The administering authority has refused your amendment application and requires you to make a site-specific application for a new EA to replace your existing EA.

It is recommended that you have a pre-lodgement meeting about this application:

- Please fill out and lodge the form Application for pre-lodgement services (ESR/2015/1664[1]), prior to lodging this application for an EA.

The fields marked with an asterisk * are mandatory, if they are not completed then your application may be considered not properly made under section 128 of the *Environmental Protection Act 1994*.

1 Applicant details

Is there more than one applicant?*	☐ No, please provide applicant's details here. ☒ Yes, please provide the principal applicant's details here and other applicants' details at attachment 1—Joint applicants and appointment of principal applicant

Name—individual or contact person if applicant is an organisation* [redacted]	
Organisation name, including any trading name (*if an organisation) Santos Limited	ABN/ACN (*if an organisation) [redacted]
Residential or registered business address (not a post office box)* [redacted]	Phone* [redacted]
Postal address (if same as above, write "AS ABOVE")* [redacted]	Facsimile N/A
Email* [redacted]	☒ Indicate if you want to receive correspondence via email

1.1 Nomination of an agent for this application

I/we nominate the below agent to act on my/our behalf and to receive correspondence relating to this application.

Do you want to nominate an agent for this application?* ☒ No → Go to *Question 2*. ☐ Yes → Complete the agent's details here.	
Name of agent—individual or contact person if the agent is an organisation Insert.	
Organisation name, including any trading name (if an organisation) Insert.	ABN/ACN (if an organisation) Insert.
Postal address Insert.	Phone Insert.
Email Insert.	☐ Indicate if you want to receive correspondence via email

[1] This application form is available at www.qld.gov.au, using the publication number 'ESR/2015/1664' as a search term.

2 Registered suitable operator status

A suitable operator is a person or a corporation assessed under Part 4, Chapter 5A of the EP Act as being suitable to carry out an ERA and is listed on the suitable operator register[2].

Are all applicants registered as a suitable operator?*	
☒ Yes	Suitable operator reference number* 601231 The suitable operator reference number provided must belong to the individual/organisation with the exact same name, DOB or ABN/ACN as the applicant. If there is more than one applicant, include all applicants' suitable operator reference numbers on Attachment 1.
☐ No	You must apply to be a registered suitable operator either online through Connect at www.qld.gov.au/environmentconnect or by completing the form Application to be a registered suitable operator (ESR/2015/1771)[3]. Note: If there is more than one applicant, a separate form must be submitted for each applicant.

3 Details of the activity/activities being applied for

Complete the tables below by advising which activities you are applying for and the locations where they will be conducted.

Resource activity name as it appears in Schedule 3 of the Environmental Protection Regulation 2019 (EP Reg)* For example, 1—Activities under a GHG injection and storage lease under the GHG storage Act, 3—A petroleum activity that is likely to have a significant impact on a category A or B environmentally sensitive area, 6—A petroleum activity carried out on a site containing a high hazard dam or a significant hazard dam,13—Mining black coal, 16—Mining gold ore	Tenure number(s)*
Non-scheduled Petroleum Activity Petroleum Lease - PL	PL 1055
Insert.	Insert.
Insert.	Insert.
Insert.	Insert.
Insert.	Insert.
Insert.	Insert.
Insert.	Insert.
Insert.	Insert.
Insert.	Insert.
Insert.	Insert.
Insert.	Insert.
Insert.	Insert.

[2] The register is available on the Queensland Government website at www.qld.gov.au, using the search term "suitable operator register".
[3] The hardcopy form is available upon request Permit and Licence Management by calling 1300 130 372 (option 4) or emailing palm@des.qld.gov.au.

What is a broad description of activity/activities?* For example, gemstone mining, geothermal activities, exploration—minerals, data acquisition authority, petroleum exploration, petroleum production	Does the ERA have standard conditions[4] that you can comply with?*	Name of the ERA standard (*if applicable)	Tenure number(s)*
Petroleum exploration and production. Refer to attachment 2 supporting information.	☒ No ☐ Yes	Insert.	PL 1055
Insert.	☐ No ☐ Yes	Insert.	Insert.
Insert.	☐ No ☐ Yes	Insert.	Insert.
Insert.	☐ No ☐ Yes	Insert.	Insert.

Ancillary activity as it appears in Schedule 2[5] of the EP Reg*		
Threshold	Name of ERA	Tenure number(s)
Insert.	Insert.	Insert.
Insert.	Insert.	Insert.
Insert.	Insert.	Insert.
Insert.	Insert.	Insert.

[4]ERAs with eligibility criteria and standard conditions are available on the Business Queensland website at www.business.qld.gov.au, using the search term “eligibility criteria”.
[5]Prescribed ERAs listed in Schedule 2 of the EP Reg can be carried out as part of a resource activity. The relevant ERA number is used as shorthand reference to describe which activities are authorised. This makes it clear as to what is authorised and in the event of a change of operation, when an amendment application needs to be made. The EA will include conditions for the prescribed ERA.

4 Description of land where the activity/activities will be carried out

Tenure type/s* e.g. DAA, EPM, EPC	Tenure number*	Local government area (LGA)*	Date on application*
PL	1055	Bulloo Shire	31/10/2018
Insert.	Insert.	Insert.	Insert date.
Insert.	Insert.	Insert.	Insert date.
Insert.	Insert.	Insert.	Insert date.
Insert.	Insert.	Insert.	Insert date.
Insert.	Insert.	Insert.	Insert date.
Insert.	Insert.	Insert.	Insert date.
Insert.	Insert.	Insert.	Insert date.
GPS coordinates (*if known): Insert.			
Provide a description of land below or on an attachment e.g. environmental values, bioregions and regional ecosystems, terrain, shallow ground water systems, floodplains, springs and soil descriptions* Refer to Attachment 2 – Supporting Information			

☐ I have attached a description of land

5 Details of contaminated land

Is there a site management plan in effect for contaminated land that relates to the land that is the subject of this application?*		
☒ No →	Go to *Question* ***Error! Reference source not found.***.	
☐ Yes →	Description of land*	
	Lot and plan number(s)	LGA
	Lot Insert. Plan Insert.	Insert.
	Lot Insert. Plan Insert.	Insert.
	Lot Insert. Plan Insert.	Insert.
	Lot Insert. Plan Insert.	Insert.
	If you are not able to provide all relevant details above, please attach them to this application and indicate you have done so below: ☐ I have attached the description of the land for which a site management plan is in effect.	

6 Regional interests development approval

A regional interests development approval (RIDA) is required when a resource activity is proposed in an area of regional interest under the *Regional Planning Interests Act 2014*. Further information, including application forms, can be found on the Department of Infrastructure, Local Government and Planning (DILGP) website at www.dilgp.qld.gov.au.

Is the resource activity located anywhere within an area of regional interest?*
☐ No

☒ Yes →	Which regional interest area, has or will require a RIDA? ☐ Priority Agricultural Areas (PAAs) ☐ Priority Living Areas (PLAs) ☒ Strategic Environmental Areas (SEAs) ☐ Strategic Cropping Area (SCA) ☐ No RIDA required, I am an exempt activity.
	If you have applied for a RIDA, provide the application reference below: RPI18-023, RPI20-023

7 Environmental offsets

An environmental offset, under the *Environmental Offsets Act 2014*, may be required for an ERA where, despite all reasonable measures to avoid and minimise impacts on certain environmental matters, there is still likely to be significant residual impact on one or more of those matters.

You must verify the presence, whether temporary or permanent, of those environmental matters. For more information refer to the Queensland Environmental Offsets Policy and the Significant Residual Impact Guideline at the Queensland Government website at www.qld.gov.au, using the search term "environmental offsets".

Will the ERA/s being applied for result in a significant residual impact to a matter of State environmental significance (MSES)?*	
☒ No →	Go to *Question 8*.
☐ Yes →	Please attach supporting information that: 1. Details the magnitude and duration of the likely significant residual impact on each prescribed environmental matter (other than matters of local environmental significance) for the entire activity; and 2. Demonstrates that all reasonable measures to avoid and minimise impacts on each of those matters will be undertaken.

7.1 Notice of election

Has a notice of election been submitted to the administering authority, or is being submitted as part of this application?

☐ No → Go to *Question 7.2*.

☐ Yes → You can attach the notice of election, if it has not already been submitted.
Go to *Question 7.3*.

7.2 Staged environmental offsets

Offset delivery can be staged, however for this to occur, the condition of any approved environmental authority needs to state that both the activity and the offset may be staged. As part of your notice of election for each stage under the *Environmental Offsets Act 2014*, you are required to provide a detailed assessment of the quantum of impact of that stage and the offset obligation requirement to be delivered for that stage.

Will the proposed activity/activities and delivery of an environmental offset be undertaken in stages?

☐ No

☐ Yes → You **must** attach supporting information that details of how the activity/activities are proposed to be staged.

7.3 Nature conservation environmental offset

Has another authority issued under the *Nature Conservation Act 1992* required an environmental offset for the same, or substantially the same, impact and the same, or substantially the same, MSES?

☐ No

☐ Yes → Provide permit number: Insert.

7.4 Marine parks environmental offset

Has marine park permit issued under the *Marine Parks Act 2004* required an environmental offset for the same, or substantially the same, impact and the same, or substantially the same, MSES?

☐ No

☐ Yes → ☐ You **must** attach a copy of the marine park permit to this application.

8 Matters of national environmental significance

There are currently nine matters of national environmental significance (MNES) which have been defined in the *Environmental Protection and Biodiversity Conservation Act 1999 (Cth)* (EPBC Act). These are:

- world heritage properties
- national heritage places
- wetlands of international importance (listed under the Ramsar Convention)
- listed threatened species and ecological communities
- migratory species protected under international agreements
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mines)
- a water resource, in relation to coal seam gas development and large coal mining development

To determine whether the proposed activity/activities will have a significant impact on MNES and for referral requirements, please refer to the guidance provided by the Federal Government's Department of Agriculture, Water and the Environment on www.environment.gov.au.

Would the carrying out of the proposed activity/activities be likely to have a significant impact on a MNES?*	
☒ No →	Go to *Question 9*.
☐ Yes →	Has the proposal been referred to the Federal Department of Agriculture, Water and the Environment for formal assessment and approval? ☐ No → Go to *Question 9.* ☐ Yes → Go to *Question 8.1*.

8.1 EPBC Act approval for environmental offsets

Has an approval been issued under the EPBC Act required an environmental offset for the same, or substantially the same, impact and the same, or substantially the same, MSES?	
☐ No →	Go to *Question 9*.
☐ Yes →	☐ I have attached a copy of the approval under the EPBC Act. Are there any MNES which were assessed under the EPBC Act which are the same, or substantially the same as an MSES, but that were not conditioned in the approval? ☐ No → Go to Question *10*. ☐ Yes → List these MNES: Insert.

9 ANZSIC Code for the activity

The Australian and New Zealand Industrial Classification (ANZSIC) is used by the Australian Bureau of Statistics.

What is the ANZSIC code for the activity?*

☐ 1101 Black coal mining	☐ 1313 Copper ore mining
☐ 1102 Brown coal mining	☐ 1314 Gold ore mining
☐ 1311 Iron ore mining	☐ 1315 Mineral sand mining
☐ 1312 Bauxite mining	☐ 1316 Nickel ore mining
☐ 1317 Silver-lead-zinc ore mining	☒ 1200 Oil and gas extraction
☐ 1319 Metal ore mining (other metallic mineral ores)	☐ Other Insert.

10 Environmental Impact Statement and Impact Assessment Report under the *State Development and Public Works Organisation Act 1971*

Certain stages of the EA application process may not apply if the proposed activities were assessed as part of a coordinated project (an Environmental Impact Statement (EIS) or Impact Assessment Report (IAR) process) declared by the Coordinator-General under the *State Development and Public Works Organisation Act 1971* (SDPWO Act). You are only required to answer Questions 10.2 to 10.4 if your project is being, or was assessed, as part of a coordinated project under the SDPWO Act.

10.1 Coordinated project status

Has the Coordinator-General declared that the project the subject of this application is a coordinated project for which an EIS or IAR under that Act is required?

☐ No →	Go to *Question 11.*
☐Yes →	What is the name of the project? Insert. Go to *Question 10.2*

10.2 Has the EIS or IAR process been completed?

Has the EIS or IAR process under the SDPWO Act been completed?*

☒ No →	Go to *Question 13*	
☐ Yes	Was the EIS or IAR completed for all activities that are the subject of this application?	
	☐ No →	Please list the activities that were not included in the EIS or IAR or attach documentation with this information to this application: Insert. ☐ I have attached the required supporting information Go to *Question 10.3*
	☐ Yes →	Go to *Question 10.3*

10.3 Environmental risks

Have the environmental risks or the way the activity/activities are proposed to be carried out changed since the EIS or IAR was completed?*
☐ No → Go to *Question 10.4*
☐ Yes → I have attached supporting information. Go to *Question 10.4*

10.4 Coordinator-General's conditions

Are there conditions contained within an evaluation report that relate to the activities being applied for?*	
☐ No →	Go to *Question 13*
☐ Yes →	Date Coordinator-General's evaluation report issued: Insert. Lapse date of report: Insert.

11 EIS under the *Environmental Protection Act 1994*

Certain stages of the EA application process may not apply if the proposed activities were assessed by EIS under the EP Act.

Note: You do not need to complete this section if you have indicated in Question 10 that the proposed activities are being, or have been assessed by the Coordinator-General as part of an EIS under SDPWO Act.

For this section, if the EIS assessment process for your project is complete please answer Questions 11.1-11.2. If the EIS assessment process has not been completed, please complete Questions 11.3 and 11.4.

Further information about the EIS process is available at www.qld.gov.au using the search term 'environmental impact statements'.

11.1 Completed EIS process

<table>
<tr><td colspan="3">Has an EIS process under Chapter 3 of the EP Act been completed?*</td></tr>
<tr><td colspan="3">☒ No → Go to Question 11.3</td></tr>
<tr><td rowspan="2">☐ Yes →</td><td colspan="2">Was the EIS process completed for all activities that are the subject of this application?</td></tr>
<tr><td>☐ No</td><td>Please list the activities that were not included in the EIS or attach documentation with this information to this application:
Insert
☐ I have attached the required supporting information.
Go to Question 11.2</td></tr>
<tr><td></td><td colspan="2">☐ Yes Go to Question 11.2</td></tr>
</table>

11.2 Environmental Risks

Have the environmental risks or the way the activity/activities are proposed to be carried out changed since the EIS was completed?*
☐ No Go to *Question 13*
☐ Yes → I have attached supporting information. Go to *Question 13*

11.3 Current EIS process

11.3.1 Have you applied for a decision on whether an EIS would be required under the EP Act for an EA application under Part 3, Chapter 3?	
☒ No →	*Go to question 11.3.2*
☐ Yes →	What was the decision? ☐ EIS would be required. ☐ EIS would not be required Go to *Question 13*

11.3.2 Have you applied to voluntarily prepare an EIS under either Part 2 or Part 3 of Chapter 3 of the EP Act?		
☒ No →	*Go to question 12*	
☐ Yes →	What was the outcome of the application?	
	☐ Refused	Go to *question 13*
	☐ Approved	Have you submitted a draft TOR to the department? ☐ Yes Insert date of submission ☐ No Go to *Question 13*
		Do you intend to prepare an EIS under chapter 3, EP Act? ☐ Yes ☐ No Go to *Question 13*

12 EIS criteria

The information provided here will assist in determining whether an EIS (under the EP Act) is required. If your response to any question is yes, you must attach details of how the criterion is triggered including details of the impact. You do not need to fill this out if you have an approval to voluntarily prepare an EIS under Part 2 or Part 3 of Chapter 3 or received a decision that an EIS would not be required for an EA application for this application under Part 3, Chapter 3 **OR** if you have indicated in question 10 that the proposed activities are being or have been assessed by the Coordinator General as part of an EIS for a coordinated project.

For further information refer to the guideline Criteria for environmental impact statements for resource projects under the Environmental Protection Act 1994 (ESR/2016/2167)[6].

#	Criteria—EIS triggers (*if applicable) *This question is **not applicable if** an EIS process under either the SDPOW Act or the EP Act has been completed for all the activities that are the subject of this application, **and** the environmental risks of the activities and the way they are proposed to be carried out has not changed since the EIS was completed.*	Response
	*Questions 12.1-12.3 are mandatory for **mining activities only**. If your proposed activity/activities is not a mining activity, tick N/A and proceed to *Question 12.4*.	☒ N/A
12.1*	Is the ERA project for a mining activity which involves the removal of two million tonnes/year or more of run-of-mine (ROM)[7] ore or coal?	☐ YES ☐ NO
12.2*	Is the ERA project for a mining activity that involves the removal of 1 million tonnes per year or more of run-of-mine (ROM) ore or coal on or under a floodplain or a coastal hazard area?	☐ YES ☐ NO
12.3*	Is the ERA project for a mining activity which involves the introduction of a novel or unproven resource extraction process, technology or activity[8]?	☐ YES ☐ NO
	*Questions 12.4-12.6 are mandatory for **petroleum and gas activities only**. If your proposed activity/activities is not a petroleum and gas activity, tick N/A and go to Question 14.	☐ N/A
12.4*	Is the ERA project for a petroleum and gas activity that is likely to have a total disturbance area of greater than 2000 hectares at any one time during the life of the proposed project? This includes areas occupied by well pads (single or multi-directional), access tracks and roads, water storages, and process plants?	☐ YES ☒ NO
12.5*	Is the ERA project for a petroleum and gas activity that is likely to involve the construction of a high pressure pipeline over a distance of 300 kilometres or greater?	☐ YES ☒ NO
12.6*	Is the ERA project for a petroleum and gas activity that is likely to involve the construction of a liquefied natural gas plant?	☐ YES ☒ NO
☐ I have attached details of how the criterion is triggered including details of the impact.		
There are numerous criteria used to make the EIS decision. Further information about the EIS process is available at www.qld.gov.au using the search term 'environmental impact statements'.		

[6] This guideline is available on the Queensland Government website at www.qld.gov.au, using the search term "criteria for EIS".
[7] ROM ore or coal means the material excavated but prior to washing or chemical concentration. It does not include overburden.
[8] For example: underground coal gasification; in-seam coal slurrying; a new method of ore concentration. This will be decided on a case-by-case basis and this trigger is not intended to discourage innovation.

13 Progressive rehabilitation and closure plan (PRC plan) under the *Environmental Protection Act 1994*

Is this application for a new site-specific environmental authority for a mining activity relating to a mining lease?*

☒ No

☐ Yes

If yes, this application **must** be accompanied by a PRC plan complying with 126C and submitted in the approved form unless:

- In relation to an EIS process under EP Act:
  - the administering authority has approved the voluntary preparation of an EIS under Part 2 or Part 3, Chapter 3 of the EP Act and the EIS has started (draft Terms of Reference submitted), or you stated in this application (question 11.3.2) that an EIS will be prepared; OR
  - DES has made a decision that an EIS is required for this application under Part 3, Chapter 3 of the EP Act; OR
- In relation to an EIS process under SDPWO Act:
  - The Coordinator-General has declared that the project the subject of this application is a coordinated project for which an EIS is required.

In the above circumstances, the intention is for the PRC plan to be provided in the EIS. Following the EIS assessment process, the PRC plan should be formally lodged in the approved form.

The approved form for lodgement of a PRC plan can be obtained from www.qld.gov.au using the publication number/2019/4957 as a search term.

14 Assessment of the environmental impact

This question is **not applicable if any** of the following apply. If relevant, please tick which scenario is relevant to your project:

In relation to an EIS process under SDPWO Act:

☐ an EIS process has been completed for all the activities that are the subject of this application **and** the environmental risks of the activities and the way they are proposed to be carried out has not changed since the EIS was completed.

OR

☐ the Coordinator-General has declared that the project the subject of the application is a coordinated project for which an EIS under that Act is required.

OR

In relation to an EIS process under EP Act:

☐ an EIS process has been completed for all the activities that are the subject of this application **and** the environmental risks of the activities and the way they are proposed to be carried out has not changed since the EIS was completed.

OR

☐ an application to the chief executive to decide if an EIS was required for an EA application for the application was approved (Chapter 3, Part 3)

OR

☐ chief executive approved application to voluntarily prepare an EIS under either Part 2 or Part 3 of Chapter **and either**

- Proponent has submitted a draft TOR

  OR

  You stated in question 11.3.2 of this form that you (the applicant) intend to prepare an EIS under chapter 3, EP Act.

You must attach to this application an assessment of the likely impact of each ERA on environmental values (*if applicable), including:

- a description of the environmental values likely to be affected by each relevant activity
- details of any emissions or releases likely to be generated by each relevant activity
- a description of the risk and likely magnitude of impacts on the environmental values
- details of the management practices proposed to be implemented to prevent or minimise adverse impacts
- if you answered 'No' to Question 0, details of how the land the subject of the application will be rehabilitated after each relevant activity ceases

☒ I have attached an assessment of the environmental impact and specific supporting information.

15 Details of waste management

Describe the proposed measures for minimising and managing waste generated by the activity/activities below or on an attachment*
REFER TO SUPPORTING INFORMATION (ATTACHMENT 2)

☐ I have attached the proposed measures.

16 Coal seam gas activities

This question is **not applicable if** an EIS process under the SDPWO Act has been completed for all the activities that are the subject of this application **and** the environmental risks of the activities have not changed since the EIS was completed.

Does the application relate to coal seam gas (CSG) activities? (*if applicable)	
☒ No →	You will not be authorised to undertake CSG activities. Go to *Question 17.*
☐ Yes →	Will CSG water be generated by the proposed activities? (*if applicable) ☐ No ☐ Yes → You **must** attach documentation detailing: • the quantity of CSG water the applicant reasonably expects will be generated in connection with carrying out each relevant CSG activity; and • the flow rate at which the applicant reasonably expects the water will be generated; and • the quality of the water, including changes in the water quality the applicant reasonably expects will happen while each relevant CSG activity is carried out; and • the proposed management of the water including, for example, the use, treatment, storage or disposal of the water; and • the measurable criteria (the management criteria) against which the applicant will monitor and assess the effectiveness of the management of the water, including, for example, criteria for each of the following: (i) the quantity and quality of the water used, treated, stored or disposed of (ii) protection of the environmental values affected by each relevant CSG activity (iii) the disposal of waste, including, for example, salt, generated from the management of the water; and • the action proposed to be taken if any of the management criteria are not complied with. This will also need to include actions to make sure that the management criteria will be able to be complied with in the future; and • whether the proposed management of the CSG water is consistent with the Coal Seam Gas Water Management Policy (ESR/2016/2381[9]), including the prioritisation hierarchy for managing and using CSG water; or • if the proposed management of the coal seam gas water is inconsistent with the prioritisation hierarchy for managing and using CSG water—the reason for managing the CSG water in the proposed way.
	Will brine or salt be generated by the proposed activities? (*if applicable) ☐ No ☐ Yes → You **must** attach documentation detailing: • whether the proposed management of the salt or brine is consistent with the Coal Seam Gas Water Management Policy (ESR/2016/2381**Error! Bookmark not defined.**), including the prioritisation hierarchy for managing saline waste; or • if the proposed management of the salt or brine is inconsistent with the prioritisation hierarchy for managing saline waste—the reason for managing the salt or brine in the proposed way.

[9] This policy is available on the Queensland Government website at www.qld.gov.au, using the publication number 'ESR/2016/2381' as a search term.

	Is a CSG evaporation dam proposed in connection with carrying out the CSG activity? (*if applicable) ☐ No ☐ Yes → You **must** attach documentation detailing: (a) an evaluation of best practice environmental management for managing the CSG water; and (b) an evaluation of alternative ways for managing the water; and (c) how the evaluation demonstrates that there is no feasible alternative to a CSG evaporation dam for managing the water.
	☐ I have attached the documentation to support all 'Yes' responses provided above.

17 Exercising underground water rights

Underground water rights provide the tenure holder with a statutory right to take or interfere with underground water in the area of the tenure if the taking or interference with that water is necessarily and unavoidably obtained in the process of extracting the resource.

For more information about exercising underground water rights or the associated application requirements please refer to the guideline Requirements for site-specific and amendment applications—underground water rights (ESR/2016/3275)[10].

If the activity/activities are proposed to be undertaken on a mineral development licence (MDL), mining lease (ML) or petroleum lease (PL), does the application propose to exercise underground water rights?*	
☐ N/A →	The proposed activity/activities are not on a MDL, ML or PL. Go to *Question 18*.
☐ No →	Go to *Question 18*.
☒ Yes →	You **must** attach documentation detailing: • the areas in which underground water rights are proposed to be exercised; • for each aquifer affected, or likely to be affected, by the exercise of underground water rights: (i) a description of the aquifer; (ii) an analysis of the movement of underground water to and from the aquifer, including how the aquifer interacts with other aquifers and surface water; and (iii) a description of the area of the aquifer where the water level is predicted to decline because of the exercise of underground water rights; and (iv) the predicted quantities of water to be taken or interfered with because of the exercise of underground water rights during the period in which resource activities are carried out; • the environmental values that will, or may, be affected by the exercise of underground water rights and the nature and extent of the impacts on the environmental values; • any impacts on the quality of groundwater that will, or may, happen because of the exercise of underground water rights during or after the period in which resource activities are carried out; and • strategies for avoiding, mitigating or managing the predicted impacts on the environmental values or the impacts on the quality of groundwater.
	☒ I have attached all relevant supporting documentation.

[10] This guideline is available on the Queensland Government website at www.qld.gov.au, using the publication number "ESR/2016/3275" as a search term.

18 Publication of application notice and documents

This question is only applicable if you are proposing to undertake a mining activity on a mining lease, or a geothermal, petroleum or greenhouse gas storage activity.

As the applicant, you may be required to make the application notice, application documents and the response to any information requests available on a website during the public notification period. By providing a website address below, you give permission for the administering authority to link to your website during the public access period.

What is the website address for the application notice and application documents (*if applicable)?
N/A
Details of contact person if technical assistance is required:
Name: Insert. Phone: Insert. Email: Insert.

19 Payment of fees

You are required to pay an application fee at the time of application. If your application is approved you will be required to pay a fee annually. Each ERA has a regulated fee and the annual fee will be the highest annual fee of any ERA associated with the project. The first annual fee will be invoiced when one or more of the tenures are granted. Information on fees is available on the Business Queensland website at www.business.gov.au.

The application fee is*: $ 887.30 ($677.00 + $210.3 (30% annual fee))

Please select your payment method for the application fee below*:

☐ Cheque or money order payable to the Department of Environment and Science (attached).

☒ For credit card payments for applications to the Department of Environment and Science you must complete the application using Connect at www.des.qld.gov.au.

For more information on payment options go to the Business Queensland website at www.business.qld.gov.au and search 'Forms and fees for mining and resources'.

20 Applicant declaration

I declare that the information I have provided is true and correct. I understand that it is an offence under the *Environmental Protection Act 1994* to give information that I know is false, misleading or incomplete.

I will comply with all conditions on my environmental authority as well as any relevant provision in the *Environmental Protection Act 1994.*

I understand that I am responsible for managing the environmental impacts of these activities, and that approval of this application is not an endorsement by the administering authority of the effectiveness of the management practices proposed or implemented.

Applicant's full name*	Applicant's position (*if an organisation)
John Sarto	HSER MANAGER - ONSHORE
Applicant's signature* 	Date* 19/03/2021

Important note: Estimated rehabilitation cost (ERC)

It is a condition of all environmental authorities for resource activities, under section 297 of the EP Act, that the holder must not carry out, or allow the carrying out of, a resource activity under the authority unless an ERC decision is in effect, and the holder has paid scheme assurance and complied with the requirements under the *Mineral and Energy Resources (Financial Provisioning) Act 2018* for paying this assurance. If your application for an environmental authority is approved, you must lodge a separate application for an ERC decision either using Connect[11]or by submitting the approved form *Application for a Decision on the Estimated Rehabilitation Cost*[12] (publication number ESR/2018/4426). For further information regarding the estimated rehabilitation cost, refer to Guideline *Estimated rehabilitation cost under the Environmental Protection Act 1994*[13] (publication number ESR/2018/4425).

Submitting your completed application

Submit your completed application (in word searchable electronic PDF format) via email to palm@des.qld.gov.au or:

Post:	**Further information:**
Permits and License Management	www.business.qld.gov.au
Department of Environment and Science	Email: palm@des.qld.gov.au
GPO Box 2454	Phone: 13 QGOV (13 74 68)
BRISBANE QLD 4001	

Privacy statement

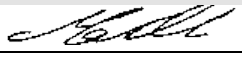
The Department of Environment and Science (the Department) and the Department of Resources are collecting the information on this form in accordance with and as authorised by Chapter 5 of the *Environmental Protection Act 1994* (EP Act).

Pursuant to section 540 of the EP Act, the Department is required to maintain a register of certain documents and information authorised under the EP Act. A copy of this document will be kept on the public register. The register is available for inspection by members of the public who are able take extracts, or copies of the documents from the register. Documents that are required to be kept on the register are published in their entirety, unless alteration is required by the EP Act. There is no general discretion allowing the Department to withhold documents or information required to be kept on the public register. For more information on the Department's public register, search 'public register' at www.qld.gov.au. For queries about privacy matters please email privacy@des.qld.gov.au or telephone 13 74 68.

[11] Certain applications to DES can be made using DES's digital platform for online services and transactions—Connect. For more information and to register to use Connect go to www.des.qld.gov.au/Connect.
[12] This form is available on the Queensland Government website at www.qld.gov.au, using the publication number ESR/2018/4426 as a search term.
[13] This form is available on the Queensland Government website at www.qld.gov.au, using the publication number ESR/2018/4425 as a search term.

Attachment 1—Joint applicants and appointment of principal applicant

We are joint applicants for this environmental authority and hereby appoint: SANTOS LIMITED
as the principal applicant to receive statutory documents relating to this application.

Name—individual or contact person if applicant is an organisation	Suitable operator reference number
Mark Sales, General Manager, Cooper Basin Joint Venture	601232
Organisation name (include trading name if relevant)	**ABN/ACN (if an organisation)**
Delhi Petroleum Pty Ltd	7854686
Residential or registered business address (not a post office box)	**Phone**
Level 8, 80 Flinders Street, ADELAIDE SA 5000	08 8433 1451
Postal address (if different from above)	**Facsimile**
GPO Box 175, ADELAIDE SA 5001	Insert.
Email	☐ Indicate if you want to receive correspondence via email
Mark.sales@beachenergy.com	
Signature	**Date** 1 December 2020
	Insert date.

Name—individual or contact person if applicant is an organisation	Suitable operator reference number
MARK SALES, GENERAL MANAGER, COOPER BASIN JOINT VENTURE	607236
Organisation name (include trading name if relevant)	**ABN/ACN (if an organisation)**
Beach Energy (Operations) Limited	7845338
Residential or registered business address (not a post office box)	**Phone**
LEVEL 8, 80 FLINDERS STREET, ADELAIDE SA 5000	08 8433 1451
Postal address (if different from above)	**Facsimile**
GPO BOX 175, ADELAIDE SA 5001	Insert.
Email	☐ Indicate if you want to receive correspondence via email
MARK.SALES@BEACHENERGY.COM	
Signature	**Date**
	.24 November 2020

Site specific application for a new environmental authority for a resource activity

Name—individual or contact person if applicant is an organisation	Suitable operator reference number
John Sarto	601497
Organisation name (include trading name if relevant)	**ABN/ACN (if an organisation)**
Vamgas Pty Ltd	Insert.
Residential or registered business address (not a post office box)	**Phone**
60 Flinders Street, ADELAIDE SA 5000	07 3838 3668
Postal address (if different from above)	**Facsimile**
GPO Box 1010, BRISBANE QLD 4001	Insert.
Email	☐ Indicate if you want to receive correspondence via email
Elizabeth.dunlop@santos.com	
Signature	**Date**
	19/03/2021

Name—individual or contact person if applicant is an organisation	Suitable operator reference number
John Sarto	601502
Organisation name (include trading name if relevant)	**ABN/ACN (if an organisation)**
Santos Australian Hydrocarbons Pty Ltd	006245110
Residential or registered business address (not a post office box)	**Phone**
60 Flinders Street, Adelaide SA 5000	07 3838 3668
Postal address (if different from above)	**Facsimile**
GPO BOX 1010, BRISBANE QLD 4001	Insert.
Email	☐ Indicate if you do not want to receive correspondence via email
ELIZABETH.DUNLOP@SANTOS.COM	
Signature	**Date**
	19/03/2021

Name—individual or contact person if applicant is an organisation	Suitable operator reference number
Insert.	Insert.
Organisation name (include trading name if relevant)	**ABN/ACN (if an organisation)**
Insert.	Insert.
Residential or registered business address (not a post office box)	**Phone**
Insert.	Insert.
Postal address (if different from above)	**Facsimile**
Insert.	Insert.
Email	☐ Indicate if you want to receive correspondence via email
Insert.	
Signature	**Date**
	Insert date.

Name—individual or contact person if applicant is an organisation Insert.	Suitable operator reference number Insert.
Organisation name (include trading name if relevant) Insert.	ABN/ACN (if an organisation) Insert.
Residential or registered business address (not a post office box) Insert.	Phone Insert.
Postal address (if different from above) Insert.	Facsimile Insert.
Email Insert.	☐ Indicate if you want to receive correspondence via email
Signature	Date Insert date.

Santos

ATTACHMENT 2 – Supporting Information

Santos

Attachment 2

Supporting Information for a Site-Specific EA Application

Petroleum Lease (PL) 1055 - Bantam

Table of Contents

Tables

Figures

Appendices

Abbreviations and Units

Acronym	Description
ATP	Authority to Prospect
BIM	Block Identification Map
BPEM	Best Practice Environmental Management
CSG	Coal Seam Gas
DEHP	Department of Environment and Heritage Protection, Queensland (now DES)
DES	Department of Environment and Science, Queensland
EA	Environmental Authority
EO Act	*Environmental Offsets Act 2014*
EP Act	*Environmental Protection Act 1994*
EP Reg	*Environmental Protection Regulation 2019*
EPP	*Environmental Protection Policy*
ERA	Environmentally Relevant Activities
ESA	Environmentally Sensitive Area
GAB	Great Artesian Basin
GES	General Ecological Significance
ha	Hectares
HES	High Ecological Significance
IEMS	Integrated environmental management system
km	Kilometre
LC	Least Concern
m	Metres
MSES	Matters of State Environmental Significance
N/A	Not Applicable
NCA	*Nature Conservation Act 1992*
NCAP	No Concern at Present
PJ	Petajoule
PL	Petroleum Lease
PMST	Commonwealth Protected Matters Search Tool
PPL	Petroleum Pipeline Licence
RE	Regional Ecosystem
RoW	Right of Way
SEA	Strategic Environmental Area
SMC	Streamlined Model Conditions
SMP	Site Management Plan
SMS	Santos Management System

Acronym	Description
SWQ	South West Queensland
UWIR	Underground Water Impact Report

1.0 Introduction

Santos Limited, Delhi Petroleum Pty Ltd, Beach Energy (Operations) Limited, Vamgas Pty Ltd and Santos Australian Hydrocarbons Pty Ltd (the proponents) are applying for an Environmental Authority (EA) for a new resource activity – Petroleum Lease (PL) 1055. Santos Limited (Santos) is the principal applicant.

PL 1055 is situated in the central-eastern portion of Authority to Prospect (ATP) 1189 in south-west Queensland, approximately 34 km northeast of the Ballera Gas Centre (refer to Figure 1-1). PL 1055 will replace 22 blocks of ATP 1189. Petroleum produced within PL 1055, once granted, will be transported to the Santos Ballera Gas Facility for processing via existing and new pipeline infrastructure.

Santos has prepared this document in accordance with Sections 125 and 126A of the *Environmental Protection Act 1994* (EP Act) and the Department of Environment and Heritage Protection's (DEHP) Guideline – *Application requirements for petroleum activities'* (DEHP, 2013).

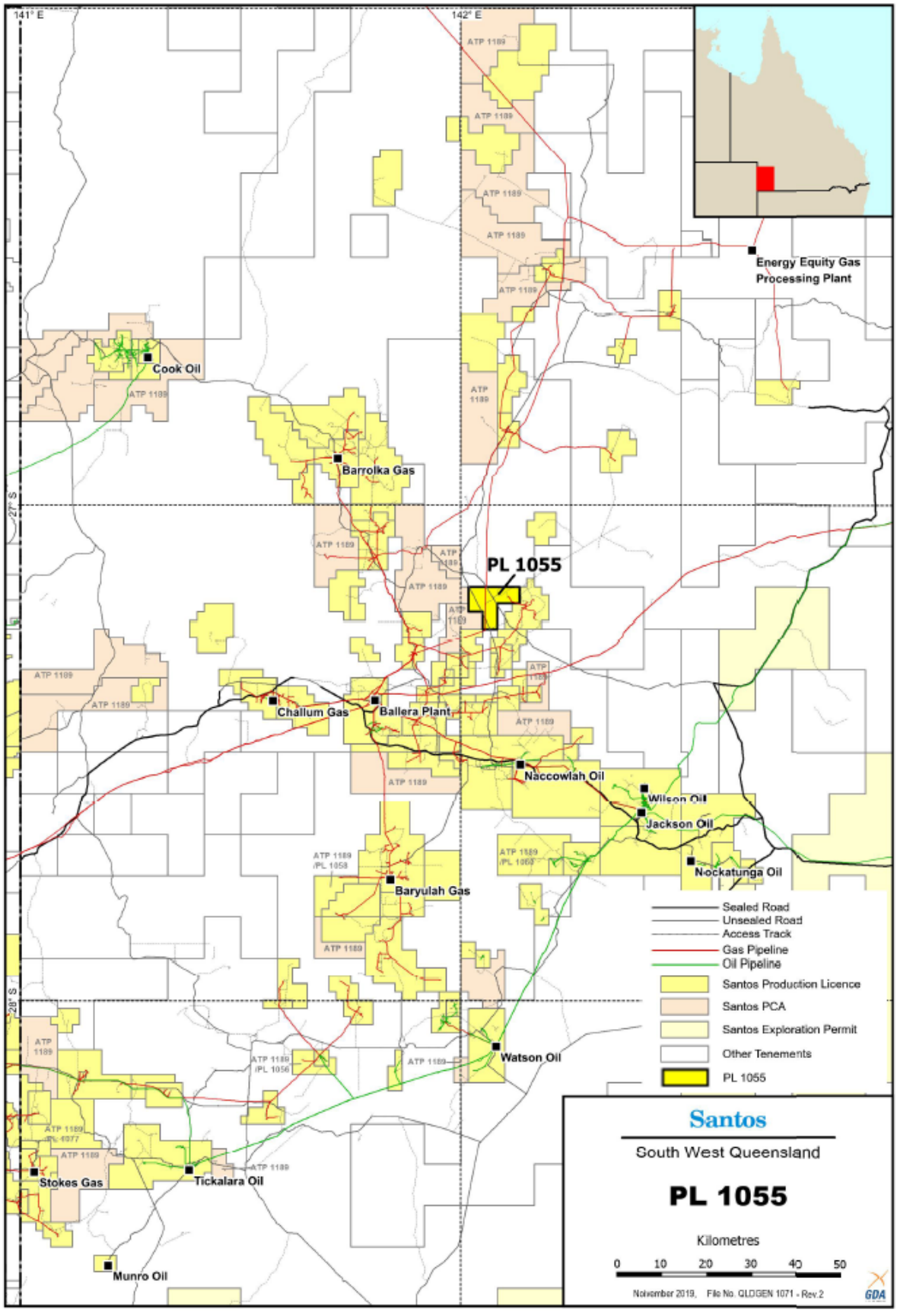


Figure 1-1: Regional location of PL 1055

2.0 Application Description

This application is for a site-specific EA to authorise petroleum activities under the *Petroleum and Gas (Production and Safety) Act 2004* on PL 1055 once granted. Santos submitted an application for PL 1055 (Bantam) over 22 sub blocks of the existing ATP 1189 on 31 October 2018.

2.1 Existing Activities

Existing petroleum infrastructure / activities on ATP 1189 within the area of PL 1055 authorised by EA EPPG03518215, includes (refer to Figure 2-1):

- 2 conventional gas wells (as at March 2021);
- associated pipelines, access tracks, borrow pits and temporary camps;
- seismic surveys; and
- ancillary infrastructure.

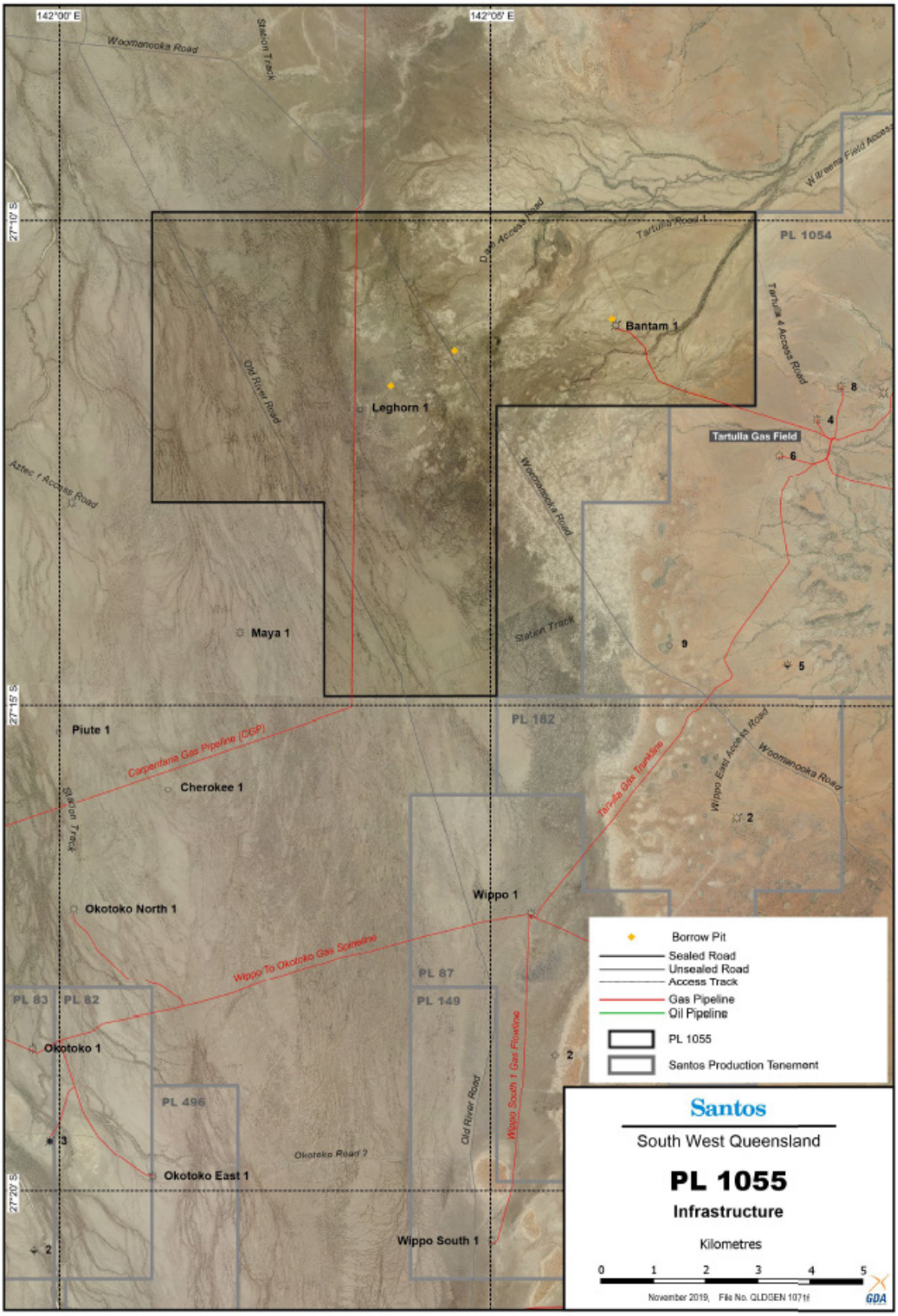


Figure 2-1: PL 1055 existing infrastructure

2.2 Proposed Activities

Santos proposes to continue undertaking conventional petroleum exploration and appraisal activities in PL 1055, but will also commence production of petroleum product. Production will commence from the existing conventional gas wells, however there is potential for production to occur from up to 12 wells in total (comprised of 2 existing and 10 proposed exploration, appraisal and production wells) should further exploration be successful. Stimulation may occur for all 12 wells. A proposed *Schedule A, Table 1 – Scale of Activities* is provided in Table 2-1.

Table 2-1: Schedule A, Table 1 – Scale of Activities

Petroleum Activities and Infrastructure	Scale (number of activities)
Wells	12
Stimulation	12 wells

Associated activities proposed to be undertaken on PL 1055 may include construction and/or operation of the following:

- well leases and equipment laydown areas;
- drilling and completions, including well stimulation;
- gathering lines/pipelines;
- access tracks and borrow pits;
- temporary camps and sewage treatment plants and irrigation (<21 EP);
- seismic surveys;
- communication systems; and
- other incidental petroleum activities.

These and other incidental activities are described in Section 2.3.

No production facilities or centralised produced water storage ponds are proposed to be constructed or operated within PL 1055. There would be no change to existing water management resulting from the additional activities. That is, total fluids (petroleum product and water) will be transferred to a Santos processing facility located outside PL 1055.

No prescribed ERAs are proposed to be conducted. No notifiable activities under schedule 3 of the EP Act are proposed within PL 1055. As a result, activities to be carried out in PL 1055 will continue as per that on ATP 1189 – the only key difference will be the enablement of petroleum production (i.e. sale of petroleum) through the change in tenure type.

Authorised and incidental activities under ATPs and PLs are prescribed under Chapter 2, Part 1, Division 1, and Chapter 2, Part 2, Division 2 of the *Petroleum and Gas (Production and Safety) Act 2004*, respectively. It is noted that authorised and incidental activities are substantially the same if authorised under an ATP or PL; the key difference being that petroleum production is only authorised under a PL (s109(1)(c)). Relevant excerpts of the *Petroleum and Gas (Production and Safety) Act 2004* are compared in Table 2-2 (emphasis added on s109(1)(c)).

Table 2-2: Authorised and incidental activities under ATPs and PLs

Authorised activities - ATP	Authorised activities - PL
Part 1 Authorities to prospect ***Division 1 Key authorised activities*** ***32 Exploration and testing*** *(1) The authority to prospect holder may carry out any of the following activities in the area of the authority—* *(a) exploring for petroleum;*	***Part 2 Petroleum leases*** ***Division 1 Key authorised activities*** ***109 Exploration, production and storage activities*** *(1) The lease holder may carry out the following activities in the area of the lease—* *(a) exploring for petroleum;*
(b) testing for petroleum production;	*(b) subject to section 152—* *(i) testing for petroleum production; and*
(c) evaluating the feasibility of petroleum production;	*(ii) evaluating the feasibility of petroleum production; and* *(iii) testing natural underground reservoirs for storage of petroleum or a prescribed storage gas;*
N/A	*(c) petroleum production;*
(d) evaluating or testing natural underground reservoirs for the storage of petroleum or a prescribed storage gas;	*(d) evaluating, developing and using natural underground reservoirs for petroleum storage or to store prescribed storage gases, including, for example, to store petroleum or prescribed storage gases for others;*
(e) plugging and abandoning, or otherwise remediating, a bore or well the holder reasonably believes is a legacy borehole and rehabilitating the surrounding area in compliance with the requirements prescribed under a regulation.	*(e) plugging and abandoning, or otherwise remediating, a bore or well the lease holder reasonably believes is a legacy borehole and rehabilitating the surrounding area in compliance with the requirements prescribed under a regulation.*
(2) However, the holder must not carry out any of the following— *(a) extraction or production of a gasification or retorting product from coal or oil shale by a chemical or thermal process;*	*2) However, the holder must not carry out any of the following—* *(a) extraction or production of a gasification or retorting product from coal or oil shale by a chemical or thermal process;*
(b) exploration for coal or oil shale to carry out extraction or production mentioned in paragraph (a);	*(b) exploration for coal or oil shale to carry out extraction or production mentioned in paragraph (a);*
(c) GHG stream storage.	*(c) GHG stream storage.*
(3) The carrying out of activities mentioned in subsection (1), other than exploring for petroleum, is subject to section 73.	N/A
(4) The rights under subsection (1) may be exercised only by or for the holder.	*(3) The rights under subsection (1) may be exercised only by or for the holder.* *(4) The right to store petroleum or prescribed storage gases for others is subject to part 6.*

Authorised activities - ATP	Authorised activities - PL
33 Incidental activities *(1) The authority to prospect holder may carry out an activity (an incidental activity) in the area of the authority if carrying out the activity is reasonably necessary for, or incidental to, an authorised activity under section 32(1) for the authority or another authority to prospect.*	***112 Incidental activities*** *(1) The lease holder may carry out an activity (an incidental activity) in the area of the lease if carrying out the activity is reasonably necessary for, or incidental to—* *(a) another authorised activity for the lease; or* *(b) an authorised activity for another petroleum lease or an authority to prospect.*
Examples of incidental activities— *1 constructing or operating plant or works, including, for example, communication systems, pipelines associated with petroleum testing, powerlines, roads, separation plants, evaporation or storage ponds, tanks and water pipelines*	*Examples of incidental activities—* *1 constructing or operating plant or works, including, for example, communication systems, compressors, powerlines, pumping stations, reservoirs, roads, evaporation or storage ponds and tanks*
2 constructing or using temporary structures or structures of an industrial or technical nature, including, for example, mobile and temporary camps	*2 constructing or using temporary structures or structures of an industrial or technical nature, including, for example, mobile and temporary camps*
3 removing vegetation for, or for the safety of, exploration or testing under section 32(1) *Note— See also part 10, section 239, chapter 5 and section 20.*	*3 removing vegetation for, or for the safety of, exploration or testing under section 152(1)* *Note— See also part 10, section 239, chapter 5 and section 20(2).*
(2) However, neither of the following activities is an incidental activity— *(a) constructing or using a structure, other than a temporary structure, for office or residential accommodation;* *Note— For development generally, see the Sustainable Planning Act 2009, chapter 6.*	*(2) However, constructing or using a structure, other than a temporary structure, for office or residential accommodation is not an incidental activity.* *Note— For development generally, see the Sustainable Planning Act 2009, chapter 6 (Integrated development assessment system (IDAS)).*
(b) the processing of gaseous petroleum, other than gaseous petroleum produced as an unavoidable result of ATP production testing. *(3) In this section—* ***gaseous petroleum** means petroleum in a gaseous state.* ***processing**, of gaseous petroleum, means treating the petroleum to be suitable for transport.*	N/A

2.3 Description of Project Activities

The following sections describe the proposed activities and infrastructure to be undertaken on PL 1055.

2.3.1 Seismic Surveys

Seismic acquisition is a method of investigating subsurface geological structures to identify locations to conduct drilling activities. During exploration, seismic surveys are the most common geological field assessment method and they are often the first field activity undertaken. Seismic data is collected by recording acoustic (sound) waves that are reflected from geological interfaces at depths of up to several thousands of metres below the surface.

Modern (>1990) seismic line preparation in the Cooper-Eromanga Basin is undertaken to cause minimal ground, soil and vegetation disturbance. Seismic line preparation generally involves 'walking' a bulldozer with its front blade in the up position along seismic lines to gently flatten terrain and vegetation. Seismic lines are regularly 'offset' and 'weaved' around obstacles to:

(a) avoid the need to disturb terrain and long-lived perennial vegetation or other sensitivities such as watercourses; and
(b) reduce the 'linearity' and visual impact of seismic lines.

No seismic line preparation is undertaken in Gibber land systems i.e. seismic lines are simply driven by light vehicles and Vibroseis trucks. In rough or highly vegetated terrain, seismic lines may require light preparation by earthmoving or vegetation slashing machinery to enable safe and efficient vehicle and equipment access. In flat terrain with limited vegetation cover, seismic line preparation is generally not required. Seismic lines generally consist of lightly prepared 3 to 5m wide lines. Post-survey rehabilitation of seismic survey lines generally consists of utilising a grader to remove and respread any windrows created during line preparation. Seismic lines are checked for any remaining survey pegs or rubbish. Minor areas of compacted soil are ripped (~0.5m depth and ~1m tine spacing).

Santos undertakes seismic surveys in accordance with best practice environmental management principles, which have been derived from the *Statement of Environmental Objectives* (SEO) *for Seismic Operations in the Cooper and Eromanga Basins* (Cockshell, 1998; Santos, 2012).

2.3.2 Well Lease Establishment

For each proposed well, well leases of around 1.5 hectares (1.65 ha if well requires stimulation) would be established to accommodate drilling and ancillary equipment including a derrick, power generators, pipe handling equipment, tanks, drilling sumps, flares, and office areas. Well lease establishment would involve:

- surveying and pegging the pad boundary
- constructing a diversion bund if required due to slope or proximity to watercourses
- clearing (usually sparse, shrubby) vegetation that is unable to be avoided
- removing and stockpiling topsoil
- levelling the pad by cutting and filling using material from borrow pit if required
- excavating and capping the rig hardstand
- capping and compacting the lease footprint
- excavating sump pit if required
- installing fencing and gate
- installing cellar and conductor on well centre
- installing pads for ancillary equipment and infrastructure (such a tanks and flowlines); and
- setting up drill rig and associated equipment.

2.3.3 Well Drilling Activities and Associated Infrastructure

2.3.3.1 Drilling

Wells would be constructed in accordance with the *Code of Practice for the construction and abandonment of petroleum wells and associated bores in Queensland* (DNRME, 2019).

Drilling fluid would be continuously circulated down the drill pipe and back to the surface equipment to overbalance subsurface pressure (if required), cool the drilling bit and carry back formation cuttings. A drilling sump would be used to store drilling fluids and cuttings. Following the completion of drilling, the rig would be rigged down and transported from site.

2.3.3.2 Hydraulic Fracturing

Well stimulation techniques including hydraulic fracturing may be used to increase the recovery of resources (oil and gas) by increasing the permeability of the reservoir. Hydraulic fracturing involves pumping a fluid under pressure into the reservoir to open up and connect fractures within the reservoir rock, thereby increasing the opportunity for the resource to move within the reservoir rock and flow toward the well. A proppant within the fluids holds the fractures open after the activity ceases. Approximately 99.5% of the material pumped into the well is water and sand. Minor quantities of additives make up the remaining 0.5% of the fluid. The purpose of these additives is to:

- enhance fracture initiation;
- help lubricate the flow of proppant (i.e. sand) into the fractures;
- prevent microbial or chemical reactions following introduction of the fluids; and
- prevent formation of scale deposits that may affect the well or pumps.

After the fracture process is completed, fluids that return to surface when the pressure is released are captured in tanks or lined pits for reuse, recycling or transported to a licenced water management facility.

All existing and proposed wells (12 in total) within PL 1055 have the potential to be hydraulically fractured. When the well is brought on-line, produced water is pumped from the well, allowing the petroleum resource to move through the well to the surface. The use of specific chemicals such as benzene, toluene, ethyl-benzene and xylene in hydraulic fracturing fluids above prescribed levels has been banned in Queensland. The use of other chemicals is subject to a risk assessment process as described in Section 5.5.

2.3.4 Gathering Lines

A right-of-way (RoW) for pipeline routes would be lightly graded to allow access for vehicles required for above and below ground pipeline construction. Pipeline sections would be transported and temporarily stored along the proposed pipeline route prior to joining together the tubing connections of each pipe section. Above ground pipelines would be raised above ground level on prefabricated supports located along the proposed pipeline route. Below ground pipelines would be constructed using a standard construction methodology including:

- clearing and grading
- trenching and padding
- pipe stringing, laying and welding
- backfilling and ROW re-instatement; and
- rehabilitation.

Pipeline ROWs are re-instated to the condition and profiles existing at the commencement of activities. Given the nature of the climate within PL 1055 (average rainfall is low and evaporation rates are high, refer to Section 3.2), re-instatement and rehabilitation activities are focused on promoting the natural re-

establishment of vegetation of similar species composition and density to the surrounding undisturbed land.

2.3.5 Access Tracks

Access tracks are required to provide drilling equipment access to the proposed conventional petroleum well sites and for ongoing operational access. Existing access tracks would be used where practicable to minimise the length of proposed access tracks required. Access tracks would be up to 13 metres wide to accommodate a six metre wide roadway and 3.5 metre wide table drains either side of the roadway. The roadway would be lightly graded and capped with clay or similar locally available borrow pit material. Access tracks are constructed to allow the natural passage of surface waters, to minimise any changes to the natural surface hydrology.

2.3.6 Borrow Pits

Borrow pits provide a source of construction material (generally in the form of clay rich soil) to provide a stable and supportive surface for well leases and access tracks where required. Borrow pits vary in dimension, depending on the quality and quantity of material available. Borrow pits are sited preferentially in flat areas with limited vegetation, outside of drainage features, with tree removal and woody vegetation avoided as much as possible. The borrow pits will be restored by ripping the floor and sides of the borrow pit to a depth of up to 500 mm generally along the contour. Stockpiled topsoil and vegetation would then be respread to a uniform depth over the entire area from which it was removed. The pit is then re-contoured to blend in with adjacent undisturbed land.

2.3.7 Other Incidental Petroleum Activities

Other activities necessary to facilitate the petroleum extraction and production, incidental to the above, include, but are not limited to:

- temporary laydown areas;
- fencing;
- power and communication lines/towers;
- storage tanks;
- mobile and temporary camps, that may involve sewage treatment works that are no release works or are release works less than 21 EP;
- geophysical, geotechnical, geological, topographic, cadastral and ecological surveys;
- installation of environmental monitoring equipment; and
- activities necessary to achieve compliance with conditions of the EA (e.g. sediment and erosion control, rehabilitation works).

2.4 Blueprint Conditions

PL 1055 will share infrastructure and operational efficiencies with adjacent Santos tenures. These adjacent tenures are conditioned in accordance with 'blueprint conditions'. To enable consistent operation and environmental conditioning of PL 1055 with the adjacent tenures, Santos requests the new EA for PL 1055 include 'blueprint conditions'.

Santos extensively liaised with DES on the 'blueprint project' to develop a set of standardised conditions ('blueprint conditions') for regulating conventional oil and gas exploration and production activities in SWQ. The blueprint conditions were primarily developed for the following reasons:

1. to contemporise EA conditions on SWQ EAs to reflect modern regulatory standards;

2. to ensure the condition set was fit-for-purpose for the Cooper Basin environment and conventional oil and gas operations instead of CSG activities; and
3. to promote consistency of regulation across Santos' SWQ operations by removing differing condition sets for standard activities.

Petroleum activities undertaken in SWQ are fundamentally different to CSG activities undertaken in central-eastern QLD. The operating environments, human and environmental values and sensitivities, and regional settings are also very different. For example, CSG activities typically involve drilling numerous shallow wells within relatively small tenure areas to access a broad resource i.e. coal seams. CSG well locations can also be largely pre-planned to be drilled in relatively regular patterns across a given tenure, with some surface location flexibility to avoid sensitivities. CSG tenures are also typically located in areas with higher land use intensity i.e. areas with intensive grazing and cropping land commingled with residential and public infrastructure. In comparison, SWQ petroleum activities involve drilling a smaller number of deep, precisely located wells across very large tenure areas, with low land use intensity i.e. low intensity cattle grazing and limited landholders / private properties.

The blueprint conditions are for the most part the same as the Department's Streamlined Model Conditions for petroleum activities (SMCs). However, some conditions have been modified to accommodate differences in operational requirements and environmental settings, with regard to effectively carrying out conventional petroleum activities in SWQ and in some cases to reflect previously agreed conditions for SWQ activities.

Santos has undertaken a comparison of SMCs with proposed blueprint model conditions for PL 1055 refer to Appendix A). The intent of the comparison is to demonstrate that:

a) blueprint conditions and SMCs are largely consistent or the same for the majority of conditions; and
b) where blueprint conditions differ from SMCs, the grounds for the change are reasonable.

Proposed EA conditions are provided in Appendix B.

3.0 Site Description, Land Use and Climate

3.1 Site Description and Land use

PL 1055 is located on Lot 1, Plan SP133822 on the Durham Downs freehold pastoral lease, approximately 38 km north-east of the Ballera Gas Facility in the Bulloo Shire local government area in South West Queensland. It encompasses an area of approximately 6,718 ha. PL 1055 is located on 22 sub blocks as detailed in Table 3-1 and shown in Figure 3-1.

Cattle grazing is the primary land use of land within PL 1055. Durham Downs operates an 8,910 km^2 cattle station owned by S Kidman & Co Ltd. The applicants have also conducted petroleum exploration activities on the land under the existing EA EPPG03518215 for ATP 1189. Tenements adjoining PL 1055 (other than the underlying ATP1189) include PL 1054 (Tartulla) to the east and PL 1047 (under application) to the south.

Table 3-1: PL 1055 block identification

BIM Name	BIM Code and Blocks	Sub-Blocks
Cooper Creek	2785	B, C, D, E, G, H, J, K, M, N, O, P, T, U, Y, Z
Cooper Creek	2786	A, B, C, F, G, H

3.2 Climate

PL 1055 is situated in south-west Queensland, an arid region of Australia, where the average rainfall is low and evaporation rates are high. The seasons are generally characterised by hot dry summers and cold dry winters. Temperatures exhibit large seasonal and diurnal fluctuations. In summer, average daily maximum temperatures exceed 36°C and the average minimum is 23°C. Average daily temperatures in winter range from 6°C to 22°C (BOM, 2020).

Rainfall variability is amongst the highest in Australia, while average annual totals are amongst the lowest. There is no distinct seasonal rainfall pattern, but the majority of rainfall occurs during the warmer months from October to March. Summer rainfall is generally associated with thunderstorm activity driven by monsoonal and tropical cyclone weather systems moving inland from northern and north-eastern Australia (BOM, 2018). Winter rainfall can occur from the formation of low-pressure systems pushing cool moist air northwards from the Great Australian Bight into central Australia (GABCC, 1998). Average annual rainfall in the region ranges from 164 mm at Moomba Airport to 290 mm at Windorah (BOM, 202020). However, changes in the irregular atmospheric circulation phenomenon known as the El Niño–Southern Oscillation (ENSO) can significantly influence weather patterns in central Australia. Changes in ENSO can lead to exceptionally dry or wet years with annual rainfall ranging from as low as 100 mm during a dry event (termed an 'El Niño') to as high as 660 - 730 mm (2010 at Moomba Airport and Windorah, respectively) during a wet event (termed a 'La Niña') (BOM, 2020). There are on average 18 to 28 rainfall days (≥1mm) per year in the region. Larger rainfall events of between 10 to 25 mm or more, occur on average 3 to 8 days per year, respectively. Larger rainfall events predominantly occur during the warmer months from October to March (BOM, 2020).

Average seasonal evaporation rates range from 550 mm in summer to 150 mm in winter. Average annual evaporation is extremely high, ranging from 3,000 to 3,800 mm (Marree Soil Conservation Board, 2004). The most common wind direction throughout the year is from the south-east. Light winds (<20 km/h) are most common between May to July, while the greatest frequencies of strong winds (41-61 km/h) occur between September to January.

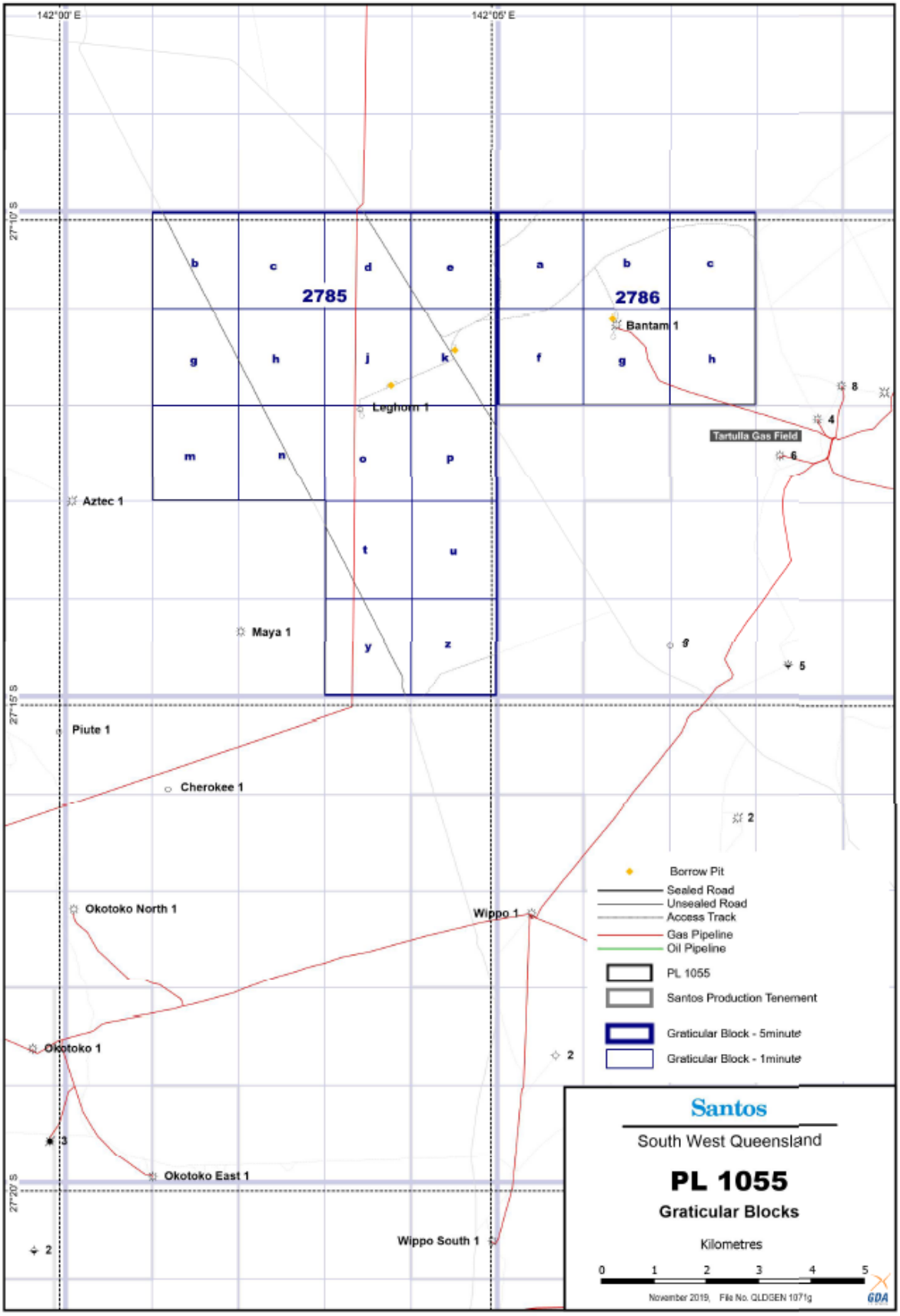


Figure 3-1: PL 1055 graticular blocks and sub-blocks

4.0 Relevant Environmental Values

Desktop and field based methods were used to assess relevant environmental values within PL 1055. Desktop methods included searches of environmental databases and government environmental mapping and reporting. Field based methods included an ecological field survey (undertaken by E2M Consulting (E2M)) of PL 1055. Database search results, government environmental reports, and the E2M ecological assessment report are attached as Appendix C. Relevant environmental values for PL 1055 include:

- land resources;
- regional ecosystems;
- environmentally sensitive areas;
- flora and fauna;
- surface waters and wetlands;
- groundwater;
- air quality;
- noise and vibration;
- waste;
- rehabilitation; and
- Matters of State Environmental Significance.

Sections 4.1 to 4.11 discuss relevant environmental values within PL 1055. The risks and potential impacts to these values as a result of the proposed activities, and mitigation measures for potential impacts are discussed in Section 5.0.

4.1 Land Resources

PL 1055 is located in the Channel Country bioregion, and Sturt Stony Desert and Cooper – Diamantina Plains subregions (IBRA version 7, 2012). Approximately 98% of the tenure area is mapped as land zone 3 (alluvial river and creek flats) under the Regional Ecosystem Framework (Wilson & Taylor, 2012). The remaining areas of the tenure are mapped as land zones 6 (quaternary inland dunefields) or 9 (undulating country on fine-grained sedimentary rocks) (Wilson & Taylor, 2012).

Major land systems mapped within PL 1055 include alluvial plains with gradients less than 1:5000 and flooded or frequently flooding flat alluvial plains. There is a small area of land (52.72 ha) in the east of PL 1055 is mapped as gently undulating to undulating rolling plains. All land within the PL has an agricultural land class of C2 (pasture land – native pastures) (Refer to Figure 4-1).

4.2 Flora and Regional ecosystems

Vegetation mapped within PL 1055 is typical of the Bioregion (Channel Country) and is predominately open shrublands, tussock grasslands, variable sparse to open-herbland and low open woodland. Much of the vegetation present within PL 1055 has undergone historic disturbance due to grazing pressure from the operation of the existing cattle station.

E2M conducted a number of field surveys to verify mapped regional ecosystems (REs) within PL 1055. Nine ground-truthed REs were identified within the PL. These entirely comprised Category B regulated vegetation under the *Vegetation Management Act 1999* with a 'least concern' vegetation management class and 'no concern at present' biodiversity status. Structure of vegetation was sparse to very sparse. Refer to Table 4-1 and Figure 4-2 for the extent of ground-truthed REs. Table 4-1 also identifies wetland values derived from the Regional Ecosystem Description Database (REDD) (Queensland Herbarium, 2019) for each RE.

No threatened or protected plants listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or *Nature Conservation Act 1992* (NC Act) were considered likely to occur within PL 1055. No high-risk areas for NC Act Protected Plants were identified to occur within PL 1055.

Table 4-1: E2M ground-truthed REs

RE Code	Short Description	VM Class/BD Status	Approx. area within PL (ha)
5.3.7	*Eucalyptus coolabah* +/- *Lysiphyllum gilvum* +/- *Acacia stenophylla* +/- *Acacia cambagei* low open woodland on major channels	Least concern / No concern at present	89.1
5.3.8a	*Eucalyptus coolabah* low open woodland +/- *Duma florulenta* on braided channels, drainage lines, flood plain lakes and claypans	Least concern / No concern at present	9.2
5.3.13a	*Duma florulenta* open shrubland in depressions on flood plains, interdune flats, clay pans and clay plains	Least concern / No concern at present	307.7
5.3.17	*Tecticornia* spp. open succulent shrubland fringing playa lakes or clay pans	Least concern / No concern at present	70.5
5.3.18a	*Chenopodium auricomum* open shrubland on braided channel complex of major alluvial plains.	Least concern / No concern at present	400.3
5.3.18b	Variable sparse to open-herbland on braided channel complex of major alluvial plains.	Least concern / No concern at present	3,401.5
5.3.21a	Variable sparse to open herbland, *Senna* spp. open shrubland and bare scalded areas on infrequently flooded alluvia of major rivers their distributaries, drainage channels and creeks	Least concern / No concern at present	2,317.4
5.6.4	*Atalaya hemiglauca* +/- *Acacia aneura* +/- *Acacia* spp. +/- *Corymbia terminalis* low open woodland on reticulate sand dunes	Least concern / No concern at present	46.3
5.9.3	*Astrebla* spp. +/- short grasses +/- forbs open herbland on Cretaceous sediments	Least concern / No concern at present	63.9

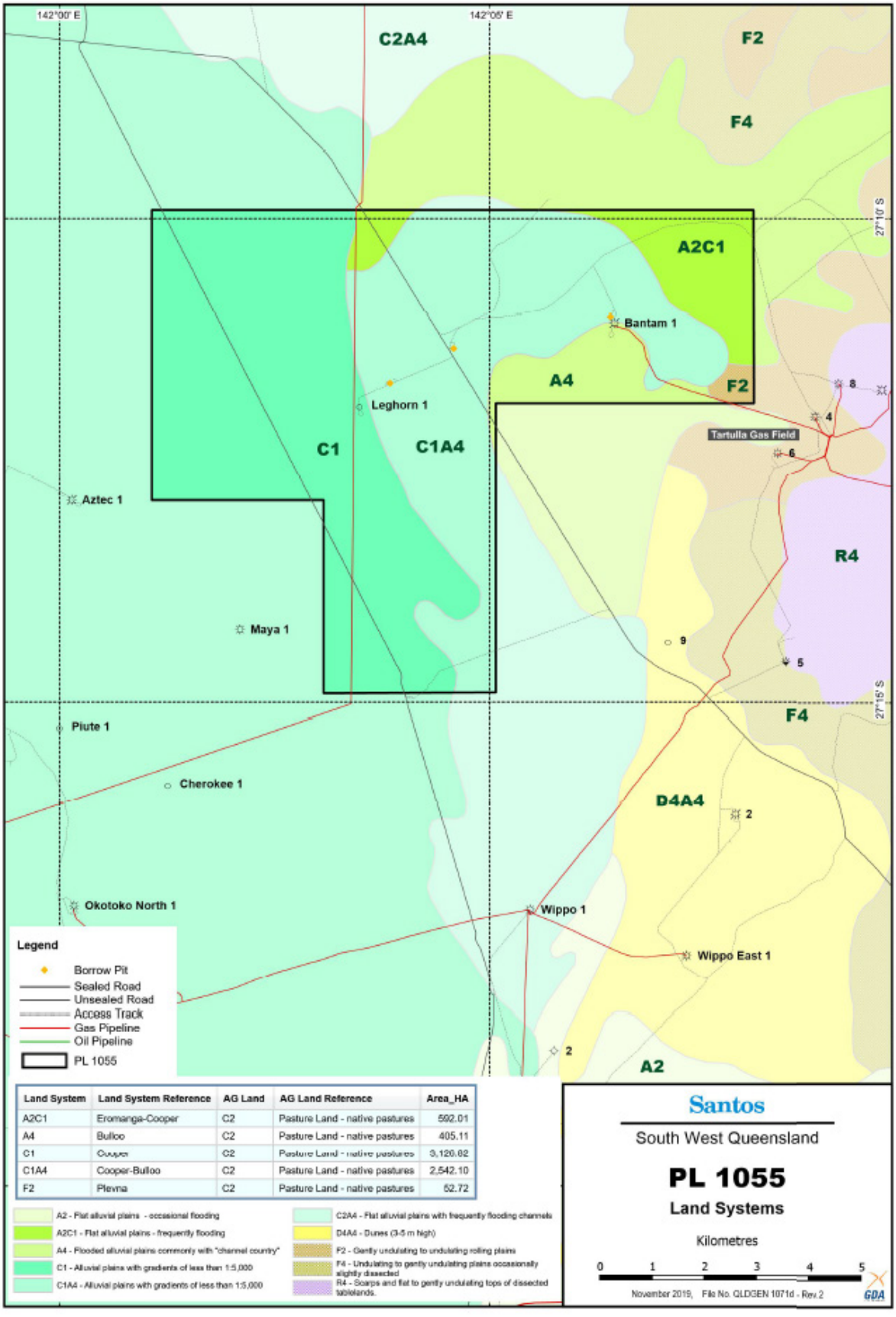


Figure 4-1: Land systems

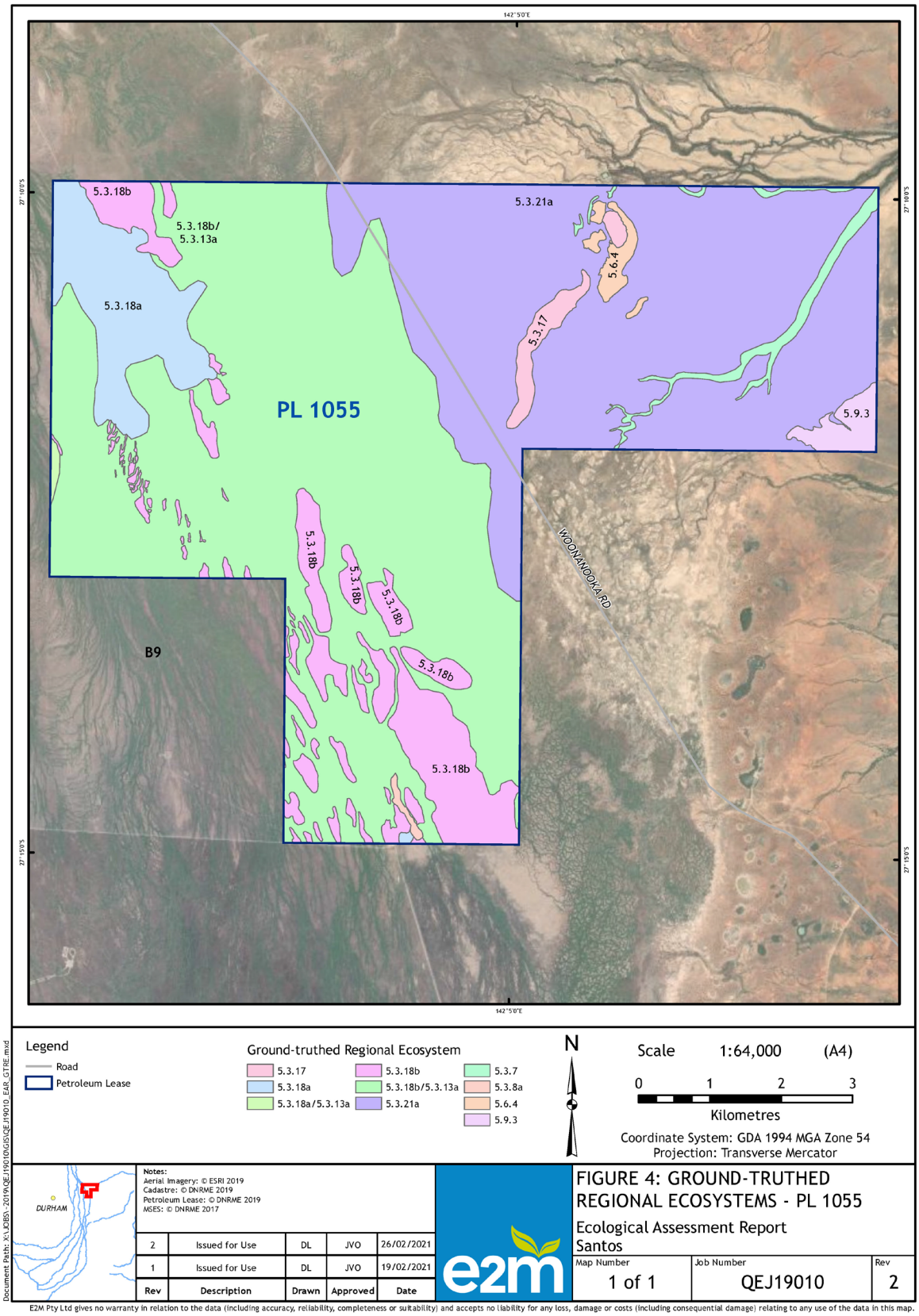


Figure 4-2: Ground-truthed regional ecosystems by E2M (Figure 4 of Appendix C)

4.3 Environmentally Sensitive Areas

No Environmentally Sensitive Areas (ESAs) defined under the EP Act are mapped or have been identified to be present within PL 1055 based on desktop and field assessments (E2M, 2021).

4.4 Fauna

E2M carried out desktop and field based likelihood of occurrence assessments to identify the potential presence of Matters of National Environmental Significance (MNES) and Matters of State Environmental Significance (MSES) species within PL 1055.

These assessments considered the species distribution, habitat requirements and historical records in proximity to the PL, as well as observations and evidence of occurrence, habitat suitability, threats and on-site environmental conditions identified during the field survey. The assessment methodology and results are described in the ecological assessment report attached as Appendix C. Table 4-2 summarises species listed under the NC Act and/or EPBC Act considered likely to occur within PL 1055, based on the work by E2M and the area of associated RE within PL 1055. No NC Act listed threatened species were identified to be present within the PL during the field survey.

Table 4-2: NC Act / EPBC Act listed species considered likely to occur within PL 1055

Species	NC Act status	EPBC Act status	Regional Ecosystem (RE) associations	Area within the PL (ha)
Fork-tailed swift (*Apus pacificus*)	Special least concern	Marine and migratory	All REs	6,705.9
Glossy ibis (*Plegadis falcinellus*)	Special least concern	Marine and migratory	REs associated with riverine and palustrine wetlands, including: 5.3.7, 5.3.8a, 5.3.13a, 5.3.17 and 5.3.18a	876.8
Grey grasswren *(Amytornis barbatus) barbatus* or *diamantina* subspecies	*Barbatus ss.* – endangered *Diamantina ss.* – near threatened	*Barbatus ss.* - endangered	REs containing lignum (*Duma florulenta*) and swamp canegrass (*Eragrostis australasica*) thickets, including 5.3.7, 5.3.8a and 5.3.13a	406
Gull-billed tern (*Gelochelidon nilotica*)	Special least concern	Marine and migratory	REs associated with riverine and palustrine wetlands, including: 5.3.7, 5.3.8a, 5.3.13a, 5.3.17 and 5.3.18a	876.8
Sharp-tailed sandpiper (*Calidris acuminata*)	Special least concern	Marine and migratory	REs associated with riverine and palustrine wetlands, including: 5.3.7, 5.3.8a, 5.3.13a, 5.3.17 and 5.3.18a	876.8
Major Mitchel's Cockatoo (*Lopochroa leadbeateri*)	Vulnerable	-	RE 5.3.7 – foraging and breeding habitat RE 5.3.8a – foraging habitat only	89.1 9.2
Short-beaked echidna (*Tachyglossus aculeatus*)	Special least concern	-	All REs	6,705.9

4.5 Surface Water and Wetlands

The environmental values of waters to be enhanced or protected are defined in section 6 of the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* for 'water mentioned in schedule 1' and 'other water'. Water within the Cooper Basin is not mentioned in schedule 1 and so is considered 'other water'. Its environmental values relate to:

- the biological integrity of particular aquatic ecosystems;

- the suitability of water for certain human uses (such as for drinking water, food production, recreation and aesthetic purposes or industrial uses); and
- the cultural and spiritual values of the water.

PL 1055 is located within the Cooper Creek drainage sub-basin, which has a catchment area of approximately 95,800 km^2 (DES, 2019). Cooper Creek is Australia's largest braided stream and inland floodplain (Wainwright *et al,* 2006). It is approximately 1500 km long and stretches from the Warrego Range in Queensland to Lake Eyre in South Australia (Kotwicki, 1986).

The Cooper is ephemeral and predominantly influenced by surface flows with little input from groundwater (Santos, 2019). Large flow events are associated with heavy episodic rainfall events in the upstream catchment areas of south-west Queensland. These rainfall events are associated with summer monsoonal and cyclonic weather systems and changes in the El Niño–Southern Oscillation (ENSO) cycle—the large Cooper Creek flood events that occurred between 2010 and 2012 were associated with a switch from El Niño to La Niña (BOM, 2018a). Heavy rainfall events are more likely to occur from October to April (BOM, 2018a). Minor Cooper Creek flow events generally occur each year, causing inflows from south-west Queensland into north-east South Australia, but large flow events are rare, with Cooper Creek flows only reaching Lake Eyre approximately once in every ten years (Puckridge *et al*, 1999; Kotwicki, 1986).

The turbidity of Cooper Creek is generally high, particularly as it approaches the border with South Australia, but varies according to local influences (Karim *et al*, 2015). Electrical conductivity levels of the creek are generally lower than water quality objective trigger levels (Karim *et al*, 2015).

Four mapped non-perennial tributaries of Cooper Creek (stream order 8 or above) traverse the western bounds of the tenure (refer to Figure 4-3). The Wareena Creek (non-perennial, stream order 7) runs from the north east of PL 1055 into Cooper Creek. The watercourses are typical of the majority of the wider Cooper Basin with high flow variability in response to infrequent large rainfall events. They are hydrologically connected to the Cooper Creek floodplain.

Environmental values for wetlands are defined in section 7 of the *Environmental Protection (Wetland and Biodiversity) Policy 2019* as the qualities of a wetland that support and maintain the biodiversity of the wetland, including:

- the health of the wetland's ecosystems;
- the wetland's natural state and biological integrity;
- the presence of distinct or unique features, endemic plants or animals and their habitats, including threatened wildlife and near threatened wildlife under the *Nature Conservation Act 1992* (NC Act);
- the wetland's natural hydrological cycle; and
- the natural interaction of the wetland with other ecosystems, including other wetlands.

The *map of Queensland wetland environmental values* established by the *Environmental Protection Policy (Water and Wetland Biodiversity) Policy 2019* identifies wetlands of high ecological significance (HES) and general ecological significance (GES) across the state. There are no HES wetlands within PL 1055. GES wetlands (non-riverine, palustrine) are present across a large proportion of PL 1055.

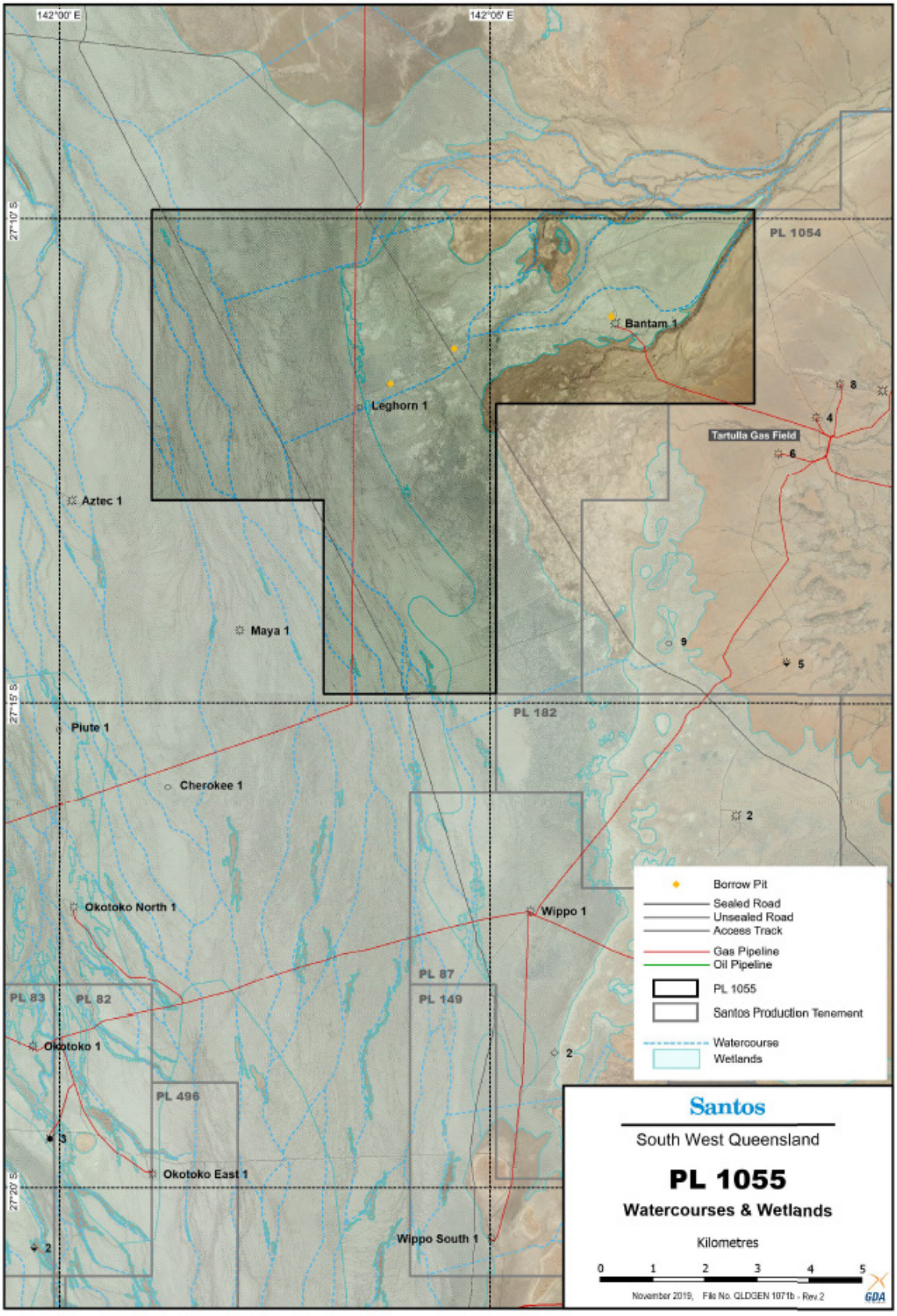


Figure 4-3: Watercourses and wetlands

4.6 Groundwater

The information in this section, and Sections 5.5 and 6.1.3, is derived from a *'Revised scenario for the Underground Water Impact Report – Santos Cooper Basin Oil and Gas Fields, South – West Queensland'* (herein referred to as the February 2020 SWQ UWIR (Feb 2020 SWQ UWIR) (Appendix D).

PL 1055 is located in the Central Eromanga region of the Great Artesian Basin (GAB). The GAB is Australia's largest groundwater system, with confined artesian and sub-artesian aquifers. The Eromanga Basin is the largest sub-basin of the GAB and entirely overlays the older Cooper Basin. The Cooper and Eromanga Basins are multi-layered systems with alternating layers of sandstone, shales, mudstones and siltstones.

The sandstone formations of the Eromanga Basin generally correspond to water-bearing formations and can yield significant quantities of groundwater. The main GAB aquifers within the Eromanga Basin are the Winton Formation, Cadna-owie Formation, Hooray Sandstone, Hutton Sandstone and Poolowanna Formation. Due to accessibility, groundwater use by local communities is mostly limited to the shallower formations of the Eromanga Basin.

The main aquifers of the Cooper Basin are the Wimma Sandstone, Toolachee Formation, Epsilon Formation, Patchawarra Formation and Tirrawarra Formation. Due to the depth of these formations, they are usually only accessed for petroleum activities and are not considered by the regulator to be 'sandstone aquifers of the GAB'. Only the upper formations of the Basin, including the Tinchoo Formation and Arraburry Formation, are included in the Queensland GAB Regulation (Great Artesian Basin Resource Operations Plan (GAB ROP) and Water resources (GAB) Plan 2006.

Existing and proposed petroleum activities within PL 1055 target the Toolachee Formation, secondary Epsilon Formation and Patchawarra Formation of the Cooper Basin. These formations are stacked porous sandstone separated by finer grained siltstone and mudstone formations and, together with the Tirrawarra sandstone, form the main gas reservoirs of the Cooper Basin.

Groundwater flow in the GAB is generally toward the low-lying areas of Central Australia. In the Central Eromanga region, groundwater mostly flows toward the west, south and south-west. Aquifer recharge primarily occurs through uptake at the boundary of the system. Recharge from infiltration through overlying formations is considered a minor recharge mechanism and is limited to the upper formations.

Groundwater Dependent Ecosystems

There are no GAB ROP discharge or recharge springs located within PL 1055. The closest GAB springs are located more than 200km from PL 1055. These springs are too far away to be at risk of hydraulic impact due to the proposed activities on PL 1055.

A terrestrial GDE area is mapped to potentially occur in the western half of PL 1055. The GDE is mapped as quaternary alluvial aquifers with brackish, ephemeral groundwater connectivity regime. Two potential aquifers supporting potential terrestrial GDEs are also mapped in PL 1055. These areas are mapped as brackish, ephemerally saturated alluvial and fresh episodically saturated sand aquifers. These potential aquifers may support terrestrial GDEs dependent on alluvial aquifers e.g. regional ecosystems containing deep rooted tree species (DES, 2018).

Environmental values relating to, or dependant on groundwater resources, in the Cooper and Eromanga Basins include:

- GDEs including wetlands and springs;
- Drinking water;
- Sandstone aquifer of the GAB; and
- Groundwater uses.

Further information on groundwater is presented in Sections 5.5 and 6.1.3.

Water Bores

No registered groundwater bores are located within PL 1055. The closest registered groundwater bore is located approximately 3.2 km east of the eastern boundary of PL 1055.

4.7 Air Quality

The air quality environmental values relevant to PL 1055 include environmental values for the air environment provided in Section 6 of the *Environmental Protection (Air) Policy 2019* as follows:

- the qualities of the air environment that are conducive to protecting the health and biodiversity of ecosystems;
- the qualities of the air environment that are conducive to human health and wellbeing;
- the qualities of the air environment that are conducive to protecting the aesthetics of the environment, including the appearance of buildings, structures and other property; and
- the qualities of the air environment that are conducive to protecting agricultural use of the environment.

The existing air quality of PL 1055 is typical of a remote environment influenced by existing petroleum activities and agricultural industries including the operation of the surrounding pastoral lease.

There are no sensitive receptors within PL 1055. The nearest sensitive receptor is the Woomanooka Homestead located approximately 4.5 km west of the lower eastern boundary of PL 1055.

There is no ambient air quality monitoring stations (AQMSs) within the vicinity of PL 1055. The closest DES AQMS is located at Moranbah, approximately 830 km north-east of PL 1055. This monitoring station has been operational since 2011 and was established to measure particles levels (particulate matter (PM_{10} and $PM_{2.5}$)) from coal mining operations in the community and surrounding area. The Toowoomba AQMS was the closest station for oxides of nitrogen (NOx) and carbon monoxide (CO) (located approximately 970km east of PL 1055). This station was operational from 2003 to 2010. Table 4-3 provides a very conservative estimate of the background air quality in SWQ.

Table 4-3. Background air quality data relevant to PL 1055

Parameter	Source	Value (ug/m^3)	Objective (ug/m^3)	Averaging Period
Carbon monoxide (CO)	Toowoomba	1.9mg/m^3	11,000	8 hour rolling average
Nitrogen dioxide(NO_2)	Toowoomba	82.8µg/m^3	250	Maximum 1 hour average
		10.5µg/m^3	62	Annual average
PM_{10}	Moranbah (Utah Drive)	29.1	50	24 hours
$PM_{2.5}$	Moranbah (Utah Drive)	4.1	25	24 hours
		7.2	6	Annual

Note – PM_{10} and $PM_{2.5}$ values have been derived from DES monitoring data for the period 1 August 2019 to 30 July 2020.

4.8 Noise

The noise environmental values relevant to PL 1055 include environmental values for the acoustic environment provided in Section 6 of the *Environmental Protection (Noise) Policy 2019* as follows:

- the qualities of the acoustic environment that are conducive to protecting the health and biodiversity of ecosystems; and
- the qualities of the acoustic environment that are conducive to human health and wellbeing, including by ensuring a suitable acoustic environment for individuals to do any of the following—
    - sleep;
    - study or learn;
    - be involved in recreation, including relaxation and conversation; and
- the qualities of the acoustic environment that are conducive to protecting the amenity of the community.

The existing noise environment is typical of remote, largely unpopulated area, with low levels of background noise dominated by natural sources (e.g. wind, animals and insects) and intermittent noise from vehicular traffic and grazing activities (e.g. mustering) from the operation of the surrounding pastoral lease.

There are no sensitive receptors in PL 1055. The nearest sensitive receptor is the Woomanooka Homestead located approximately 4.5 km west of the lower eastern boundary of PL 1055.

Background noise monitoring has not been undertaken for this development given the remote nature of the location and the absence of sensitive receptors and other noise generating industries / activities. In the absence of background noise monitoring, the deemed background levels nominated in the proposed conditions for the EA and the DES guideline - *Prescribing noise conditions for environmental authorities for petroleum activities* (ESR/2016/1935) have been adopted as being representative of the ambient acoustic environment. The deemed background levels are as follows:

- 7:00 am – 6:00 pm 35db(A)
- 6:00 pm – 10:00 pm 30db(A)
- 10:00 pm – 6:00 am 25db(a)
- 6:00 am – 7:00 am 30dB(A)

4.9 Waste

Environmental values that may be impacted by waste from petroleum activities relate to:

- human health and wellbeing;
- land quality;
- water quality;
- visual amenity; and
- existing ecological processes and biodiversity.

Under Schedule 8, Part 3 of the EP Reg, the environmental objective for activities with waste impacts is:

> *Any waste generated, transported, or received as part of carrying out the activity is managed in a way that protects all environmental values.*

Performance outcomes are:

a) *Waste generated, transported, or received, is managed in accordance with the waste and resource management hierarchy in the Waste Reduction and Recycling Act 2011; and*
b) *If waste is disposed of, it is disposed of in a way that prevents or minimises adverse effects on environmental values.*

Wastes potentially generated from project activities within PL 1055 would include the following:

- Batteries and electrical – lead acid batteries, gel type batteries, nickel cadmium batteries and alkaline batteries generated from equipment, vehicles, generators and electronics.
- Chemical waste and chemical containers – chemical wastes may include herbicides, pesticides, paints and solvents. Chemical containers are those containing any volume of free chemical that is a regulated waste and may include waste oil containers and aerosol cans containing solvent or paint.
- Concrete / aggregate / asphalt – concrete, aggregate and asphalt materials removed from demolished infrastructure that are not suitable for recycling.
- Contaminated soil – contaminated soils may be generated where localised spills of hydrocarbons and other contaminants occurs.
- Cooking oil – waste cooking oil is generated from kitchen facilities at temporary mobile camps.
- Drilling fluids and muds – waste drilling fluids, muds and cuttings are generated from the drilling process.
- General recycling – plastic bottles and food containers, glass bottles and jars, milk cartons, aluminum bottles and cans, metal lids from jars, tin cans, aluminum cans, plastic cups, cardboards and paper packaging, folders, envelopes, office paper, magazines, cereal boxes, clean paper towels, steel scraps.
- Grease trap waste – grease trap waste is generated from kitchen facilities at temporary mobile camps.
- Green waste – green waste produced from vegetation clearing activities.
- Hydrostatic test water – spent water used in the hydrostatic testing of pipelines to test pipeline integrity.
- Intermediate bulk containers (IBCs) – containers used for transport of fluids and bulk materials.
- Oily filters, rags, and absorbents - Oily filters, rags, and absorbents are generated from routine equipment and vehicle servicing, repair and filter changes.
- Oily water – oily water may be produced from servicing equipment, machinery and vehicles.
- Pipeline tape wrap – pipeline tape wrap protects the pipeline against corrosion.
- Plastic liners - waste plastic liners associated with sumps and turkeys nest dams.
- Produced water – produced water is primarily generated from the operation of wells.
- Putrescible and other domestic waste – food scraps, food wrappers, packaging materials, textile materials, plastic wrapping film, plastic bags, facial tissues, ear plugs, pens and pencils, polystyrene, aluminum foil, waxy paper, cardboard, non-recyclable plastics, etc.
- Scrap steel and metal – scrap steel and metal may include steel piping, values and cabling.
- Stimulation flowback water – this waste is generated when the fluids used in the stimulation process are brought back to the surface.
- Timber – untreated timber derived from packaging and uses that cannot be reused or recycled.

- Triethylene glycol (TEG) / glycol / coolant – is generated from equipment and vehicle fluid changes.
- Tyres – tyres and tubes are generated from tyre changes on work and vehicle equipment.
- Used spill kits – used spill kits are generated from spill clean-up of chemicals and hydrocarbons.Waste oil – small quantities of waste oil are generated routinely from vehicle and equipment oil changes.
- Wiring – electrical wiring and equipment not suitable for reuse.

Leftover fracture stimulation fluids would be removed from the site for use on subsequent wells or offsite authorised disposal.

Produced water from conventional gas wells does not require onsite storage. Total fluids would enter the pipeline for transfer to the Ballera facility (outside of PL 1055) where they would be separated and then stored. Where of an appropriate quality, some produced water may be re-used for the purposes of dust suppression, and in drilling and hydraulic fracturing activities. Similarly, if the water is of an appropriate quality, hydrotest water may be released to land at the end of the testing for disposal.

4.10 Rehabilitation

The environmental values of the existing environment and pre-disturbed land use of PL 1055 are described in the preceding sections.

Rehabilitation and decommissioning of disturbed land would occur progressively in accordance with the proposed EA conditions (refer to Schedule J in Appendix B). The objective of rehabilitation and decommissioning is to achieve a post development landform that is:

- safe for humans, native fauna and livestock;
- non-polluting; and
- stable and able to sustain appropriate land use.

The rehabilitation works would aim to provide appropriate site conditions to facilitate revegetation. The success of revegetation would be subject to prevailing weather conditions and rainfall.

Consistent with Santos operations surrounding PL 1055, a two-stage rehabilitation program approach would be pursued. Stage 1 pertains to stabilisation works which would be completed post construction within the footprint of operational assets, predominantly pipeline easements. The land is stabilised to ensure the safe and effective operation of assets and to minimise the risk of erosion, soil loss and weed invasion. Where possible, land would be returned to the landholder for productive use (e.g. grazing). Stabilisation works would include:

- remediating areas of contaminated land resulting from petroleum activities
- re-establishing surface drainage lines and re-profiling contours for operational use
- establishing a safe landform for humans and livestock in areas of significant cut and fill
- reinstating top soil (where present)
- improving the condition of soil through the appropriate assessment and treatment of soils where required
- promoting the establishment of groundcover vegetation

Stage 2 rehabilitation activities relate to disturbance footprints no longer required for operational purposes. Rehabilitation activities in Stage 2 would return remaining disturbance footprints to an appropriate land use in accordance with landholder needs and applicable regulatory requirements.

Agricultural land uses and natural areas comprising native vegetation are the two most common pre-disturbance land uses to be rehabilitated. Final rehabilitation of natural areas would be undertaken to achieve the final rehabilitation criteria conditions specified for the proposed EA.

Where infrastructure is to be left for the landholder, a written agreement will be submitted alongside the Final Rehabilitation Report.

4.11 Matters of State Environmental Significance

E2M assessed the MSES as defined in Schedule 2 of the *Environmental Offsets Regulation 2014* within PL 1055. Seven (7) MSES were identified as known or likely to be present, as shown in Table 4-4. These MSES include regulated vegetation, connectivity areas, Strategic Environmental Areas (Channel Country SEA) and habitat for threatened and special least concern species.

Table 4-4: MSES summary

MSES	Area in PL (ha)
Regulated vegetation: • REs intersecting a watercourse • Within 100m of a Vegetation Management Wetland	 1,125.7 5,863.9
Connectivity areas	6,705.9
Wetlands and watercourses - High Ecological Significance wetlands	0
Designated precinct in the Channel Country SEA	6,642.4
Protected wildlife habitat for: • Grey Grasswren, listed as endangered • Major Mitchell's cockatoo, listed as vulnerable • Short-beaked echidna, listed as special least concern	 406 89.1 plus 9.2 (foraging only) 6,705.9
Protected areas	0
Highly protected zones of State marine parks	0
Fish habitat areas	0
Waterway providing for fish passage	0
Marine plants	0
Legally secured offset areas	0

5.0 Potential Impacts, Mitigation Measures and Environmental Risk Assessment

This section identifies and assesses potential impacts, mitigation measures (control strategies), and environmental risks to relevant environment values resulting from carrying out the proposed activities as required by section 125 of the EP Act.

To assess environmental risks associated with the proposed activities, a risk assessment for each relevant environmental value (as identified in Section 4.0) has been completed. The environmental risk assessment is based on risk factors associated with both the initial construction and ongoing operational phases of the proposed activities.

Risk assessments for a proposed activity identify a wide range of risks and potential impacts to relevant environmental values as a result of carrying out proposed activities. This should not be interpreted to assume that all identified potential impacts will occur as a result of carrying out activities. Once initial unmitigated risks and potential impacts are identified as part of a risk assessment, appropriate control strategies are identified and implemented. Appropriately implemented control strategies will typically mitigate the likelihood of a potential impact occurring, and/or reduce the severity/consequences of the potential impact.

The risk assessment identifies initial (unmitigated) risks associated with the proposed activities for each relevant environmental value (EV). Following identification of appropriate mitigation measures (control strategies), the residual (mitigated) risk posed to each EV has also been determined.

The risk assessment has been undertaken in accordance with the Santos Management System (SMS) Risk Management Standard. The SMS Risk Management Standard is based on accepted principles and applicable Australian standards. Further detail on the risk assessment process is provided in Appendix E. The results of the risk assessment are summarised in Table 5-1.

Impacts to MSES in context of the *Environmental Offset Act 2014* are discussed in Section 5.10.

5.1 Land resources

The proposed activities will result in direct and indirect impacts to land resources (as described in Section 4.1), primarily as a result of:

- infrastructure construction (earthworks activities);
- vehicle and plant movements;
- minor spills or leaks of fuels, chemicals or other produced fluids;
- production operations;
- loss of containment;
- storage and disposal of general waste, chemical and process wastes;
- fire (ignition sources resulting from activities); and
- bushfire and flood (natural events).

Santos aims to minimise the operational footprint and significant disturbance associated with its activities as far as reasonably practicable. However, potential direct and indirect impacts to land resources resulting from the proposed activities may include:

- reduction in visual amenity;
- soil erosion, topsoil loss, inversion and compaction;

- disturbance to land use and suitability changes;
- reduction in agricultural productivity; and
- contamination of soil.

The area of direct disturbance within PL 1055 would be up to 115.5 hectares for the proposed activities including 10 new wells and associated well leases, flowlines, access tracks and borrow pits. This is a conservative estimate only, as future well locations (and associated infrastructure) are not known at the time of application. A large proportion of disturbance associated with flowline construction will be rehabilitated soon after construction to reduce the total disturbed area per well. The remaining areas of disturbance would be rehabilitated following the cessation of petroleum activities (refer to Section 5.9).

Management (control) strategies, risk sources, potential impacts and the level of risk associated with the proposed activities are summarised in Table 5-1. The results of the risk assessment indicate the residual risk to land resources as a result of the proposed activities is classified as 'low'. Furthermore, any short-term reduction in the agricultural availability of the pasture land would be offset by commercial agreements between the proponents and the property owner.

5.2 Flora, Regional Ecosystems and Environmentally Sensitive Areas

The proposed activities will result in direct and indirect impacts to flora and REs (native remnant vegetation) and potentially to ESAs (if they were subsequently identified to be present in PL 1055) (as described in Sections 4.2 and 4.3) primarily as a result of:

- infrastructure construction (earthworks activities);
- vehicle and plant movements;
- minor spills or leaks of fuels, chemicals or other produced fluids;
- storage and disposal of general waste, chemical and process wastes;
- loss of containment; and
- fire (ignition sources resulting from activities).

Santos aims to minimise the operational footprint and significant disturbance associated with its activities as far as reasonably practicable. However, potential direct and indirect impacts to flora and REs (native remnant vegetation) and potentially to ESAs resulting from the proposed activities may include:

- loss of ecosystem functioning;
- loss of species population, further endangerment and loss in species diversity; and
- introduction and/or spread of weeds, pest plants, animals and pathogens.

The proposed petroleum activities would directly impact up to 115.5 hectares of remnant native vegetation comprising 'least concern' RE. This estimate is conservative given that the locations of proposed wells and infrastructure are currently unknown i.e. drilling targets are subject to the findings of exploration (seismic surveys and subsurface confirmation through exploration drilling). Preliminary disturbance footprints are conservative and, for the purposes of impact assessment, a large proportion of the proposed disturbance footprint has been located within 'high constraint' areas, where appropriate (refer to Figure 5-1). As such, the assessment of impacts within this application takes a precautionary approach and simulates a conservative disturbance scenario.

Disturbance would occur progressively over a 10 to 20 year period and includes the development of areas, such as flowline alignments, which are subject to temporary disturbance only. The bulk (approximately 39 ha) of these areas would be reinstated and permitted to naturally revegetate

immediately following completion of construction activities, thereby reducing the overall development footprint.

Santos will maximise avoidance of ground-truthed REs 5.3.7, 5.3.8a and 5.3.13a as far as reasonably practicable. These REs, shown in red on Figure 5-1, are high constraint areas dominated by either MSES vegetation intersecting a wetland, or vegetation that may provide habitat for the Grey Grasswren or Major Mitchell's Cockatoo.

As stated in Section 4.3, no ESAs are mapped or have been identified to be present within PL 1055, however future surveys or changes in ESA definitions may result in ESAs being identified in the tenure. If this were to occur, EA conditions proposed in Appendix B, and management strategies outlined in Table 5-1 would mitigate potential impacts to ESAs.

Management (control) strategies, risk sources, potential impacts and the level of risk associated with the proposed activities are summarised in Table 5-1. The results of the risk assessment indicate that residual risks to flora, REs (native remnant vegetation) and ESAs as a result of the proposed activities are classified as 'low'.

5.3 Fauna

The proposed activities will result in direct and indirect impacts to fauna and/or fauna habitat (as described in Section 4.4), primarily as a result of:

- infrastructure construction (earthworks activities);
- entrapment in voids and pipelines;
- vehicle and plant movements;
- fire (ignition sources resulting from activities);
- storage and disposal of general waste, chemical and process wastes;
- loss of containment; and
- seismic source.

Santos aims to minimise the disturbance and risk posed to fauna associated with its activities as far as reasonably practicable. However, potential direct and indirect impacts to fauna resulting from the proposed activities may include:

- loss of ecosystem functioning;
- loss of species population, further endangerment and loss in species diversity;
- disturbance, injury or loss of fauna and livestock; and
- introduction and/or spread of weeds, pest plants, animals and pathogens.

As described in Section 5.2, the proposed activities will result in direct disturbance of up to 115.5 ha of potential fauna habitat, of which, approximately 39 ha will be rehabilitated immediately post-construction. This estimate is conservative given that the locations of proposed wells and infrastructure are currently unknown.

Preliminary disturbance footprints are conservative and, for the purposes of impact assessment, a large proportion of the proposed disturbance footprint has been located within 'high constraint' areas, where appropriate (refer to Figure 5-1). As such, the assessment of impacts within this report takes a precautionary approach and simulates a conservative disturbance scenario. Using this approach, E2M (refer to Appendix C) calculated the proposed activities may require clearing of protected wildlife habitat of up to approximately:

- 57.8 ha of Grey Grasswren habitat, which represents 14.2% of the species habitat identified within PL 1055. This disturbance area is based on an assumed five wells and associated infrastructure being located within the species habitat. Table 5-1 outlines specific management measures to mitigate potential impacts to Grey Grasswren habitat.
- 1.8 ha of Major Mitchell's cockatoo foraging and breeding habitat (of which 0.2 ha is foraging habitat only), which represents 1.9% of the species habitat identified within PL 1055. Due to the location of suitable habitat within the PL, proposed disturbance is considered to be minimal, largely associated within ancillary infrastructure (i.e. flowline and access track). Table 5-1 outlines specific management measures to mitigate potential impacts to Major Mitchell's cockatoo habitat.
- 115.5 ha of echidna habitat, which represents 2% of the species habitat identified within PL 1055. The proposed clearing comprises a negligible proportion of the species habitat, which is widely available within and surrounding the PL.

More generally, other listed species identified in Section 4.4 as likely to occur within PL 1055 are NC Act listed special least concern migratory species. These species only utilise the project area from time to time, and the area only provides generally suitable habitat for the species. Impacts to these species as a result of the proposed activities are expected to be minor, short-term and localised, or will otherwise be mitigated by a range of management (controls) strategies (as summarised in Table 5-1). As a result, the proposed activities and associated disturbance are unlikely to impact local or broader populations of these species.

Management (control) strategies, risk sources, potential impacts and the level of risk associated with the proposed activities are summarised in Table 5-1. The results of the risk assessment indicate that residual risks to fauna as a result of the proposed activities are classified as 'low'.

5.4 Surface Waters and Wetlands

The proposed activities may result in direct and indirect impacts to surface water and wetlands (as described in Section 4.5), primarily as a result of:

- infrastructure construction (earthworks activities, including borrow pits);
- vehicle and plant movements;
- storage and disposal of general waste, chemical and process wastes;
- well control or well head equipment failure;
- minor spills or leaks of fuels, chemicals or other produced fluids;
- production operations;
- loss of containment; and
- flood (natural event).

Santos aims to minimise the operational footprint and significant disturbance associated with its activities as far as reasonably practicable. However, potential direct and indirect impacts to surface water and wetlands resulting from the proposed activities may include:

- loss of wetland values;
- disturbance to natural drainage patterns;
- degradation of water quality and wetlands from sediment releases, spills or leaks of fuels and chemicals;

- impacts to aquatic flora and fauna from sediment releases, spills or leaks of fuels and chemicals; and
- contamination of surface water and wetlands.

As described in Section 4.5, four mapped non-perennial tributaries of Cooper Creek (stream order 8 or above) traverse the western bounds of the tenure. The Wareena Creek (non-perennial, stream order 7) runs from the north east of PL 1055 into Cooper Creek. The watercourses are typical of the majority of the wider Cooper Basin with high flow variability in response to infrequent large rainfall events. They are hydrologically connected to the Cooper Creek floodplain.

PL 1055 is within the Cooper Creek floodplain and petroleum activities may be subject to inundation risk. However, due to the slow-moving nature of flood waters in the Cooper Creek system, sufficient time (i.e. can be months) is generally available to prepare operational areas for potential flood impacts. This includes removing non-essential items and infrastructure from operational sites. Construction and drilling activities within PL 1055 would also be scheduled outside of known flood events and, where practicable, during the extended periods of no flow within PL 1055. In addition, access to PL 1055 for construction and operational activities is severely restricted during periods of extended/high rainfall.

The presence of infrastructure, including borrow pits, within the floodplain and wetlands is not expected to significantly impact hydrology and/or flows. Given the vastness of the floodplain and the area of mapped wetlands within it, in conjunction with the volume of water and extent of flooding typically experienced during inundation events, the water will continue to move around and/or through these areas largely uninhibited. This is evident from the extent of development already present within the greater Cooper Creek floodplain and wetlands and its existing functional state.

Management (control) strategies, risk sources, potential impacts and the level of risk associated with the proposed activities are summarised in Table 5-1. The results of the risk assessment indicate that residual risks to surface water and wetlands as a result of the proposed activities are classified as ‘low’.

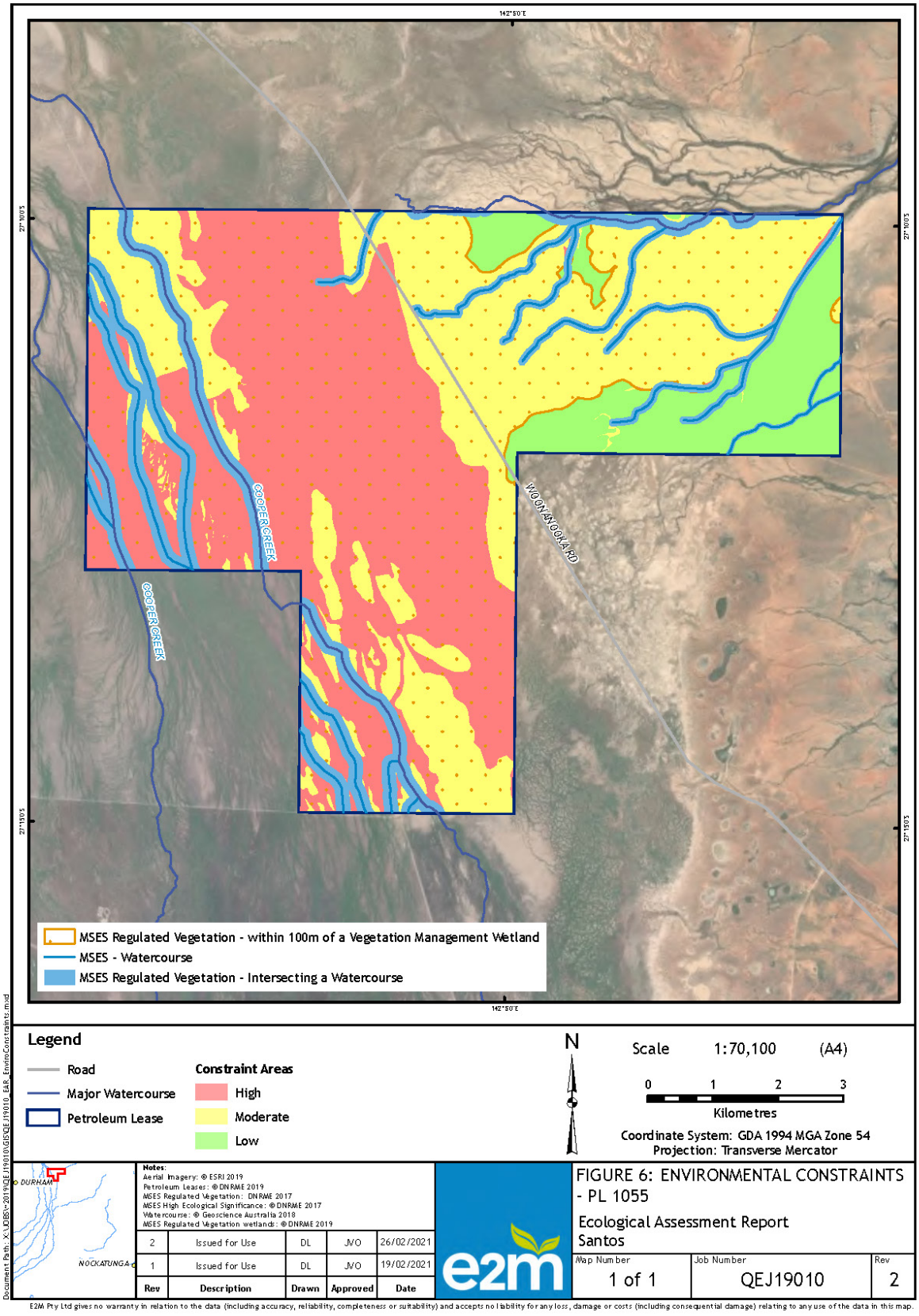


Figure 5-1: Environmental constraint areas by E2M (Figure 6 of Appendix C)

5.5 Groundwater

The proposed activities may result in direct and indirect impacts to groundwater (as described in Section 4.6) primarily as a result of:

- drilling and hydraulic stimulation / fracturing activities;
- production operations;
- well control or well head equipment failure;
- well casing or cement failure (well integrity failure);
- minor spills or leaks of fuels, chemicals or other produced fluids;
- loss of containment;
- storage and disposal of general waste, chemical and process wastes; and
- vehicle and plant movements.

These risk sources may result in the following potential impacts:

- contamination of groundwater resources;
- crossflow, aquifer contamination or reduction in pressure in aquifers;
- reduction in groundwater quantity and/or availability for other users; and
- impacts to groundwater dependant ecosystems.

The proposed activities would co-produce groundwater as a by-product of gas extraction from the Toolachee to Patchawarra formations within the Cooper Basin. The risk to groundwater resources from this extraction is low given the geology and isolation of the Cooper Basin from overlying water-bearing formations within the Eromanga Basin and the relatively small volumes of co-produced water expected compared to oil and unconventional gas wells.

Santos South West Queensland (SWQ) Underground Water Impact Report (UWIR)

The Santos SWQ UWIR assesses cumulative drawdown impacts from oil and gas extraction from the Cooper and Eromanga basins across SWQ.

Since 2013, the decision has been taken to use modelling to generate an “indicative estimate of the magnitude of potential drawdown in the target beds and neighbouring formations in the immediate and long-term scenarios” as stated in the SWQ UWIR. The SWQ UWIR was updated in February 2020 (Feb 2020 SWQ UWIR – Appendix D) to include recent historical extraction data and to predict immediate and long-term impacts from existing and future wells in both existing PLs and new development areas including PL 1055.

UWIR Modelling Philosophy:

The modelling philosophy for the successive iterations of the SWQ UWIR comprises a design that provides an “indicative estimate of the magnitude of potential drawdown in the target beds and neighbouring formations in the immediate and long-term scenarios” as described in the UWIR.

This approach is considered reasonable given the need to assess the potential connectivity of a conventional hydrocarbon reservoir. In conventional reservoirs, the naturally occurring hydrocarbons, such as crude oil or natural gas, are trapped by overlying rock formations with lower permeability. Conventional reservoirs only exist because the vertical connectivity is so poor that the oil and gas have accumulated over geological timescales (i.e. millions of years). If there were any vertical connectivity, hydrocarbons would continue to migrate through the system and not be able to accumulate. This is the

defining feature of conventional reservoirs. The geology of the Eromanga and Cooper Basins, including hydrocarbon trapping mechanisms and environmental values, is discussed in detail in Section 4 of the SWQ UWIR.

Successive iterations of the SWQ UWIR present findings from an analytical and 'steady-state' (as opposed to numerical and 'time-dependent') groundwater model.

As presented in the Feb 2020 SWQ UWIR, the decision to model the system in this way was based on the following constraints and opportunities:

- Depth of extraction: Santos extracts associated / produced water from depths greater than 2,000m bgl in the Cooper Basin and for more than 90% of Eromanga Basin wells, deeper than 1,000m bgl. It is noted that most private bores in the Eromanga Basin target the upper (Quaternary and Tertiary) formations (upper 300m) where economic hydrocarbons are not present.
- Stratigraphic settings: numerous confining beds separate the deeper target hydrocarbon bearing formations and the upper aquifers which are accessed primarily by private users for water supply.
- Geographic extent: Santos' SWQ operations cover an area in excess of 8,000km² and are classified as remote. The density of all extraction activities (comprising both oil and gas extraction from reservoirs and water extraction from aquifers) is very low.
- Data availability: Any modelling is constrained by the availability of data to inform that model. There is a general paucity of data, given the depth of extraction, stratigraphic setting and geographical extent of Santos' SWQ operations, which means it is only possible to model the system at a coarse scale.

The following model assumptions are incorporated to compensate for a lack of data to inform a more detailed model parameterisation and are commensurate with the modelling philosophy. These assumptions will typically overestimate drawdown in overlying formations such as water bearing aquifers:

- Steady-state drawdown calculations: These assume the drawdown after pumping for effectively an infinite amount of time. It defines the new 'steady-state equilibrium' that will be reached if extraction continues forever. This is in contrast to time dependent modelling which will model the drawdown at a specific time-step (e.g. at 3 years, or the worst drawdown throughout an operational lifetime of 40 years before pressures are allowed to recover).
- Extraction rates higher than observed or predicted: The modelled extraction rate used to estimate drawdown will exceed the actual extraction rate (refer to Section 7.1.2 of the Feb 2020 SWQ UWIR) insofar that:
    - For the purposes of Immediately Affected Area (IAA) predictive modelling of both the Eromanga and Coopers Basins, Santos has used extraction data from the last year of historical data (2019) to represent future extraction rates. These values are considered to be representative over the next three years. This was considered conservative as the actual extraction is likely to decline over this period.
    - Long Term Affected Area (LTAA) predictive modelling assumes the water production rate increases linearly with the number of additional wells planned in the future (where in fact the number of operational wells is unlikely to increase at the same rate as older wells would be expected to be decommissioned from service) – and continue in perpetuity.

- High model permeabilities: The model assumes high permeabilities for the reservoir production zone, and also the immediately overlying formations/aquitards (i.e. model layers 3-5). The Kh (horizontal permeability) range is 1 x10-2 to 1 x 10-3 m/d, and Kv (vertical permeability) range is 1 x 10-4 to 1 x 10-5 m/d. For comparison, the 2019 UWIR for the Surat CMA had Kh range of 1 x10-2 to 1 x 10-4 m/d, and Kv range of 1 x 10-4 to 1 x 10-7 m/d. This shows the SWQ UWIR assumes two orders of magnitude greater horizontal permeability and one order of magnitude greater vertical permeability. Noting that this comparison demonstrates higher vertical permeabilities in formations overlying the conventional reservoirs in SWQ versus the unconventional (coal seam gas) reservoirs of the Surat Basin. Since conventional reservoirs must be overlain by low permeability units, this demonstrates the modelled vertical permeabilities values are extremely conservative.
- Stratigraphy typical of the shallowest part of basin: 90% of wells in the Eromanga Basin extract from reservoirs located ~1000m below ground level. However, the model assumes these wells are much shallower, from 620m to 900m below ground level.

The approved approach to assessing potential groundwater impacts within the successive iterations of the SWQ UWIR is commensurate to the lack of risks and impacts due to a lack of receptors and hydraulic connectivity in general. Monitoring of reservoir pressures would provide limited value in validating the model assumptions, since the assumptions are intentionally conservative. If the predicted drawdown do not result in any unacceptable prediction of impact or the management or mitigation of potential impact to other environmental values other than make good of impact to water bore supplies (none of which have yet required any make good measures), then validation of a highly conservative model should not be required, other than to confirm that shallow and useable aquifers remain unaffected by resource development, as proposed.

Underground Water Monitoring

Section 9 of the Feb 2020 SWQ UWIR presents the past and future Underground Water Monitoring in relation to the findings of the SWQ UWIR, as well as the current monitoring strategy.

The stated objective of the monitoring strategy described in Section 9, and which has been approved by the DES since 2013, is the early detection and protection for impact to shallow aquifers and the Hooray Sandstone aquifer within, and adjacent to, the study area.

This monitoring has been undertaken in accordance with the monitoring strategy articulated in each successive iteration of the SWQ UWIR which have been approved by DES.

Features of the water monitoring strategy include:

- implemented since the first SWQ UWIR was approved in 2013, and currently provides ~7 years of reliable trend data.
- monitoring of water depth/pressure and water quality at bores within the IAA.
- monitoring of third-party water supply bores. These are “low-use” stock bores which are adequate for the purpose of monitoring long-term groundwater level trends; and
- monitoring data is reviewed annually. The data, and the conclusions which can be drawn from the data, is provided to DES each year as part of the SWQ UWIR annual report.

Monitoring to date has shown that groundwater levels in usable aquifers are stable, and there is no clear depressurisation of the monitored aquifers throughout the monitoring period.

This is supported by observations recorded from 1990 to 2011, as reported in Section 5.5 of the Feb 2020 SWQ UWIR, which show that for all except the target reservoir formations, water level trends are generally stable or upward trending.

Monitoring plans have been revised in subsequent iterations of the SWQ UWIR to reflect the practical operability of each monitoring point. Most monitoring points remain operational and provide a good time series of data points since monitoring commenced in 2013.

Monitoring of the reservoirs is not proposed as it will not provide data that can be used to validate the model. This is because the model incorporates highly conservative assumptions (refer to UWIR Modelling Philosophy above) to demonstrate a general lack of potential for depressurisation impact to overlying formations. Monitored reservoir depressurisation is almost certainly not going to be adequately modelled, for example:

- by overestimating the water abstraction rate and duration, the monitored depressurisation of the reservoir may be greater than predicted by the model because less water is extracted and over a much shorter duration than assumed by the model.
- by overestimating the vertical permeability and connectivity with aquifers, the monitored depressurisation of the reservoir may be far less than predicted by the model because there is far less 'leakage' from overlying formations than assumed by the model.

Feb 2020 SWQ UWIR Modelling – PL 1055:

- The modelling predicts the IAA (after 3 years) and LTAA (after 20 years) from groundwater extraction from existing and planned wells. The IAA model used extraction rates from the last historical extraction year (2019) to represent future extraction rates.
- The LTAA used these historical extraction rates and added the extraction from 611 new petroleum wells in the Cooper Basin, including 10 new wells within PL 1055. The 'affected area' was defined as those areas with two metres of drawdown in the shallow alluvial aquifers or more than five metres of drawdown in the deeper consolidated aquifers.
- The modelling identified that:
    - the maximum estimated drawdown in the IAA due to cumulative extraction from the Cooper Basin is less than 2 m in the Tinchoo and Arraburry Formations
    - the maximum estimated drawdown for the LTAA due to cumulative extraction from the Cooper Basin is less than 25 m in the Toolachee to Patchawarra Formations
    - the calculated pressure decline at the top of the Cooper Basin stratigraphy is relatively very small
    - no impact is likely to propagate above the top of the Tinchee and Arraburry Formations due to extraction in the Toolachee to Patchawarra Formations
    - the impact of extraction in the Cooper Basin does not affect areas beyond the assumed extraction well locations at the top of the Cooper Basin stratigraphy – these can therefore be discounted from the analysis of the overlying Eromanga Basin.
- There are no GAB ROP discharge or recharge springs located within PL 1055. The closest GAB springs are located more than 200km from PL 1055. These springs are too far away to be at risk of hydraulic impact due to the proposed activities on PL 1055. Potential impacts to groundwater environmental values due to exercising underground water rights are further discussed in Section 6.1.3.
- Terrestrial GDEs, and shallow alluvial aquifers supporting potential GDEs are mapped to potentially occur within the tenure (DES, 2018). UWIR groundwater modelling demonstrates that groundwater pressure in the shallowest formations, which may be hydraulically connected to and support GDEs, will not be impacted by the exercise of existing underground water rights on PL 1055. This would remain the case for the development of any additional wells on PL 1055

due to the vertical separation between hydrocarbon target formations for the proposed wells (Toolachee and Patchawarra Formations) and the location of any potential GDEs that may be dependent on groundwater.

- No registered water bores are located within PL 1055. The closest registered groundwater bore is located approximately 3.2 km east of the eastern boundary of PL 1055. Groundwater values and use of this bore is highly unlikely to be affected by underground water extraction within the PL 1055, as predicted by the modelling.
- As any hydraulic impacts from extraction in the Cooper Basin are confined (e.g. hydraulic impacts would not propagate above the top of the Tinchoo and Arraburry Formations), there would be no impact to the shallower Eromanga Basin which hosts aquifers providing regional groundwater supply.
- The SWQ UWIR modelling results are conservative and worst-case. The actual drawdown is expected to be less than predicted based on the intermittent and time-limited operation of extraction wells, and the conservative assessment of flow rate assigned to each well in the model.

Potential impacts to groundwater environmental values due to exercising underground water rights are discussed further in Section 6.1.3.

Hydraulic Fracturing Activities:

There are key differences between coal seam gas and conventional oil and gas operations, both in the geographic and geological setting of the resource and the methodology for assessing the resource, that have substantial bearing on the risk profile presented by hydraulic fracturing activities. These include:

- Santos' conventional oil and gas operations in SWQ are located in an arid, sparsely populated area of central Australia. Whilst groundwater is an important water supply source to support rural land uses, the extent of groundwater supply development is limited.
- In Santos' SWQ operations, the hydrocarbon reservoirs generally occur in anticlines capped with thick, laterally-extensive low permeability formations that isolate the reservoirs from overlying water-bearing formations.
- The oil and gas reservoirs in SWQ are very deep, of the order of 1,500 to 3,000 m below ground level, which provides hundred to thousands of metres vertical separation between the formations in which fracturing activities have occurred or are proposed to occur and the shallow groundwater resources.

Santos also ensures that the risk of environmental harm to groundwater formations is negligible by ensuring that hydraulic fracturing processes are undertaken in accordance with the Queensland Government's *Code of Practice for the Construction and Abandonment of Coal Seam Gas and Petroleum Wells, and Associated Bores in Queensland* (DNRME, 2019).

A hydraulic fracturing risk assessment (HFRA) for Santos' oil and gas production operations throughout South-West Queensland, including PL 1055, has been prepared by Golder Associates (attached as Appendix F).

The HRFA has 2 volumes:

- Volume 1 discusses the environmental and geological settings within which Santos' fracturing operations take place and the general techniques for the drilling, completion and fracturing of wells. The HFRA details why hydraulic stimulation is essential in SWQ and outlined Santos' forward program (subject to ongoing review) for fracture-stimulation.

- Volume 2 relates specifically to the fracturing fluids used by Santos' Fracturing Service Providers (e.g. Halliburton, Schlumberger) and considers the ecological and human health toxicity of the chemical constituents in the fracturing fluids and includes an exposure assessment and risk characterisation based on a review of complete exposure pathways and controls to mitigate exposure.

The Queensland Government's Gasfields Commission publishes data on well integrity. They have concluded that when such national and international codes are used then the likelihood, and therefore risk, of well integrity failure resulting in underground leakage is assessed to be low to near zero (Queensland Gasfield Commission, 2015).

The additional wells planned as part of the proposed amendment application target the Toolachee to Patchawarra formations, from which gas is currently extracted and stimulation activities have occurred.

As any hydraulic impacts from extraction in the Cooper Basin are confined (e.g. hydraulic impacts would not propagate above the top of the Tinchoo and Arraburry Formations), there would be no impact to the shallower Eromanga Basin which hosts aquifers providing regional groundwater supply.

Management (control) strategies, risk sources, potential impacts and the level of risk associated with the proposed activities are summarised in Table 5-1. The results of the risk assessment indicate that residual risks to groundwater as a result of the proposed activities are classified as 'low'.

5.6 Air Quality

The proposed activities may result in impacts to air quality a (as described in Section 4.7), primarily as a result of:

- infrastructure construction;
- vehicle and plant movements;
- seismic source;
- fire (ignition sources resulting from activities);
- minor air emissions generated from vehicles and equipment; and
- air emissions vented from testing and production activities.

Santos aims to minimise the operational footprint and significant disturbance associated with its activities as far as reasonably practicable. However, potential direct and indirect impacts to air quality values resulting from the proposed activities may include:

- air pollution and localised reduction in air quality;
- nuisances caused by dust and light; and
- disturbance to fauna and livestock.

These potential air quality impacts from the petroleum activities within PL 1055 would be consistent with those associated with the existing petroleum activities and pastoral activities.

The primary air pollutants generated during construction, drilling and operations would consist of minor dust and exhaust emissions (NO_x, CO, volatile organic compounds and PM_{10}) from operating vehicles, plant, machinery and wellhead equipment (e.g. pumps).

These relatively minor dust and exhaust emissions would be localised and highly unlikely to significantly impact the air quality environmental values of PL 1055 provided that the mitigation measures listed in Table 5-1 are carried out. These emissions would be unlikely to cause nuisance to the nearest sensitive receptor, which is located 4.5 km from the boundary of PL 1055. Many of the sources will also be

temporary, occurring only through the construction period, or by workovers or intermittent site visits during operation.

An air quality impact assessment has not been undertaken for this development given the small number of new emission sources, the remote nature of the location, the lack of other industry / pollutant sources in the region and the absence of sensitive receptors. The application seeks authority to construct, drill and operate petroleum wells and associated supporting infrastructure. It does not propose the use of fuel burning or combustion equipment that has the potential to emit more / different pollutants on a continuous basis.

Management (control) strategies, risk sources, potential impacts and the level of risk associated with the proposed activities are summarised in Table 5-1. The results of the risk assessment indicate that residual risks to air quality values as a result of the proposed activities are classified as 'low'.

5.7 Noise

The proposed activities may result in impacts to acoustic / noise values (as described in Section 4.8), primarily as a result of:

- infrastructure construction;
- vehicle and plant movements;
- seismic source;
- fire (ignition sources resulting from activities); and
- noise generated during drilling and hydraulic stimulation / fracturing activities and production operations.

Blasting activities are not proposed in the immediate future, however the application seeks to adopt streamlined model conditions (SMC) PESCC 21 (proposed condition G4), PESCC 22 (proposed conditions G5) and PESCC 23 (proposed condition G6) in the event that rock is encountered and blasting is required to continue the petroleum production activities.

Santos aims to minimise the operational footprint and significant disturbance associated with its activities as far as reasonably practicable. However, potential direct and indirect impacts to acoustic values resulting from the proposed activities may include:

- nuisance caused by vibration and noise generation; and
- disturbance to fauna and livestock.

Potential noise emissions from the proposed petroleum activities within PL 1055 would be consistent with those associated with the existing petroleum activities conducted under ATP 1189.

Santos manages noise generating activities in accordance with the 'management hierarchy for noise' set out in the *Environmental Protection (Noise) Policy 2019* (EPP Noise). Noise generated by the proposed activities will be generally consistent with 'typical sound power levels for petroleum activities' as described in Table 1 of the Guideline *Noise Assessment - Prescribing noise conditions for environmental authorities for petroleum activities* (DES, 2013).

Noise generated by the proposed activities is expected to be generally consistent with that generated by existing agricultural activities undertaken in the region and from the existing petroleum activities conducted under ATP 1189. Furthermore, noise generated by the proposed activities is highly unlikely to cause nuisance to the nearest sensitive receptor, which is located approximately 4.5 km from the boundary of PL 1055. Therefore, nuisance impacts from noise generation by the proposed activities at the nearest sensitive receptor are highly unlikely.

Noise levels associated with the proposed activities may result in localised impacts (disturbance) to fauna and livestock located in the immediate area surrounding operational sites (i.e. the immediate 100-200 m buffer around a well lease) however, these impacts are largely expected to be short-term and are not expected to result in significant ongoing impacts to local fauna populations, or impact use of the area by livestock.

Management (control) strategies, risk sources, potential impacts and the level of risk associated with the proposed activities are summarised in Table 5-1. The results of the risk assessment indicate that residual risks to acoustic / noise values as a result of the proposed activities are classified as 'low'.

5.8 Waste

The proposed activities will expose environmental values in PL 1055 (as described in Section 4.9) to the risk of direct and indirect disturbance associated with the generation of waste, primarily as a result of: the storage and disposal of general waste, waste fuels, oils and other chemicals, produced fluids and other process wastes.

Excessive waste generation from the inefficient use of resources, and improper management or storage of wastes generated by petroleum activities, has the potential to impact on environmental values. This could include pollution or contamination of land or water resources. To minimise the risk of impacts from excessive waste generation or improper management or storage of wastes, where practicable, Santos would employ the waste management hierarchy defined in Schedule 1 of the *Environment Protection (Waste Management) Policy 2000)*.

Santos will manage the on-site disposal of residual drilling material within PL 1055 in accordance with the requirements of proposed conditions I4 to I6 (refer Appendix B) in that disposal may be undertaken in accordance with either the mix-bury cover method or a method and quality certified by a suitably qualified third party that will not result in environmental harm. Compliance with these methodologies will minimise the potential for contamination of land or water associated with on-site disposal via considerations such as appropriate liners, depth of cover or mixing at ratios appropriate to meet criteria for reuse, burial or other land application. Where criteria cannot be achieved, the drilling material will be disposed of at a suitably licensed facility.

The streamlined model conditions were developed with input from the (former) Department of Environment and Heritage Protection, APPEA, technical experts and industry representatives in 2013 as part of the streamlined model condition project for the petroleum industry. If the activities are undertaken in accordance with streamlined model conditions (proposed blueprint conditions I4-I6) 'residual drilling material', then the materials have already been assessed and considered by the Department to be managed appropriately.

Santos aims to minimise the operational footprint and significant disturbance associated with its activities as far as reasonably practicable. However, potential direct and indirect impacts to environmental values resulting from the generation, storage and disposal of waste may include:

- reduction in visual amenity;
- disturbance, injury or loss of fauna and livestock (i.e. fauna/livestock access to waste/contaminants);
- contamination of soil and water resources (groundwater / surface water);
- disturbance to land use and land suitability changes; and
- reduction in agricultural productivity.

Management (control) strategies, risk sources, potential impacts and the level of risk associated with the proposed activities are summarised in Table 5-1 (Land Resources). The results of the risk

assessment indicate that residual risks to a range of environmental values from the generation, storage and disposal of waste are classified as 'low'.

5.9 Rehabilitation

The environmental values of the existing environment and pre-disturbed land use of PL 1055 are described in the preceding sections. Rehabilitation and decommissioning of disturbed land in PL 1055 would occur progressively in accordance with the proposed EA conditions (refer to Schedule J in Appendix B). The objective of rehabilitation and decommissioning is to achieve a post development landform that is:

- safe for humans, native fauna and livestock;
- non-polluting; and
- stable and able to sustain appropriate land use.

Rehabilitation works would aim to provide appropriate site conditions to facilitate revegetation. The success of revegetation would be subject to prevailing weather conditions and rainfall.

Consistent with Santos operations surrounding PL 1055, a two-stage rehabilitation program approach would be pursued. Stage 1 pertains to stabilisation works which would be completed post construction within the footprint of operational assets, predominantly pipeline RoWs.

The land is stabilised to ensure the safe and effective operation of assets, and to minimise the risk of erosion, soil loss and weed invasion. Where possible, land would be returned to the landholder for productive use (e.g. grazing). Stabilisation works would include:

- remediating areas of contaminated land resulting from petroleum activities;
- re-establishing surface drainage lines and re-profiling contours for operational use;
- establishing a safe landform for humans and livestock in areas of significant cut and fill;
- reinstating top soil;
- improving the condition of soil through the appropriate assessment and treatment of soils where required; and
- promoting the establishment of groundcover vegetation.

Stage 2 rehabilitation activities relate to disturbance footprints no longer required for operational purposes. Rehabilitation activities undertaken during Stage 2 would return remaining disturbance footprints to an appropriate land use in accordance with landholder needs and applicable regulatory requirements.

Final rehabilitation of disturbed areas would be undertaken to achieve the final rehabilitation criteria conditions specified for the proposed EA. Where infrastructure is to be left for the landholder, a written agreement will be submitted alongside the Final Rehabilitation Report.

5.10 Matters of State Environmental Significance

The proposed activities will potentially result in direct and indirect impacts to MSES (as described in Section 4.11). Desktop and field assessments conducted by E2M within PL 1055 concluded that after the application of avoidance, minimisation and mitigation measures (as outlined throughout this application, in relevant sections of the risk assessment, and within Appendix C), the proposed activities are unlikely to have a significant residual impact on MSES occurring within PL 1055. The risk of a Significant Residual Impact to MSES is assessed in Section 6.2.

Table 5-1: Environmental risk assessment

Identification				Unmitigated Risk			Control Strategies	Residual Risk		
Risk Event / Activity	Relevant EV	Potential Impact	Risk Source	Consequence	Likelihood	Risk		Consequence	Likelihood	Risk
Seismic surveys Construction and operation of wells, gathering lines, access tracks, borrow pits and incidental activities Well drilling and hydraulic fracturing	Land Resources	Reduction in visual amenity Soil erosion, topsoil loss, inversion and compaction Disturbance to land use and suitability changes Reduction in agricultural productivity Contamination of soil	Infrastructure construction (earthworks activities) Vehicle and plant movements Minor spills or leaks of fuels, chemicals or other produced fluids Production operations Loss of containment Storage and disposal of general waste, chemical and process wastes Risks posed by fire (ignition sources resulting from activities); and Bushfire and flood (natural events)	III	d	Medium	**General** • Compliance with relevant Environmental Authority conditions, and all relevant internal and external approvals in place before work undertaken. • All disturbance undertaken in accordance with Santos standards. • Appropriate emergency response plans in place. • Restricted access to site/s. • Industry standards and good industry practices are followed. **Land Resources** • Surface disturbance restricted to the minimum area required to safely carry out activities. • Consider alternate routes, locations and construction methods during planning and scouting phases to minimise environmental impacts. • Where practicable, use existing routes / disturbed ground, and co-locate access tracks and gathering lines to reduce the total disturbance area. • Existing unrestored borrow pits are used in preference to establishing new pits. • Impacts to sensitive areas are mitigated through implementation of appropriate construction and maintenance practices as detailed in the scope of works, approval documents and company procedures. • Topsoil stockpiles separated from subsoil and maintained to preserve the seedbank (where practicable). • Erosion and sediment control measures in place where appropriate. • Infrastructure and seismic lines located to minimise impacts to drainage patterns, soil and vegetation, and avoid significant cut and fill. • <u>Vehicle and plant movements</u> - No unauthorised off-site driving. - Access track maintenance (and watering) carried out as required to reduce dust generation. - Active promotion of appropriate road use behaviours, and the setting of appropriate speed limits for Santos personnel and contractors. - Work is scheduled to fit in with stock locations and the mustering schedule. • <u>Fire / Flood</u> - Activity planning will consider seasonal conditions and the risk of bushfire and flood. - Work programs in floodplain / riparian / water crossing areas scheduled to take into account seasonal conditions and rainfall / flood likelihood. - Emergency response procedures should contain a fire and flood response procedure. - Personnel are informed on the fire danger season and associated restrictions. - Ignition sources are controlled via permit to work. - Measures undertaken to reduce potential impacts of fire and flooding where appropriate (e.g. installation of fire breaks, bunds, removal of fuels/chemicals and sump contents (where appropriate / safe to do so) prior to arrival of fire or flood event). - Construction activity not undertaken during or immediately prior to flooding. • <u>Fuel, oil and chemical storage and handling</u> - Fuel, oil and chemical storage and handling undertaken in accordance with Australian standards and guidelines (i.e. in bunded areas) and in small volumes wherever practicable. - Spill leak and drip trays provided to address minor drips and spills resulting from re-fuelling operations. - Spill response equipment and materials kept on site and in operational vehicles (where appropriate). - In the event of expected flooding, non-essential items/facilities such as chemicals, fuel and oil storages and waste receptacles removed from areas at risk of inundation (where appropriate / safe to do so). - Contaminated areas will be fenced if a threat is posed to stock or wildlife. - Maintain a register of incidents and implement corrective actions based on outcome of investigations. - Vehicles and equipment are operated and maintained in accordance with specifications to minimise the potential for a spill or leak (e.g. oil leak or hydraulic hose failure). • <u>Production operations</u> - Plant and equipment designed, constructed and operated in accordance with Santos Engineering Standards and relevant Australian/International standards. - Infrastructure design process to address location and non-location specific threats (e.g. pipeline corrosion) and develop adequate controls to mitigate environmental and public/third party safety risk. - Safety, testing, maintenance and inspection procedures implemented. - Prestart-up checklist prior to commissioning and decommissioning activities. - Pipeline construction integrity verification e.g. hydrotest. • <u>Loss of containment</u> - Regular monitoring of control systems (e.g. emergency shutdown valves) to ensure that protection levels are adequate.	III	c	Low

Identification				Unmitigated Risk			Control Strategies	Residual Risk		
Risk Event / Activity	Relevant EV	Potential Impact	Risk Source	Consequence	Likelihood	Risk		Consequence	Likelihood	Risk
							- Emergency spill response equipment on site. - Loss of containment is managed via appropriate Santos incident management system, and implementation of corrective actions is based on incident investigation. - Emergency response training for emergency response personnel. • <u>Waste</u> - Waste managed in accordance with the Waste Management Hierarchy, defined in Schedule 1 of the *Environment Protection (Waste Management) Policy 2000*. - Where practicable, Santos would implement the waste management hierarchy, and reduce risks to environmental values from waste storage and disposal, by: o designing activities to incorporate less resource-intensive materials and more efficient processes. o designing contracts which encourage waste avoidance and set waste reduction targets. o identifying and separating waste streams for re-use, recycling, treatment or disposal. o storing waste in appropriate receptacles or designated areas prior to their re-use or collection for recycling, treatment or disposal. o ensuring wastes are removed by transporters which are appropriately licensed or authorised to transport that particular waste type. o ensuring all wastes removed from the site are recycled, treated or disposed of at an appropriately licensed waste facility. o reviewing and auditing waste management practice to confirm legal compliance and identify opportunities for improvement. - Treated sewage effluent (<21 EP) will be released to land provided it: o is a signed contaminant release area(s); o does not contain any properties nor contain any organisms or other contaminants in concentrations that are capable of causing environmental harm; o does not result in pooling or run-off or aerosols or spray drift or vegetation die-off; o minimises deep drainage below the root zone of any vegetation; and o does not adversely affect the quality of shallow aquifers. - Covered bins are provided for the collection and storage of wastes. - Rubbish loads are covered during transport to a licensed waste facility. - On site disposal of residual drilling material undertaken in accordance with mix bury cover method, or alternative method and quality criteria as certified by a suitably qualified third party. - Hydraulic fracturing flowback fluid contained in lined pits or tanks, and removed from site for authorised reuse or disposal upon completion of operations. - In the event of expected flooding, waste will be removed from areas at risk of inundation (where appropriate / safe to do so). - Waste materials and non-essential infrastructure removed from operational areas as soon as reasonably practicable following petroleum activities. • <u>Rehabilitation</u> - Gathering line / pipeline ROW are immediately re-instated following gathering line / pipeline installation. - Rehabilitation of significantly disturbed areas will commence within 12-months of no longer being required (unless an exceptional circumstance in the area to be rehabilitated (e.g. a flood event) prevents this timeframe being met). - Areas potentially exposed to contamination will be assessed and remediated where required. - Final rehabilitation of disturbed areas would be undertaken to achieve the final rehabilitation criteria conditions specified for the proposed EA. - Rehabilitation aims to reshape and stabilise disturbed areas to provide appropriate site conditions to facilitate natural revegetation processes, and will include the following activities (where appropriate): o ripping of areas of compacted soil (except on sensitive soils / environments). o respreading of stockpiled topsoil, vegetation and seed stock (where available) to facilitate natural revegetation; and o restoration of natural landform contours.			
Seismic surveys Construction and operation of wells, gathering lines, access tracks, borrow pits and incidental activities	Flora, Regional Ecosystems and ESAs	Loss of ecosystem functioning Loss of species population, further endangerment and loss in species diversity Introduction and / or spread of weeds, pest plants, animals and pathogens	Infrastructure construction (earthworks activities) Vehicle and plant movements Minor spills or leaks of fuels, chemicals or other produced fluids Storage and disposal of general waste, chemical and	III	c	Low	**General** • Assess proposed disturbance locations for the potential presence of high value flora and regional ecosystems before commencement of construction, and implement appropriate avoidance or mitigation measures. • Refer to general control strategies listed under the Land Resources EV. **Flora, Regional Ecosystems and ESAs** • Maximise avoidance of high constraint areas (e.g. regulated vegetation 100m from a wetland, regulated vegetation intersecting a watercourse, ESAs). • Maximise avoidance of ground-truthed REs 5.3.7, 5.3.8a and 5.3.13a as far as reasonably practicable. • Maximise use of pre-disturbed areas (where practicable). • Where practicable, clearing of mature trees avoided. • Where practicable, branches lopped rather than removing whole trees or shrubs. • Ensure activities are located and undertaken in compliance with EA conditions F7, F8 and F9. • <u>Introduction and / or spread of weeds, pest plants, animals and pathogens</u> - Hygiene protocols implemented as appropriate to minimise the introduction, spread and persistence of weeds, pest plants, animals and pathogens.	II	c	Low

Identification				Unmitigated Risk			Control Strategies	Residual Risk		
Risk Event / Activity	Relevant EV	Potential Impact	Risk Source	Consequence	Likelihood	Risk		Consequence	Likelihood	Risk
			process wastes Loss of containment Fire (ignition sources resulting from activities)				- Access to and from the site via designated access tracks only. - Vehicle and equipment wash-down when operations have been undertaken in areas of known weed infestations. - Monitor for presence of weeds within the construction and operational areas, and where necessary implement control measures. - Ensure that imported material is from an area or source considered to be pest plant/disease free. • Refer to control strategies for 'Vehicle and plant movements', 'Fuel, oil and chemical storage and handling', 'Waste', 'Loss of containment' and 'Fire' under the Land Resources EV.			
Seismic surveys Construction and operation of wells, gathering lines, access tracks, borrow pits and incidental activities	Fauna	Loss of ecosystem functioning Loss of species population, further endangerment and loss in species diversity Disturbance, injury or loss of fauna and livestock Introduction and / or spread of weeds, pest plants, animals and pathogens	Infrastructure construction (earthworks activities) Entrapment in voids and pipelines Vehicle and plant movements Fire (ignition sources resulting from activities) Storage and disposal of general waste, chemical and process wastes Loss of containment Seismic source	III	c	Low	**General** - Refer to general control strategies listed under Flora and Regional Ecosystems and Land Resources EVs. **Fauna and Livestock** • Maximise avoidance of ground-truthed REs 5.3.7, 5.3.8a and 5.3.13a as far as reasonably practicable. • Hollow logs (located on ground) within disturbance areas retained and shifted to adjacent undisturbed areas. • Seismic energy sources are not operated within the distance defined by Santos standards of landholder infrastructure e.g. stockyards, watering points. • Measures implemented to reduce risks to fauna from entrapment and injury in pipes and excavations, including: - Facilities (e.g. borrow pits, well cellars) are designed and constructed as far as practicable to minimise impacts to fauna. - Borrow pits are not established in locations which pose an unacceptable hazard to livestock. - Sumps, mud pits and other pits holding fluid are fenced as appropriate to minimise fauna (medium to large) and livestock access. - Pipes capped to prevent fauna entrapment during construction or after abandonment. - Minimising the period trenches remain open to as short as reasonably practicable. - Regular inspections of open trenches and prior to backfilling. - Provision of escape ramps and refuge material for fauna that do enter trenches. **Threatened Fauna** • Where threatened species nests are identified to be present, disturbance should be avoided. • If disturbance cannot be avoided, clearing of the nest and a surrounding area should be postponed until after the relevant breeding season and/or incubation period. • Clearing must not occur while the nest is active, with adults, eggs or nestlings. • Grey Grasswren - Field and desktop based assessments will be undertaken to preferentially place infrastructure / disturbance outside of areas that are likely to represent Grey Grasswren habitat (where practicable). - Disturbance of areas that are likely to represent Grey Grasswren habitat will be preferentially timed to occur outside of the breeding season for the species where practical. • Major Mitchell's Cockatoo - Where practicable, clearing of mature and hollow bearing trees will be avoided (breeding habitat) - Infrastructure will be sighted to avoid disturbance to hollow bearing trees wherever practicable. - Tree branches will be preferentially lopped rather than removing whole trees or shrubs. • Refer to control strategies for 'Vehicle and plant movements', 'Fuel, oil and chemical storage and handling', 'Waste', 'Loss of containment' and 'Fire' under the Land Resources EV.	II	c	Low
Seismic surveys Construction and operation of wells, gathering lines, access tracks, borrow pits and incidental activities	Surface Water and Wetlands	Loss of wetland values Disturbance to natural drainage patterns Degradation of water quality and wetlands from sediment releases, spills or leaks of fuels and chemicals	Infrastructure construction (earthworks activities) Vehicle and plant movements Storage and disposal of general waste, chemical and process wastes	IV	c	Medium	**General** • Refer to general control strategies listed under the Land Resources EV. **Surface Water and Wetlands** • Activities to be located away from watercourses and wetlands wherever practicable. • Where activities are to be undertaken in or near wetlands, appropriate review, assessment and mitigation measures are implemented to ensure surface water flows are maintained. • Essential Petroleum Activities undertaken in HES or GES wetlands would be carried out to ensure: - the flow of surface water is not significantly impeded. - surface water quality in the wetland is not impacted, unless specifically authorised by the EA. - the wetland is not drained or filled. - bank stability is not impacted; and	IV	b	Low

Identification				Unmitigated Risk			Control Strategies	Residual Risk		
Risk Event / Activity	Relevant EV	Potential Impact	Risk Source	Consequence	Likelihood	Risk		Consequence	Likelihood	Risk
Well drilling and hydraulic fracturing		Impacts to aquatic flora and fauna from sediment releases, spills or leaks of fuels and chemicals Contamination of surface water and wetlands	Well control or well head equipment failure Minor spills or leaks of fuels, chemicals or other produced fluids Production operations Loss of containment Flood (natural event).				- clearing of riparian vegetation is the minimum area practicable to carry out the activities. • Well leases constructed on high ground where practicable. • Preferentially select dry crossing sites for linear infrastructure with minimal earthworks requirements. • Pre-existing areas of disturbance used to place infrastructure or seismic lines wherever practicable. • Culverts and floodways installed where required to maintain natural water flows, drainage and surface runoff. • Areas subject to inundation are assessed for conduciveness to support vehicles prior to access. • Erosion and sediment controls installed where necessary. • Infrastructure and seismic lines located, prepared and constructed to maintain pre-existing surface water flows. • Refer to control strategies for 'Vehicle and plant movements', 'Fuel, oil and chemical storage and handling', 'Waste', 'Production operations', Loss of containment' and 'Flood' under the Land Resources EV. • Refer to control strategies for 'Drilling operations' under the Groundwater EV.			
Construction and operation of wells, gathering lines and incidental activities Well drilling and hydraulic fracturing	Groundwater	Contamination of groundwater resources Crossflow, aquifer contamination or reduction in pressure in aquifers Reduction in groundwater quantity and/or availability for other users Impacts to groundwater dependant ecosystems	Drilling and hydraulic stimulation / fracturing activities Production operations Well control or well head equipment failure Well casing or cement failure (well integrity failure) Minor spills or leaks of fuels, chemicals or other produced fluids Loss of containment Storage and disposal of general waste, chemical and process wastes Vehicle and plant movements	IV	c	Medium	**General** • Refer to general control strategies listed under the Land Resources EV. • Well drilling operations undertaken in accordance with the Code of Practice For the construction and abandonment of petroleum wells and associated bores in Queensland (DNRME, 2019). • Hydraulic fracturing processes undertaken in accordance with the Code of Practice For the construction and abandonment of petroleum wells and associated bores in Queensland (DNRME, 2019). **Groundwater** • <u>Drilling operations</u> - Formation evaluation program and drilling program in place. - Well design to leading practice. - Blowout preventers (BOP) used once surface casing is installed. - Regular BOP drills, testing, certification, and maintenance. - Implementation of control measures and monitoring as documented in the Santos SWQ Underground Water Impact Report (UWIR) (Appendix D). • <u>Hydraulic fracturing operations</u> - During the hydraulic fracturing process, Santos implements the following: ○ Pressure tests of well casing and cement are conducted prior to hydraulic fracturing to confirm well integrity. ○ Fluids utilised in hydraulic fracturing are subjected to a risk assessment prior to use. The material will not contain restricted fluids, including BTEX or the use of polycyclic aromatic hydrocarbons in concentrations above the reporting limit. ○ Hydraulic stimulation procedures utilised by Santos and its contractors follow a design philosophy predicated on international best practice. This includes practices for ensuring mechanical well integrity and surveillance. ○ Operational procedures monitor fracture design to stay within the target formation, thereby preventing interconnectivity between the target formation and an aquifer and minimising the potential for migration of stimulation fluids beyond the simulation impact zone. ○ Hydraulic fracturing fluids and flowback are stored to prevent seepage to shallow groundwater. Fluids will be removed at the cessation of the hydraulic fracturing activity to an appropriate facility for reuse or disposal. ○ Implementation of control measures described in Sections 5.5 and 6.1.3. ○ Implementation of control measures and monitoring as documented in the Santos SWQ Underground Water Impact Report (UWIR) (Appendix D) and SWQ Hydraulic Fracture Risk Assessment (HFRA) (Appendix F). ○ Implementation of the Santos Stimulation Impact Monitoring Program (SIMP). • Refer to control strategies for 'Vehicle and plant movements', 'Fuel, oil and chemical storage and handling', 'Waste', 'Production operations' and 'Loss of containment' under the Land Resources EV.	IV	a	Low
Seismic surveys Construction and operation of wells, gathering	Air Quality and Noise	Air pollution and localised reduction in air quality Nuisances caused by dust, light,	Infrastructure construction Vehicle and plant movements	III	c	Low	**General** • Refer to general control strategies listed under the Land Resources EV. • Emergency shutdown systems in place. • Fit for purpose equipment. • Conduct regular testing, inspections and maintenance of site equipment.	II	c	Low

Identification				Unmitigated Risk			Control Strategies	Residual Risk		
Risk Event / Activity	Relevant EV	Potential Impact	Risk Source	Consequence	Likelihood	Risk		Consequence	Likelihood	Risk
lines, access tracks, borrow pits and incidental activities Well drilling and hydraulic fracturing		vibration and noise generation Disturbance to fauna and livestock	Seismic source Fire (ignition sources resulting from activities) Minor air emissions generated from vehicles and equipment Air emissions vented from testing and production activities Noise generated during drilling and hydraulic stimulation / fracturing activities and production operations				**Air Quality and Noise** • Identification of sensitive receptors during planning: - Nearest sensitive receptor is located approximately 4.5 km from the boundary of PL 1055. • Landholders consulted as required where activities may affect sensitive receptors and/or agricultural operations. • Systems in place for logging stakeholder / landholder complaints to ensure issues are recorded and addressed as appropriate. • Noise managed in accordance with 'management hierarchy for noise' set out in the *Environmental Protection (Noise) Policy 2019* (EPP Noise). • Vehicles, engines and equipment operated and maintained in accordance with manufacturer specifications and planned maintenance systems. • Use of attenuation / suppression devices where required e.g. silencing equipment on mobile plant • Majority of vehicle movements will be limited to daylight hours. • Dust suppression measures carried out where required e.g. road watering. • Preference to flare rather than vent, and venting only in extreme circumstances. • Seismic energy sources are not operated within the distance defined by Santos standards of any pipeline, infrastructure / utilities, installations or buildings. • Refer to control strategies for 'Vehicle and plant movements' and 'Fire' under the Land Resources EV.			

6.0 Legislative considerations

6.1 *Environmental Protection Act 1994 (EP Act)*

6.1.1 General requirements for an EA application (s125 EP Act)

Section 125 of the EP Act, specifies the general requirements for an EA application. Table 6-1 contains a summarised checklist of the EP Act general requirements against the EA application.

Table 6-1: General requirements EA application (s125 EP Act)

Section 125 EP Act	Relevance to application
(a) be made to the administering authority; and	The EA application has been lodged with Department of Environment and Science (DES) who is the administering authority for the EP Act.
(b) be made in the approved form; and	The application was made using the approved form.
(c) describe all environmentally relevant activities; and	Refer to Sections 2.2 and 2.3.
(d) describe the land on which each activity will be carried out; and	Refer to Section 3.0.
(e) be accompanied by the fee prescribed under a regulation; and	The prescribed application fee was paid at lodgement of the EA application.
(f) if 2 or more entities (joint applicants) jointly make the application—nominate 1 joint applicant as the principal applicant; and	The approved form nominates the principal applicant.
(g) state whether the application is – (i) a standard application; or (ii) a variation application; or (iii) a site-specific application; and	The application is a site-specific application.
(h) state whether the applicant is a registered suitable operator; and	The approved form identifies the registered suitable operators.
(i) if a development permit under the Planning Act, or an SDA approval under the State Development Act, is required under either of those Acts for carrying out the environmentally relevant activities for the application—describe the permit or approval; and	N/A – there are no known relevant approvals under the Planning Act of State Development Act. Note: Regional Interests Development Approvals (RIDAs) are in place for existing infrastructure within the PL 1055 area. Future RIDAs will be obtained as necessary prior to the relevant works.
(j) if the application is a standard or variation application—include a declaration that each relevant activity complies with the eligibility criteria; and	N/A
(k) if the application is a variation application— (i) for a variation application under section 123(1)—state the standard	N/A

Section 125 EP Act	Relevance to application
conditions for the activity or authority the applicant seeks to change; or (ii) for a variation application under section 123(2)—state the standard conditions that are not the same as the Coordinator-General's conditions; and	
(l) if the application is a variation or site-specific application— (i) include an assessment of the likely impact of each relevant activity on the environmental values, including—	Refer to Sections 4.0 and 5.0.
A. a description of the environmental values likely to be affected by each relevant activity; and	Refer to Sections 4.0 and 5.0.
B. details of any emissions or releases likely to be generated by each relevant activity; and	Refer to Sections 4.0 and 5.0.
C. a description of the risk and likely magnitude of impacts on the environmental values; and	Refer to Sections 5.0.
D. details of the management practices proposed to be implemented to prevent or minimise adverse impacts; and	Refer to Section 5.0.
E. if paragraph (n) does not apply—details of how the land the subject of the application will be rehabilitated after each relevant activity ceases; and	Land disturbed by petroleum activities within PL 1055 would be rehabilitated following completion of these activities to achieve: • remediation of any contaminated areas; • a landform that is safe, stable and non-polluting and has contours that are consistent with the surrounding landform; • re-instatement of surface drainage lines; • reinstatement of top soil, where present; and • the absence of plant pest species (restricted matter) where practicable, or as consistent with surrounding areas.
(ii) include a description of the proposed measures for minimising and managing waste generated by each relevant activity; and	Refer to Section 5.8 Proposed measures for minimising and managing waste generated by the petroleum activities within PL 1055 include: • re-use of drilling and hydraulic fracturing fluid where practicable; • disposal of general and regulated waste generated by the activities at a facility lawfully able to accept the

Section 125 EP Act	Relevance to application
	waste under the EP Act, except as otherwise permitted under a condition of the EA; • removal of regulated waste from the site by a person who holds a current authority to transport such waste under the provisions of the EP Act; and • record keeping of regulated waste removal including: ○ date of pickup of waste; ○ description of waste; ○ quantity of waste; ○ origin of waste; and ○ destination of waste.
(iii) include details of any site management plan that relates to the land the subject of the application; and	Not applicable – There is no relevant site management plan or current Environmental Protection Orders (EPOs) relating to land located within PL 1055.
(m) if the application is for a prescribed ERA—state whether the applicant wants any environmental authority granted for the application to take effect on a day nominated by the applicant; and	The EA should take effect upon the grant of PL 1055 (Bantam).
(n) if the application is a site-specific application for a mining activity relating to a mining lease—be accompanied by a proposed PRC plan that complies with this division; and	N/A.
(o) include any other document relating to the application prescribed under a regulation.	Refer to the information provided throughout this supporting report.

6.1.2 Requirements for site-specific applications – CSG activities (s126 EP Act)

The proposed EA relates to conventional gas exploration and production and does not relate to CSG activities.

6.1.3 Requirements for site-specific applications – underground water rights (s126A EP Act)

Section 126A of the EP Act specifies the requirements for a site-specific application involving the exercise of underground water rights for a petroleum lease. Table 6-2 identifies and addresses these requirements.

Table 6-2: Underground water rights (s126A)

Section 126A *EP Act*	Relevance to EA application
(a) Any proposed exercise of underground water rights during the period in which resource activities will be carried out under the relevant tenure	The proposed petroleum activities would extract small volumes of underground water from the Toolachee Formation, Epsilon Formation and Patchawarra Formation within the Cooper Basin. While these deep formations are not considered useful aquifers, drawdown impacts from the extraction is predicted to propagate to Arraburry and Tinchoo formations which are included in the Queensland GAB Regulation (Great Artesian Basin Resource Operations

Section 126A *EP Act*	Relevance to EA application
	Plan (GAB ROP) and Water resources (GAB) Plan 2006. The proposed activities therefore would involve the exercise of underground water rights.
(b) The areas in which underground water rights are proposed to be exercised	The area in which underground water rights are proposed to be exercised is PL 1055.
(c) For each aquifer affected, or likely to be affected, by the exercise of underground water rights (i) A description of the aquifer	Refer to Sections 4.6 and 5.5 of this report. Groundwater extraction from the proposed activities would occur within the Toolachee to Patchawarra formations. These formations are not considered sandstone aquifers of the GAB. Drawdown from this abstraction would potentially extend to the Tinchoo Formation and Arraburry Formation but is not predicted to extend into the sandstone aquifers of the overlying Eromanga Basin. This is due to the hydraulic separation of these basins and the relatively low extraction rates associated with conventional gas.
(ii) an analysis of the movement of underground water to and from the aquifer, including how the aquifer interacts with other aquifers and surface water; and	Refer to Figures 16-18 in the Feb 2020 SWQ UWIR. These figures display groundwater level and flow directions that could be established by all available groundwater level data. In general, groundwater flow in the GAB is towards the low-lying areas of Central Australia. From the eastern margin of the basin, groundwater flows are predominantly to the west, south and southwest. From the Western Australian recharge beds, flow is generally towards the east. Groundwater flow in each of the following formations (GAB aquifers) is briefly described below: **Quaternary and Tertiary Alluvium** Groundwater flow generally follows the topographical profile of the study area, with the only limitations imposed by the fluvial nature of the sediments. A hydrogeological map of the area (presented as Figure 16 in the Feb 2020 SWQ UWIR) indicates that the hydraulic gradient is small. **Winton Formation** Based on the information available, the groundwater flow direction is broadly from the north-east to the south-west. **Cadna-Owie Formation** Insufficient water level information is available to describe water flows and water levels and therefore a hydrogeological map has not been generated. **Hooray Sandstone** It is noted that a number of bores within the Hooray Sandstone may be artesian. Groundwater bores are concentrated in the south-eastern region of the study area however, water level and salinity data is limited for the majority of the bores in the study area (i.e. within Santos tenements). Based on the information that is available, the groundwater flow direction is generally towards the southeast and the water salinity is fresh to slightly brackish. **Westbourne Formation, Adori Sandstone and Birkhead Formation** There is no data available to characterise groundwater flow in these formations within the project area. **Hutton Sandstone**

Section 126A *EP Act*	Relevance to EA application
	The groundwater flow is expected to be to the south west i.e. consistent with the flow of the major GAB units as described in the literature (Note: there is insufficient water level data in the Hutton Sandstone to characterise groundwater flow direction further). **Poolowanna Formation** As per the Hutton Sandstone, groundwater flow is expected to be to the south west, which is consistent with the flow of the major GAB units as described in the literature. **Preferential flow paths** There is a very negligible risk of vertical preferential flow paths that may bypass the lack of vertical connectivity throughout the system because: • The absence of connecting geological structures such as faults and other connecting features (such as unconformable contact zones) that would permit vertical migration. This statement seems particularly pertinent because there is an accumulation of petroleum at the location of the project. If there was any vertical connectivity, the petroleum product (which is less dense than water) could not have accumulated within the reservoir at all. • The implementation of production well construction to industry standards in order to manage the risk of gas migration into overlying formations due to inadequate seal between formations in poorly constructed wells. **Springs** There are no springs located on PL 1055. The nearest springs are located >200km away. The locations are presented in Section 4.3.8 of the Feb 2020 SWQ UWIR.
(iii) a description of the area of the aquifer where the water level is predicted to decline because of the exercise of underground water rights; and	Refer to Section 5.5. Modelling carried out for the Feb 2020 SWQ UWIR indicates maximum drawdown in the Cooper Basin of less than: • 2 m for the IAA and 7 m for the LTAA in the Tinchoo and Arraburry formations • 10 m in the IAA and 25 m in the LTAA in the Toolachee to Patchawarra formations The impacts of gas extraction from the Cooper Basin are not expected to extend beyond the top of the Cooper Basin Stratigraphy. The Feb 2020 SWQ UWIR results show that proposed development in the Cooper Basin sediments of equal or smaller magnitude than that already modelled, cannot impact aquifers of the GAB. The proposed development on PL 1055 is significantly smaller in scope and extent than already modelled. The model is a simple 'layer-cake' type model, and so parameterisation is uniform across the model domain (including vertical connectivity). Furthermore the location of PL 1055 is far enough away from existing developments in the Cooper Basin that there will be negligible cumulative drawdown effects.
(iv) the predicted quantities of water to be taken or interfered with because of the exercise of underground water rights	The long-term/conservative modelled extraction rate for petroleum wells targeting the Cooper Basin modelled for the UWIR was 4.01 m^3/day/well. The volume of water predicted

Section 126A *EP Act*	Relevance to EA application
during the period in which resource activities are carried out;	to be extracted by existing and proposed wells within PL 1055 (total of 12 wells) is up to 48.12 m^3/day.
(d) the environmental values that will, or may, be affected by the exercise of underground water rights and the nature and extent of the impacts on the environmental values;	The calculated impact in the Cooper Basin is described generally in Section 5.5. **Impact to water bores** There is no predicted impact to registered water bores from cumulative extraction activities from the Cooper Basin. **Impact to springs** There is no predicted impact to springs predicted from petroleum activities within PL 1055. The nearest springs are located >200km away. **Impact to other surface waters** No impact would occur to the shallowest aquifers that have the potential to interact with surface waters as a result of petroleum activities within PL 1055. Accordingly, no impacts are expected to surface water bodies dependent on groundwater-surface water interactions as a result of petroleum activities within PL 1055. **Impact to formation integrity and surface subsidence** The risk of subsidence impacts to groundwater due to reservoir depressurisation on PL 1055 is very low because: • the maximum estimated drawdown in the IAA due to extraction from the Cooper Basin is less than 2 metres in the Tinchoo and Arraburry formations; • the maximum estimated drawdown in the LTAA due to extraction from the Cooper Basin is less than 25 metres in the Toolachee to Patchawarra formations; • the sandstone which will be targeted is not considered easily compressible (as opposed to more compressible formations like coal seams); and • the formation is more than 1500m below ground level, and at such a depth would require significant stresses to make it deform.
(e) any impacts on the quality of groundwater that will, or may, happen because of the exercise of underground water rights during or after the period in which resource activities are carried out;	There are no expected impacts on groundwater quality given: • a pre-existing vertical gradient exists, whereby the deeper formations tend to be under greater a hydraulic pressure than overlying formation. The difference in pressure is greater than 150m throughout the full stratigraphic sequence; • the change to the hydraulic pressures induced by development on PL 1055 will not be sufficient to reverse change the general direction of migration that drives water from deeper formation up into shallower formations; and • deeper formations have generally poorer quality water than shallower formations. A reduction in the vertical upward gradient will therefore not induce more saline water from deeper formations to migrate into shallower formations. The following sections present the basis of these assertions. While the Feb 2020 SWQ UWIR does not assess impacts to

Section 126A *EP Act*	Relevance to EA application
	groundwater quality directly, it does provide baseline aquifer information to support a qualitative assessment. **Impact on baseline hydraulic gradient** Refer to figure 42 and 43 in the Feb 2020 SWQ UWIR. This shows the baseline groundwater pressures in the modelled formations. These show that vertical upward gradient throughout the stratigraphic sequence will not be impacted by development. **Baseline groundwater quality** • **Quaternary and Tertiary Alluvium** - the salinity of the aquifer is brackish, with electrical conductivity (EC) values ranging from 3,000 to 7,000µS/cm or 2,000 to 4,700mg/L Total Dissolved Solids (TDS). • **Winton Formation** - The water quality in the Winton Formation is brackish (to saline) with ECs ranging from 900 to 13,000µS/cm or 600 to 9,000mg/L TDS. • **Cadna-Owie Formation** - The limited data available in the DERM groundwater database indicate fresh to slightly brackish water quality with the Wyandra Sandstone. • **Hooray Sandstone** - The water quality in the Hooray Sandstone is generally fresh to slightly brackish. EC values range from 675 to 3,930µS/cm or 450 to 2,700mg/L TDS. A number of Hooray water supply bores have salinity values measured over a 40 year period, the latest of which compare well with historical values. • **Westbourne Formation, Adori Sandstone and Birkhead Formation** - Salinity data are not available for the Westbourne, Adori and Birkhead Formations. • **Hutton Sandstone** - Salinity data are not available for the Hutton Sandstone is not known. • **Poolowanna Formation** – Salinity data are not available for the Poolwanna Formation.
(f) strategies for avoiding, mitigating or managing the predicted impacts on the environmental values stated for paragraph (d) or the impacts on the quality of groundwater mentioned in paragraph (e).	The proposed activities within PL 1055 are unlikely to result in significant impacts to groundwater values as demonstrated in the Feb 2020 SWQ UWIR and described above. The monitoring strategy proposed by the Feb 2020 SWQ UWIR would be implemented in accordance with the requirements under the *Water Act 2000* commensurate to the risk of groundwater impact that is predicted by the Feb 2020 SWQ UWIR. This monitoring may be periodically reviewed and adapted in accordance with the requirements under the *Water Act 2000.*

6.1.4 Criteria for decision (s176 EP Act)

Section 176 of the EP Act requires the determining authority, in deciding a variation or site-specific EA application, to consider any relevant regulatory requirement having regard to:

a) the application;
b) the standard conditions for the relevant activity or authority;
c) any response given for an information request; and
d) the standard criteria.

It is proposed that the EA adopt the Blueprint Conditions for Santos' South West Queensland activities. Appendix B identifies the relevant schedules of the Blueprint Conditions.

Schedule 4 of the EP Act defines the standard criteria. Table 6-3 considers the relevance of these criteria in relation to the proposed petroleum activities.

Table 6-3: Standard criteria as defined under schedule 4 of EP Act

The standard criteria means—	Relevance
a) the following principles of environmental policy as set out in the Intergovernmental Agreement on the Environment – *(i) the precautionary principle;* *(ii) intergenerational equity;* *(iii) conservation of biological diversity and ecological integrity; and*	The precautionary principle was considered for the application. The proposed activities will use 'proven' technology and sufficient scientific data exists to predict the likely impacts of the activity. The principle of intergenerational equity was considered for the application. The proposed petroleum activities would be conducted in a manner which ensure the health, productivity and diversity of the environment. This will include minimises disturbance as far as practicable and rehabilitating disturbed areas. The principles of conservation of biological diversity and ecological integrity were considered for the application. The proposed application would not result in significant impacts to biological diversity or ecological integrity (refer to Sections 4.0 and 5.0).
b) any Commonwealth or State government plans, standards, agreements or requirements about environmental protection or ecologically sustainable development; and	The proposed activities would be undertaken in accordance with applicable requirements of other Commonwealth and State permits and approvals as required and as referenced throughout this application.
c) any relevant environmental impact study, assessment or report; and	N/A – an EIS has not been prepared for the EA application.
d) the character, resilience and values of the receiving environment; and	The character, resilience and environmental values of the receiving environment are described in in Section 4.0. Potential impacts to the environmental values as a result of petroleum activities are discussed in Section 5.0.
e) all submissions made by the application and submitters; and	Where required by DES, Santos would consider any submissions made on the application.
f) the best practice environmental management for activities under any relevant instrument, or proposed instrument, as follows- *(i) an environmental authority;* *(ii) a transitional environmental program;* *(iii) an environmental protection order;* *(iv) a disposal permit;* *(v) a development approval; and*	Best practice environmental management of the proposed activities would be achieved through compliance with the conditions of the EA and implementation of management measures as described in this document.
g) the financial implications of the requirements under an instrument, or proposed instrument, mentioned in paragraph (g) as they would relate to the type of activity or industry carried out, or proposed to be carried out under the instrument; and	Santos will continue to provide adequate funds, equipment and staff time to comply with the conditions of its environmental authorities.
h) the public interest; and	The new EA is in the public interest, as it will facilitate the production of petroleum to meet the needs of customers in Queensland and other Australian states/territories. Petroleum produced by Santos will also generate taxes and royalties to the Queensland State Government, which

The standard criteria means—	Relevance
	provide an ongoing source of revenue to support Government services provided to the public. Gas produced by the proposed activities also plays an important role as a cleaner and lower-carbon emitting alternative to coal. Furthermore, in Australia and Queensland, gas plays an important role in domestic energy security and diversification, supporting intermittent renewable energy sources. Santos is a major supplier of natural gas to the domestic energy market, and in light of recent concerns around an east coast gas shortage; Santos has committed to diverting 30 petajoules (PJ) of gas planned for export, to the east coast domestic market.
i) any relevant site management plan; and	There are no site management plans applicable to the application.
j) any relevant integrated environmental management system or proposed integrated environmental management system; and	The Santos Management System (SMS) will be implemented for the proposed activities.
k) any other matter prescribed under a regulation.	Section 35(3) of the EP Reg prescribes matters to be complied with by the administering authority in making environmental management decisions relating to prescribed ERAs. These include: • carrying out an environmental objective assessment against the environmental objectives and performance outcomes mentioned in schedule 8, part 3, Division 1; • considering the environmental values declared under the regulation; • for activities within an SEA, considering the impacts of the activity on the environmental attributes for the area under the *Regional Planning Interests Act 2014;* and • considering the management hierarchy, environmental values, quality objectives and the management intent under any relevant environmental protection policies. This document has been prepared giving consideration to the above. Significant residual impacts on the Channel Country SEA are considered in Section 6.2, Table 6-6.

6.2 *Environmental Offsets Act 2014*

In accordance with s207(1)(c) of the EP Act, the administering authority may impose an environmental offset condition on an EA. However, s14(2) of the *Environmental Offsets Act 2014* (EO Act) states that an offset condition may only be imposed on an EA if the proposed activity will, or is likely to have a significant residual impact on a prescribed environmental matter, and all reasonable on-site mitigation measures for the prescribed activity have been, or will be, undertaken.

As discussed in Section 5.10, the proposed activities are unlikely to result in significant residual impacts to prescribed environmental matters (MSES) provided the proposed measures to avoid, minimise and mitigate potential impacts are carried out (as outlined in the following sections and in Section 5.0 and Table 5-1). Table 6-4 summarises the relevant MSES present in PL 1055.

Table 6-4: Prescribed environmental matter assessment

Schedule 2 *Environmental Offsets Regulation 2014*	Presence	Relevance to PL 1055
2. Regulated vegetation	✓	Regulated Vegetation is mapped within PL 1055, including: • 1,125.7 ha intersecting a watercourse; and • 5,863.9 ha within 100 m of a vegetation management wetland.
3. Connectivity areas	✓	While connectivity areas are present, the proposed resource activity does not relate to a fixed footprint and therefore cannot be assessed using the Landscape Fragmentation and Connectivity Tool. However, the current extent of remnant vegetation in PL 1055 largely represents the pre-clearing extent. Therefore, impacts are unlikely to trigger for significance under the Landscape Fragmentation and Connectivity Tool irrespective of infrastructure locations. Using the Queensland Environmental Offsets Policy, Significant Residual Impact Guideline, a development impact on connectivity areas is determined to be significant if either of the following tests are true: **Test 1 — change in core remnant ecosystem extent at the local scale is greater than the threshold.** The change in the core remnant ecosystem extent at the local scale (post impact) is greater than a threshold determined by the level of fragmentation at the regional scale. PL 1055 is mapped as 100% remnant vegetation (regional scale extent of core remnant ecosystem > 90%), therefore change threshold for local core scale remnant ecosystem is 50%. Future disturbance will not result in a reduction of more than 50% of the core remnant ecosystem extent around any disturbance. **Test 1 would be false irrespective of infrastructure locations.** **Test 2 — Loss or fragmentation of core remnant ecosystem at the site scale.** Any core area that is greater than or equal to 1 hectare is lost or reduced to patch fragments (core to non-core). If the number of core areas that are greater than or equal to one hectare in area is greater pre-impact than post-impact, that part of the significant impact test is true. PL 1055 is mapped as 100% remnant vegetation; the connectivity tool sees this as one patch. The number of core areas that are greater than or equal to one hectare in area will not be greater pre-impact than post-impact. The proposed disturbances will not result in the removal of the one existing core patch. **Test 2 would also be false.**
4. Wetlands and watercourses	x	The following areas are not present within PL 1055: • wetlands in a wetland protection area as shown on the Map of referrable wetlands under the former schedule 12, part 2 of the *Environmental Protection Regulation 2008*; • wetlands of high ecological significance as shown on the Map of referrable wetlands under the former schedule 12, part 2 of the *Environmental Protection Regulation 2008*; or • wetlands or watercourses in a high ecological value waters as identified under the former *Environmental Protection (Water) Policy 2009*, schedule 2.
5. Designated precinct in a strategic environmental area	✓	99.0 % (6,642.4 ha) of PL 1055 is located within a Strategic Environmental Area - Designated precinct (Channel Country).

Schedule 2 *Environmental Offsets Regulation 2014*	Presence	Relevance to PL 1055
6. Protected wildlife habitat	✓	The prescribed activity: • will not be undertaken in an area identified as essential habitat on the essential habitat map for an animal or plant that is endangered or vulnerable wildlife; • will not be undertaken in an area that is shown as a high risk area on the flora survey trigger map; and • may be undertaken in an area of habitat (e.g. foraging, roosting, nesting or breeding habitat) for an animal – as follows: o Grey Grasswren, listed as Endangered o Major Mitchell's cockatoo, listed as Vulnerable; and o Short-beaked echidna, listed as Special Least Concern.
7. Protected areas	x	Protected areas (estates and nature refuges) are not present within PL 1055.
8. Highly protected zones of State marine parks	x	State marine parks are not present within PL 1055.
9. Fish habitat areas	x	Areas declared under the Fisheries Act 1994 to be a fish habitat area are not present within PL 1055.
10. Waterway providing for fish passage	x	The *Queensland Environmental Offsets Policy Significant Residual Impact Guideline* provides the criteria for determining significant impacts on a waterway providing for fish passage. Based on these criteria, the proposed activities would not have a significant residual impact on this prescribed environmental matter due to: (a) The highly ephemeral streams within PL 1055 only provide potential for fish passage during periods of high rainfall causing streamflow. (b) Construction within watercourses would not occur during periods of streamflow, avoiding potential fish mortality or injury. Accordingly, construction of infrastructure within watercourses would not: a. reduce the extent, frequency, or duration of fish passage; b. result in a substantial change to the hydrological regime of the watercourse; or c. lead to significant changes in water quality parameters within the watercourse.
11. Marine plants	x	Areas containing marine plants are not present within PL 1055.
12. Legally secured offset areas	x	Legally secured offset areas (offset register areas and vegetation offsets through a Property Map of Assessable Vegetation) are not present within PL 1055.

As per Section 8 of the EO Act, a significant residual impact is generally an adverse impact, whether direct or indirect, of a prescribed activity on all or part of a prescribed environmental matter that:

(a) remains, or will or is likely to remain, (whether temporarily or permanently) despite on-site avoidance and mitigation measures for the prescribed activity; and
(b) is, or will or is likely to be, significant.

The *Queensland Environmental Offsets Policy Significant Residual Impact Guideline* (DEHP, 2014) has been developed to assist in deciding whether or not a prescribed activity will, or is likely to have a significant residual impact on a MSES. The criteria contained in the guideline provides direction for identifying when an impact on a prescribed environmental matter that is MSES, may be 'significant'. Table 6-5 considers this criteria for each of the relevant prescribed matters present in the subject tenures.

Impacts have been assessed for activities associated with development of ten additional wells and associated infrastructure.

The precise location of infrastructure is subject to the progressive development of the gas field within the study area over a 10 - 20 year timeframe.

Preliminary disturbance footprints are conservative and, for the purposes of impact assessment, a large proportion of the proposed disturbance footprint has been located within 'high constraint' areas, where appropriate (refer to Section 5.2 and 5.3 and Figure 5-1). An upper disturbance limit of 115.5 ha for MSES has been utilised for this assessment. As such, the assessment of impacts within this report (as undertaken by E2M – refer to Appendix C) takes a precautionary approach and simulates a conservative disturbance scenario.

Table 6-5: Significant residual impact summary table

Prescribed Environmental Matters	Consideration of Significant Residual Impact Criteria
Regulated vegetation	Table 1 of the *Significant Residual Impact Guideline* (EHP 2014) details the significant residual impact test criteria for Regulated vegetation. Where disturbance to regulated vegetation exceeds the clearing limits for appropriate criteria set out in Table 1, a significant residual impact to Regulated vegetation will occur. The proposed prescribed activities may involve clearing up to 108.8 ha of regulated vegetation - within 100 m of a Vegetation Management Wetland (as shown on the vegetation management wetlands map), which represents 1.9% of this MSES identified within the PL. The proposed disturbance is less than the residual impact criteria for both linear and non-linear infrastructure. As such, a SRI to this MSES is unlikely. In addition, areas of regulated vegetation intersecting a watercourse may require clearing (as identified on the vegetation management watercourse and drainage feature map). The project will avoid the placement of non-linear infrastructure within the defined distance of the defining bank of regulated vegetation intersecting a watercourse, where practicable. Where disturbance occurs within the defined distance of Vegetation Management Watercourses and Drainage Features and within 5 m of the defining bank, it will comply with SRI clearing limits. As such, a SRI to this MSES is unlikely.
Designated precinct in a strategic environmental area	Section 7 of the *Regional Planning Interests Regulation 2014* prescribes the environmental attributes relevant to the Channel Country SEA. With the implementation of avoidance and mitigation measures, the impacts on the environmental attributes relevant to the Channel Country SEA are unlikely to remain or be significant. Refer to Section 6.2.1 for further information.
Protected wildlife habitat	PL 1055 may provide suitable general habitat for a range of threatened and near threatened fauna species. However, the proposed prescribed activities are unlikely to constitute a significant residual impact. Refer to Section 6.2.2 for further information.

6.2.1 Designated precinct in a strategic environmental area

There is no significant residual impact test for a strategic environmental area defined in the *Significant Residual Impact Guideline* (DEHP, 2014). To assess for significance, an assessment against the environmental attributes relevant to the Channel Country SEA. Section 7 of the *Regional Planning Interests Regulation 2014* prescribes the following environmental attributes relevant to the Channel Country SEA. These are discussed in Table 6-6.

Table 6-6: Impact assessment of the environmental attributes of the Channel Country SEA

Environmental attribute relevant to Channel Country SEA (s7 of the Regional Planning Interests Regulation 2014)	Significant Residual Impact Assessment
(a) the natural hydrologic processes of the area characterised by: (i) natural, unrestricted flows in and along stream channels and the channel network in the area; and (ii) overflow from stream channels and the channel network onto the flood plains of the area, or the other way; and (iii) natural flow paths of water across flood plains connecting waterholes, lakes and wetlands in the area; and	**SRI unlikely** Construction within watercourses would not occur during periods of streamflow and all activities in a watercourse will be conducted in accordance with proposed conditions (B3) through to (B16) and proposed condition (C1) of the EA. Proposed condition (B3) limits activities within a watercourse to linear infrastructure. Proposed condition (B5) states that activities in a watercourse must be conducted in the following preferential order: (a) firstly, in times where there is no water present; (b) secondly, in times of no flow; and (c) thirdly, conducting works in times of flow but in a way that does not impede low flow. Proposed condition (B10) prohibits activities from changing the existing surface water hydrological regime, impacting on the flow of surface water, impacting on surface water quality and impacting on bank stability within GES and HES wetlands. Proposed condition (B16) prohibits activities from diverting flood flows from natural drainage paths and altering flow distribution. Activities undertaken within PL 1055 will not restrict flows in and along stream channels and the channel network in the area.
(iv) groundwater sources, including the Great Artesian Basin and springs, that support waterhole persistence and ecosystems in the area	**SRI unlikely** All activities in a watercourse will be conducted in accordance with proposed conditions (B3) through to (B16) and proposed condition (C1) of the EA. Proposed condition (C1) prohibits groundwater extraction activities from causing environmental harm to underground aquifers. Activities undertaken within PL 1055 will not alter groundwater sources, including the Great Artesian Basin and springs that support waterhole persistence and ecosystems in the area.
(b) the natural water quality in the stream channels and aquifers and on flood plains in the area	**SRI unlikely** All activities in a watercourse will be conducted in accordance with proposed conditions (B3) through to (B16) and proposed condition (C1) of the EA. Contaminants likely to cause environmental harm must not be released to waters (proposed condition (B1)).

Environmental attribute relevant to Channel Country SEA (s7 of the Regional Planning Interests Regulation 2014)	Significant Residual Impact Assessment
	Proposed condition (B10) and (B11) prohibit activities from changing the existing surface water hydrological regime, impacting on the flow of surface water, impacting on surface water quality and impacting on bank stability within GES and HES wetlands. Proposed condition (C1) prohibits groundwater extraction activities from causing environmental harm to underground aquifers. Erosion and sediment control measures are required to minimise water turbidity (proposed condition (A19). Activities in floodplains, as required by proposed condition (B16) must be carried in a way that does not concentrated flood flows, divert flood flows from natural drainage paths, alter flow distribution, increase the local duration of floods or increase the risk of detaining flood flows. Activities undertaken within PL 1055 will not significantly impact the natural water quality in the stream channels and aquifers and on flood plains in the area.
(c) the beneficial flooding of land that supports flood plain grazing and ecological processes in the area	**SRI unlikely** Proposed condition (B3) limits activities within a watercourse to linear infrastructure. Proposed condition (B5) states that activities in a watercourse must be conducted in the following preferential order: • firstly, in times where there is no water present; • secondly, in times of no flow; and • thirdly, conducting works in times of flow but in a way that does not impede low flow. Proposed condition B16 provides that where petroleum activities are carried out on floodplains they must be carried out in a way that does not: (a) concentrate flood flows in a way that will or may cause environmental harm; or (b) divert flood flows from natural drainage paths and alter flow distribution; or (c) increase the local duration of floods; or (d) increase the risk of detaining flood flows.

6.2.2 Protected wildlife habitat

The prescribed activity is likely to have a significant impact on protected wildlife habitat if:

For endangered and vulnerable wildlife habitat (including essential habitat), an action is likely to have a significant impact on endangered and vulnerable wildlife if the impact on the habitat is likely to:

- lead to a long-term decrease in the size of a local population; or
- reduce the extent of occurrence of the species; or
- fragment an existing population; or

- result in genetically distinct populations forming as a result of habitat isolation; or
- result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat; or
- introduce disease that may cause the population to decline, or
- interfere with the recovery of the species; or
- cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.

For special least concern (non-migratory) animal wildlife habitat, an action is likely to have a significant impact on a special least concern (non-migratory) animal wildlife habitat if it is likely that it will result in:

- a long-term decrease in the size of a local population; or
- a reduced extent of occurrence of the species; or
- fragmentation of an existing population; or
- result in genetically distinct populations forming as a result of habitat isolation; or
- disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species.

As discussed in Section 4.4, PL 1055 contains potential habitat for the following species subject to protected wildlife habitat:

- Grey Grasswren (NC Act listed Endangered)
- Major Mitchell's Cockatoo (NC Act listed Vulnerable); and
- Short-beaked Echidna (NC Act listed Special Least Concern).

E2M assessed the potential impacts of the proposed disturbance on the above listed species against the significant impact criteria described above, and determined that a significant residual impact to these species was unlikely (refer Appendix C). Detailed summaries of the E2M assessment are provided in Table 6-7, Table 6-8 and Table 6-9. Further information and mitigation measures in relation to the management of potential impacts to fauna is provided in Section 5.3, Table 5-1 and Appendix C.

Table 6-7: Significant residual impact assessment for Grey Grasswren

MSES Significant Residual Impact Guideline Criteria. The activity is likely to:	Assessment
Lead to a long-term decrease in the size of a population	**No significant impact** The proposed disturbance will require the clearing of approximately 57.8 ha of Grey Grasswren habitat, which represents 14.2% of the Grey Grasswren habitat identified within the PL. This disturbance area is based on an assumed five wells and associated infrastructure being located within the species habitat. A SRI to the species is unlikely as: • Suitable habitat for the species is widely available within the PL and the surrounding Cooper Creek floodplain • Lignum, which is the key habitat feature for the species, rapidly re-establishes within disturbed areas following flood events (E2M, 2021). Approximately 19.5 ha of the disturbance footprint is proposed for rehabilitation, which includes pipeline right of ways, sump pits and a proportion of the lease areas (assumed five wells and associated

	infrastructure). These areas are expected to re-establish to suitable habitat for grey grasswren • Management measures have been identified to mitigate impacts on the species habitat (refer to Section 5.3 and Appendix C).
Reduce the extent of occurrence of the species	**No Significant Impact** The proposed clearing comprises a minimal proportion of the overall extent of occurrence of the species and will not impact connectivity of suitable habitat.
Fragment an existing population	**No Significant Impact** The project is unlikely to impact the movement of Grey Grasswren individuals among habitat areas within and surrounding the PL and is unlikely to fragment the local Grey Grasswren population.
Result in genetically distinct populations forming as a result of habitat isolation	**No Significant Impact** The project is unlikely to impact the movement of Grey Grasswren individuals among habitat areas within and surrounding the PL.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat	**No Significant Impact** Feral predators (cats and foxes), pigs and rabbits are listed as threatening processes to the species (E2M, 2021). The project is unlikely to increase the abundance of these invasive species above their current levels or result in the introduction of new invasive species.
Introduce disease that may cause the population to decline	**No Significant Impact** Disease is not listed as a potential threat to the species (E2M, 2021). The project is unlikely to introduce a disease that may cause the species to decline.
Interfere with the recovery of the species	**No Significant Impact** The proposed works are unlikely to interfere with the recovery of the species due to the minimal impact on the Grey Grasswren population. No actions proposed are in contrast to the specific recovery actions for the species (DotE 2014; DEE 2019).
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.	**No Significant Impact** The precautionary principle was applied to consider all Grey Grasswren habitat mapped within the PL to represent ecologically significant locations for the species as this habitat predominantly comprises lignum dominated communities that are used at all stages of the grey grasswren lifecycle. The project is unlikely to cause disruption to ecologically significant locations as: • Suitable habitat for the species is widely available within the PL and the surrounding Cooper Creek floodplain. • Lignum, which is the key habitat feature for the species, rapidly re-establishes within disturbed areas following flood events (E2M, 2021). Approximately 19.5 ha of the disturbance footprint is proposed for rehabilitation, which includes pipeline right of ways, sump pits and a proportion of the lease areas. These areas are expected to re-establish to suitable habitat for Grey Grasswren • Management measures have been identified to mitigate impacts on the species habitat (refer to Section 5.3 and Appendix C).

Table 6-8: Significant residual impact assessment for Major Mitchell's Cockatoo

MSES Significant Residual Impact Guideline Criteria. The activity is likely to:	Assessment
Lead to a long-term decrease in the size of a population	**No Significant Impact** The proposed disturbance will require the clearing of approximately 1.8 ha of Major Mitchell's cockatoo habitat, which represents 1.9% of the Major Mitchell's cockatoo habitat identified within the PL. Given suitable habitat for the species is widely available within and surrounding the PL, the proposed vegetation clearing is unlikely to lead to a long-term decrease in the size of the Major Mitchell's cockatoo population. Approximately 0.2 ha of the Major Mitchell's cockatoo habitat has been identified as foraging habitat only, due to the absence of suitable hollow-bearing trees for nesting. In addition, management measures have been identified to mitigate impacts on habitat for Major Mitchell's cockatoo (refer to Section 5.3 and Appendix C).
Reduce the extent of occurrence of the species	**No Significant Impact** The proposed clearing comprises a minimal proportion of the overall extent of occurrence of the species and will not impact connectivity of suitable habitat.
Fragment an existing population	**No Significant Impact** The project is unlikely to impact the movement of Major Mitchell's Cockatoo individuals among habitat areas within and surrounding the PL and is unlikely to fragment the local Major Mitchell's Cockatoo population.
Result in genetically distinct populations forming as a result of habitat isolation	**No Significant Impact** The project is unlikely to impact the movement of Major Mitchell's Cockatoo individuals among habitat areas within and surrounding the PL.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat	**No Significant Impact** Feral herbivores such as rabbits and goats are listed as a threatening process to the species (E2M, 2021). The project is unlikely to increase the abundance of these invasive species above their current levels or result in the introduction of new invasive species.
Introduce disease that may cause the population to decline	**No Significant Impact** Psittacine beak and feather disease is a potential threat to the species (E2M, 2021). The project is unlikely to introduce Psittacine beak and feather disease or any other disease that may cause the species to decline.
Interfere with the recovery of the species	**No Significant Impact** The proposed works are unlikely to interfere with the recovery of the species due to the minimal impact on the Major Mitchell's Cockatoo population. No actions proposed are in contrast to the specific recovery actions for the species (E2M, 2021).
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.	**No Significant Impact** The project is unlikely to cause disruption to ecologically significant locations as: The proposed clearing comprises a negligible proportion of the species habitat, which is widely available surrounding the PL.

	• The PL contains foraging habitat only for the species, with no suitable breeding habitat present. • Management measures have been identified to mitigate impacts on habitat for Major Mitchell's cockatoo (refer to Section 5.3 and Appendix C). • Infrastructure will be sighted to avoid disturbance to hollow bearing trees (if present) wherever practicable. For example, roads and pipeline alignments will be aligned to avoid the requirement to disturb or clear large mature, or hollow bearing trees (dead or alive). • The proposed clearing will not increase fragmentation of the species habitat. • Approximately 0.8 ha of the disturbance footprint is proposed for rehabilitation, which includes pipeline right of ways, sump pits and a proportion of the lease areas. These areas are expected to re-establish to suitable habitat for the species following rehabilitation.

Table 6-9: Significant residual impact assessment for Short-beaked Echidna

MSES Significant Residual Impact Guideline Criteria. The activity is likely to:	Assessment
Lead to a long-term decrease in the size of a local population	**No Significant Impact** The proposed disturbance will require the clearing of approximately 115.5 ha of echidna habitat. As the species is widely distributed and has no particular habitat preferences, except for the supply of ants and termites (E2M, 2021), the project is unlikely to lead to a long-term decrease in the local population of the species. In addition, management measures have been identified to mitigate impacts on fauna habitat (refer to Section 5.3 and Appendix C).
A reduced extent of occurrence of the species	**No Significant Impact** As the species is widely distributed and has no particular habitat preferences, except for the supply of ants and termites (E2M, 2021), the project is unlikely to reduce the extent of occurrence of the species.
Fragmentation an existing population	**No Significant Impact** The project will have negligible impact on the species local and regional movement.
Reduced gene flow among populations	**No Significant Impact** The project will have negligible impact on the species local and regional movement.
Disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species	**No Significant Impact** The proposed disturbance will require the clearing of approximately 115.5 ha of echidna habitat, which is likely to include breeding, feeding and nesting habitat. However, as the species is widely distributed and has no particular habitat preferences, except for the supply of ants and termites (E2M, 2021), the project is unlikely to lead to a long-term decrease in the local population of the species. In addition, management measures have been identified to mitigate impacts on fauna habitat (refer to Section 5.3 and Appendix C).

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8.0 Appendices

Appendix A – Streamlined Model and Blueprint Model Condition Comparison Table

<table>
<tr><th>SMC Reference</th><th>Streamlined Model Condition</th><th>Blueprint Reference</th><th>Blueprint Condition</th><th>Blueprint Justification</th></tr>
<tr><td colspan="2">Streamlined Conditions—General Environmental Protection</td><td colspan="2">SCHEDULE A - General</td><td></td></tr>
<tr><td>Authorised activities
Conditions (General 1) to (General 6)</td><td><< The environmental authority will contain conditions that explicitly authorise particular activities to be carried out on the relevant resource authorities. This will include a scoping table and thresholds for scale and intensity.>></td><td>A1</td><td>(A1) This environmental authority authorises the carrying out of the following resource activities:
(a) the petroleum activities listed in Schedule A, Table 1 – Scale of Activities to the extent they are carried out in accordance with the activity's corresponding scale and intensity;
(b) petroleum activities, including but not limited to:
(i) linear infrastructure;
(ii) borrow pits / extracting, other than by dredging; and
(iii) compressor stations; and
(iv) sewage treatment – operating sewage treatment works, other than no release works; and
(v) seismic surveys
(c) the specified relevant activities prescribed by this Environmental Authority at the locations specified on the cover pages of this environmental authority;
(d) incidental activities that are not otherwise specified relevant activities.

Schedule A, Table 1 – Scale of Activities

<table><tr><th>Petroleum Activities and Infrastructure</th><th>Scale (number of activities)</th></tr><tr><td>Wells</td><td>12</td></tr><tr><td>Stimulation</td><td>12 wells</td></tr></table></td><td>No Change / Same Condition</td></tr>
<tr><td>Monitoring standards
General 7. PESCD[3] 1</td><td>All monitoring must be undertaken by a suitably qualified person[4].</td><td>A11</td><td>(A11) All monitoring must be undertaken by a suitably qualified person.</td><td>Same Condition</td></tr>
<tr><td>General 8.</td><td>If requested by the administering authority in relation to investigating a complaint, monitoring must be commenced within 10 business days.</td><td>A12</td><td>(A12) If requested by the administering authority in relation to investigating a complaint, monitoring must be commenced within 10 business days.</td><td>Same Condition</td></tr>
<tr><td>General 9.</td><td>All laboratory analyses and tests must be undertaken by a laboratory that has NATA accreditation for such analyses and tests.</td><td>A13</td><td>(A13) All laboratory analyses and tests must be undertaken by a laboratory that has NATA accreditation for such analyses and tests unless NATA accredited tests are not available in Australia.</td><td>Similar / Equivalent Condition</td></tr>
<tr><td>General 10.</td><td>Notwithstanding condition (General 9), where there are no NATA accredited laboratories for a specific analyte or substance, then duplicate samples must be sent to at least two separate laboratories for independent testing or evaluation.</td><td>NA</td><td>NA</td><td>Condition A13 has been modified to address the concern. NATA accredited labs will be used.</td></tr>
<tr><td>General 11.</td><td>Monitoring and sampling must be carried out in accordance with the requirements of the following documents (as relevant to the sampling being undertaken), as amended from time to time:
(a) for waters and aquatic environments, the Queensland Government's Monitoring and Sampling Manual 2009 – Environmental Protection (Water) Policy 2009
(b) for groundwater, Groundwater Sampling and Analysis – A Field Guide (2009:27 GeoCat #6890.1)
(c) for noise, the Environmental Protection Regulation 2008
(d) for air, the Queensland Air Quality Sampling Manual and/or Australian Standard 4323.1:1995 Stationary source emissions method 1: Selection of sampling positions, as appropriate for the relevant measurement</td><td>A14</td><td>(A14) Monitoring and sampling must be carried out in accordance with the requirements of the following documents (as relevant to the sampling being undertaken), as amended from time to time:
(a) for waters and aquatic environments, the Queensland Government's Monitoring and Sampling Manual 2009 – Environmental Protection (Water) Policy 2019;
(b) for groundwater, Groundwater Sampling and Analysis – A Field Guide (2009:27 GeoCat #6890.1);
(c) for noise, the Environmental Protection Regulation 2019;
(d) for air, the Queensland Air Quality Sampling Manual and/or Australian Standard 4323.1:1995 Stationary source emissions method 1: Selection of sampling positions, as appropriate for the relevant measurement;</td><td>Same Condition</td></tr>
</table>

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
	(e) for soil, the Guidelines for Surveying Soil and Land Resources, 2nd edition (McKenzie et al. 2008), and/or the Australian Soil and Land Survey Handbook, 3rd edition (National Committee on Soil and Terrain, 2009). f) for dust, Australian Standard AS3580.		(e) for soil, the *Guidelines for Surveying Soil and Land Resources*, 2nd edition (McKenzie et al. 2008), and/or the Australian Soil and Land Survey Handbook, 3rd edition (National Committee on Soil and Terrain, 2009); and (f) for dust, Australian Standard 3580.	
Advice statements for the environmental authority (footnotes)	*a) It is an offence under section 426 of the Act for a person to carry out an environmentally relevant activity unless the person holds, or is acting under, an environmental authority for the activity.* *b) The environmental authority does not authorise a relevant act to occur in carrying out an authorised relevant activity unless a condition of this environmental authority expressly authorises the relevant act to occur.* *c) The environmental authority does not authorise environmental harm unless a condition contained within the authority explicitly authorises that harm. Where there is no condition, the absence of a condition shall not be construed as authorising harm.* *3 Conditions that include 'SC' are an existing approved and published standard condition.* *4 Words underlined are currently defined in the dictionary, schedule of an environmental authority or the Environmental Protection Act 1994 and/or its subordinate legislation*	**A2** **A3**	(A2) The activities in condition (A1) are authorised subject to the conditions of this environmental authority. (A3) This environmental authority does not authorise a relevant act[1] to occur in carrying out an authorised resource activity unless a condition of this environmental authority expressly authorises the relevant act to occur[2]. Where there is no condition, the lack of a condition must not be construed as authorising the relevant act. *[1] See section 493A of the Act.* *[2] Section 493A(2) of the Act provides that a relevant act is unlawful unless it is authorised to be done under, among other things, an environmental authority.*	Similar / Equivalent Conditions
Notification General 12.	In addition to the requirements under Chapter 7, Part 1, Division 2 of the Environmental Protection Act 1994, the administering authority must be notified through the Pollution Hotline and in writing, as soon as possible, but within 48 hours of becoming aware of any of the following events: (a) any unauthorised significant disturbance to land (b) potential or actual loss of structural or hydraulic integrity of a dam (c) when the level of the contents of any regulated dam reaches the mandatory reporting level (d) when a regulated dam will not have available storage to meet the design storage allowance on 1 November of any year (e) potential or actual loss of well integrity (f) when the seepage trigger action response procedure required under condition (Water 14(g)) is or should be implemented (g) unauthorised releases of any volume of prescribed contaminants to waters (h) unauthorised releases of volumes of contaminants, in any mixture, to land greater than: i. 200 L of hydrocarbons; or ii. 200 L of stimulation additives; or iii. 500 L of stimulation fluids; or iv. 1 000 L of brine; or v. 5 000 L of untreated coal seam gas water; or vi. 5 000 L of raw sewage; or vii. 10 000 L of treated sewage effluent. (i) the use of restricted stimulation fluids (j) groundwater monitoring results from a landholder's active groundwater bore monitored under the stimulation impact monitoring program which is a 10% or greater increase from a previous baseline value for that bore and which renders the water unfit for its intended use (k) monitoring results where two out of any five consecutive samples do not comply with the relevant limits in the environmental authority.	**A15**	**(A15) Notification** In addition to the requirements under Chapter 7, Part 1, Division 2 of the Environmental Protection Act 1994, the administering authority must be notified through the Pollution Hotline and in writing, as soon as possible, but within 48 hours of becoming aware of any of the following events: (a) any unauthorised significant disturbance to land (b) potential or actual loss of structural or hydraulic integrity of a dam (c) when the level of the contents of any regulated dam reaches the mandatory reporting level (d) when a regulated dam (or network of linked containment systems) will not have available storage to meet the design storage allowance on 1 November of any year (e) potential or actual loss of well integrity (f) when the seepage trigger action response procedure required under condition (C3) (g)) is or should be implemented (g) unauthorised releases of any volume of prescribed contaminants to waters (h) unauthorised releases of volumes of contaminants, in any mixture, to land greater than: i. 200 L of hydrocarbons; or ii. 200 L of stimulation additives; or iii. 500 L of stimulation fluids; or iv. 1 000 L of brine; or v. 5 000 L of associated water; or vi. 5 000 L of raw sewage; or vii. 10 000 L of treated sewage effluent. (i) The use of restricted stimulation fluids (j) groundwater monitoring results from a landholder's active groundwater bore monitored under the stimulation impact monitoring program which is a 10% or greater increase from a previous baseline value for that bore and which renders the water unfit for its intended use (k) monitoring results where two out of any five consecutive samples do not comply with the relevant limits in the environmental authority.	Same Condition

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
Financial assurance **General 13.** **PESCB 1.**	Petroleum activities that cause significant disturbance to land must not be carried out until financial assurance has been given to the administering authority as security for compliance with the environmental authority and any costs or expenses, or likely costs or expenses, mentioned in section 298 of the Environmental Protection Act 1994.	N/A	N/A	Conditions General 13 to 15 are no longer required as the requirements for Estimated Rehabilitation Cost are specified in Section 297 of the EP Act.
General 14.	Prior to any changes in petroleum activities which would result in an increase to the maximum significant disturbance since financial assurance was last given to the administering authority, the holder of the environmental authority must amend the financial assurance and give the administering authority the increased amount of financial assurance.	N/A	N/A	
General 15.	If the amount of financial assurance held by the administering authority has been discounted and either the nominated period of financial assurance has ended, or an event or change in circumstance has resulted in the holder of the environmental authority no longer being able to meet one or more of the mandatory pre-requisites or applicable discount criteria, the holder of the environmental authority must amend the financial assurance and give the administering authority the increased amount of financial assurance as soon as practicable.	N/A	N/A	
Contingency procedures for emergency environmental incidents **General 16.**	Petroleum activities involving significant disturbance to land cannot commence until the development of written contingency procedures for emergency environmental incidents which include, but are not necessarily limited to: (a) a clear definition of what constitutes an environmental emergency incident or near miss for the petroleum activity. (b) consideration of the risks caused by the petroleum activity including the impact of flooding and other natural events on the petroleum activity. (c) response procedures to be implemented to prevent or minimise the risks of environmental harm occurring. (d) the practices and procedures to be employed to restore the environment or mitigate any environmental harm caused. (e) procedures to investigate causes and impacts including impact monitoring programs for releases to waters and/or land. (f) training of staff to enable them to effectively respond. (g) procedures to notify the administering authority, local government and any potentially impacted landholder.	**A16**	(A16) From [insert date 6 months from grant date of EA] petroleum activities involving significant disturbance to land cannot commence until the development of written contingency procedures for emergency environmental incidents which include, but are not necessarily limited to: (a) a clear definition of what constitutes an environmental emergency incident or near miss for the petroleum activity; (b) consideration of the risks caused by the petroleum activity including the impact of flooding and other natural events on the petroleum activity; (c) response procedures to be implemented to prevent or minimise the risks of environmental harm occurring; (d) the practices and procedures to be employed to restore the environment or mitigate any environmental harm caused; (e) procedures to investigate causes and impacts including impact monitoring programs for releases to waters and/or land; (f) training of staff to enable them to effectively respond; and (g) procedures to notify the administering authority, local government and any potentially impacted landholder.	Same Condition
Maintenance of plant and equipment **General 17.** **PESCC 4.**	All plant and equipment must be maintained and operated in their proper and effective condition.	**A17**	(A17) All plant and equipment must be maintained and operated in their proper and effective condition.	Same Condition
General 18.	The following infrastructure must be signed with a unique reference name or number in such a way that it is clearly observable: (a) regulated dams and low consequence dams (b) exploration, appraisal and development wells (c) water treatment facilities (d) brine encapsulation facilities (e) landfill cells (f) sewage treatment facilities (g) specifically authorised discharge points to air and waters (h) any chemical storage facility associated with the environmentally relevant activity of chemical storage (i) field compressor stations (j) central compressor stations (k) gas processing facilities; and (l) pipeline compressor stations.	**N/A**	NA	Given the remoteness of this asset, signage is not considered necessary. Infrastructure is located on private property. Public access is therefore restricted making community interactions (other than by landholders) extremely low. Given the harshness of the environment, signs will also require regular maintenance and/or replacement. It is expected this may be necessary every 5 - 10 years and is an unnecessary expense.

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
General 19.	Measures to prevent fauna being harmed from entrapment must be implemented during the construction and operation of well infrastructure, dams and pipeline trenches.	**A18**	(A18) For activities commenced [after grant date of EA] measures to minimise fauna being harmed from entrapment must be implemented during the construction and operation of well infrastructure, dams and pipeline trenches.	Same Condition A date reference has been added to ensure compliance for existing infrastructure.
Erosion and sediment control **General 20.**	For activities involving significant disturbance to land, control measures that are commensurate to the site-specific risk of erosion, and risk of sediment release to waters must be implemented to: (a) allow stormwater to pass through the site in a controlled manner and at non-erosive flow velocities (b) minimise soil erosion resulting from wind, rain, and flowing water (c) minimise the duration that disturbed soils are exposed to the erosive forces of wind, rain, and flowing water (d) minimise work-related soil erosion and sediment runoff; and (e) minimise negative impacts to land or properties adjacent to the activities (including roads).	**A19**	(A19) For activities involving significant disturbance to land, control measures that are commensurate to the site-specific risk of erosion, and risk of sediment release to waters must be implemented to: (a) allow stormwater to be diverted around or pass through the site in a controlled manner (b) minimise soil erosion resulting from wind, rain, and flowing water (c) minimise the duration that disturbed soils are exposed to the erosive forces of wind, rain, and flowing water (d) minimise work-related soil erosion and sediment runoff; and (e) minimise negative impacts to land or properties adjacent to the activities (including roads).	Same Condition
Complaints **General 21.**	Petroleum activities must not cause environmental nuisance at a sensitive place, other than where an alternative arrangement is in place.	**A20**	(A20) Petroleum activities must not cause environmental nuisance at a sensitive place, other than where an alternative arrangement is in place.	Same Condition
Documentation **General 22.**	A certification must be prepared by a suitably qualified person within 30 business days of completing every plan, procedure, program and report required to be developed under this environmental authority, which demonstrates that: (a) relevant material, including current published guidelines (where available) have been considered in the written document (b) the content of the written document is accurate and true; and (c) the document meets the requirements of the relevant conditions of the environmental authority.	**A21**	(A21) A certification must be prepared by a suitably qualified person within 30 business days of completing every plan, procedure, program and report required to be developed under this environmental authority, which demonstrates that: (a) relevant material, including current published guidelines (where available) have been considered in the written document (b) the content of the written document is accurate and true; and (c) the document meets the requirements of the relevant conditions of the environmental authority.	Same Condition
General 23.	All plans, procedures, programs, reports and methodologies required under this environmental authority must be written and implemented.	**A22**	(A22) All plans, procedures, programs, reports and methodologies required under this environmental authority must be written and implemented.	Same Condition
General 24.	All documents required to be developed under this environmental authority must be kept for five years.	**A23**	(A23) All documents required to be developed under this environmental authority must be kept for five years.	Same Condition
General 25.	All documents required to be prepared, held or kept under this environmental authority must be provided to the administering authority upon written request within the requested timeframe.	**A24**	(A24) All documents required to be prepared, held or kept under this environmental authority must be provided to the administering authority upon written request within the requested timeframe.	Same Condition
General 26.	A record of all complaints must be kept including the date, complainant's details, source, reason for the complaint, description of investigations and actions undertaken in resolving the complaint.	**A25**	(A25) A record of all complaints must be kept including the date, complainant's details, source, reason for the complaint, description of investigations and actions undertaken in resolving the complaint.	Same Condition
N/A	No applicable SMC	**A4**	(A4) By [insert date 6 months from date of issues of this EA] an inventory of all existing petroleum activities which commenced prior to [insert date of grant of EA] must be developed and maintained.	Condition is required to document existing infrastructure present within the relevant tenure prior to a new EA coming into force.
N/A	No applicable SMC	**A5**	(A5) The inventory required under condition (A4) must be provided to the administering authority upon written request and within the requested timeframe.	As above
N/A	No applicable SMC	**A6**	(A6) At the request of the administering authority, a third-party auditor must audit compliance with the conditions of this environmental authority.	Condition is required to facilitate third-party compliance audits
N/A	No applicable SMC	**A7**	(A7) Notwithstanding condition (A6), and prior to undertaking the third-party audit, the timing[1], scope and content of the third-party audit may be negotiated with the administering authority. *[1] The intent of allowing the timing to be negotiated is to allow the EA holder to plan and commission third party audits in such a way that does not result in unnecessary*	Condition is required to ensure appropriate time is available to plan and facilitate third-party audits i.e. logistics, travel, health and safety, administration and field

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
			administrative burden on the EA holder (e.g. no more than four (4) audits in a given year across the EA holders other resource EAs in south-west QLD).	resource availability as well as to focus the audit requirements.
N/A	No applicable SMC	**A8**	(A8) An audit report must be prepared and certified by the third-party auditor presenting the findings of each audit carried out.	Condition is required to ensure third-party audit reports required at Condition A4 are prepared and certified
N/A	No applicable SMC	**A9**	(A9) Any recommendations arising from the audit report must be acted upon by: (a) investigating any non-compliance issues identified; and (b) as soon as reasonably practicable, implementing measures or taking necessary action to ensure compliance with the requirements of this environmental authority.	Condition is required to ensure third-party compliance audit recommendations are appropriately investigated and addressed as soon as reasonably practicable.
N/A	No applicable SMC	**A10**	(A10) A written response must be attached to the audit report detailing the actions taken or to be taken on stated dates: (a) to ensure compliance with this environmental authority; and (b) to prevent a recurrence of any non-compliance issues identified.	Condition is required to ensure actions taken to address third-party audit recommendations are documented.
Streamlined Conditions—Waste Management		**SCHEDULE I - WASTE**		
General waste management **Waste 1.** **PESCC 24.**	Measures must be implemented so that waste is managed in accordance with the waste and resource management hierarchy and the waste and resource management principles.	**I2**	(I2) Measures must be implemented so that waste is managed in accordance with the waste and resource management hierarchy and the waste and resource management principles.	Same Condition
Waste 2.	Waste, including waste fluids, but excluding waste used in closed-loop systems, must be transported off-site for lawful re-use, remediation, recycling or disposal, unless the waste is specifically authorised by conditions <<Insert List>> to be disposed of or used on site.	**I1**	(I1) All waste generated in carrying out the activity must be lawfully reused, recycled or removed to a facility that can lawfully accept the waste, except as permitted under another condition of this environmental authority.	Similar / Equivalent Condition
Waste 3.	Waste fluids, other than flare precipitant stored in flare pits, or residual drilling material or drilling fluids stored in sumps, must be contained in either: (a) an above ground container; or (b) a structure which contains the wetting front.	**N/A**	N/A	N/A
Waste 4.	Green waste may be used on-site for either rehabilitation or sediment and erosion control, or both.	**I7**	(I7) Green waste may be used on-site for either rehabilitation or sediment and erosion control, or both.	Same Condition
Waste 5.	Vegetation waste may be burned if it relates to a state forest, timber reserve or forest entitlement area administered by the Forestry Act 1959 and a permit has been obtained under the Fire and Rescue Service Act 1990.	**N/A**	N/A	N/A There are no state forests, timber reserves or forest entitlement areas administered by the *Forestry Act 1959* located within PL 1055. Burning of waste is not proposed for PL 1055.
Pipeline wastewater **Waste 6.**	Pipeline waste water, may be released to land provided that it: (a) can be demonstrated it meets the acceptable standards for release to land; and (b) is released in a way that does not result in visible scouring or erosion or pooling or run-off or vegetation die-off.	**I14**	(I14) Hydrostatic test water from pipelines may be released to land in accordance with condition (I8).	Similar / Equivalent Condition: I14 has been modified to be outcome focussed in accordance with the requirements of Blueprint Condition I8.
Authorised uses of produced water for petroleum activities **Waste 7.**	Produced water may be re-used in: (a) drilling and well hole activities; or (b) stimulation activities.	**I9**	(I9) Associated water produced from the authorised petroleum activity(ies) may be used for the following in accordance with condition (I8): (a) for dust suppression on roads;	Similar / Equivalent Condition: The condition authorises the use of associated water for construction and operational activities and for domestic and stock purposes which will be managed in accordance

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
			(b) for construction and operational purposes, including drilling, well hole activities and stimulation, for the petroleum activity(ies) authorised by this environmental authority; (c) domestic and stock purposes.	with proposed conditions I8, I10 to I13.
Waste 8.	Produced water may be used for dust suppression provided the following criteria are met: (a) the amount applied does not exceed the amount required to effectively suppress dust; and (b) the application: i. does not cause on-site ponding or runoff ii. is directly applied to the area being dust suppressed iii. does not harm vegetation surrounding the area being dust suppressed; and iv. does not cause visible salting.	**I8**	(I8) The release of contaminants to land must be carried out in a manner such that: (a) vegetation is not damaged; (b) soil quality is not adversely impacted; (c) there is no surface ponding or runoff to waters; (d) there is no aerosols or odours; (e) deep drainage below the root zone of any vegetation is minimised; (f) the quality of shallow aquifers is not adversely affected	Condition is required to ensure appropriate outcome based conditions are applied to the release of contaminants to land.
Waste 9.	Produced water may be used for construction purposes provided the use: (a) does not result in negative impacts on the composition and structure of soil or subsoils (b) is not directly or indirectly released to waters (c) does not result in runoff from the construction site; and (d) does not harm vegetation surrounding the construction site.	**N/A**	N/A	Condition I8 and I9 above cover this requirement.
Waste 10.	If there is any indication that any of the circumstances in condition (Waste 8)(b)(i) to (Waste 8(b)(iv)) or (Waste 9)(a) to (Waste 9(d)) is occurring the use must cease immediately and the affected area must be remediated without delay.	**N/A**	N/A	Condition I8 and I9 above cover this requirement.
Use of produced water for irrigation activities	<< Insert either option A, B or C: >> Option A: Insert general beneficial use approval irrigation of associated water conditions including release limits Option B: Insert release limits proposed in the application and as determined by an independent suitably qualified person Option C: Insert conditions (Waste C1) and (Waste C2): Waste C1. Irrigation of produced water is authorised providing it ensures: (a) ensures that soil structure, stability and productive capacity can be maintained or improved (b) toxic effects to crops do not result; and (c) yields and produce quality are maintained or improved. Waste C2. Irrigation of produced water is authorised providing a written report is provided to the chief executive which: (a) certifies that the outcomes in condition (Waste C1) will be achieved (b) states water quality criteria, which has been determined in accordance with the assessment procedures outlined in Waste Schedule, Table 1—Assessment procedures for water quality criteria (c) includes a water monitoring program to monitor that the outcomes listed in condition (Waste C1) are being achieved.	N/A	N/A	Provision of water for irrigation purposes is not proposed.

<table>
<tr><th>SMC Reference</th><th>Streamlined Model Condition</th><th>Blueprint Reference</th><th>Blueprint Condition</th><th>Blueprint Justification</th></tr>
<tr><td></td><td>Waste management schedule, Table 1—Assessment procedures for water quality criteria
<table>
<tr><th>Water quality criteria</th><th>Assessment procedure</th></tr>
<tr><td>electrical conductivity

sodium adsorption ratio

pH</td><td>Salinity Management Handbook, with reference to Chapter 11; and/or Australian and New Zealand Guidelines for Fresh and Marine Water Quality, with reference to Volume 1 Chapter 4 and Volume 3 Chapter 9. The assessment should consider:
soil properties within the root zone to be irrigated (e.g. clay content, cation exchange capacity, exchangeable sodium percentage)
water quality of the proposed resource (e.g. salinity, sodicity)
climate conditions (e.g. rainfall)
leaching fractions
average root zone salinity (calculated)
crop salt tolerance (e.g. impact threshold and yield decline)
management practices and objectives (e.g. irrigation application rate, amelioration techniques)
broader landscape issues (e.g. land use, depth to groundwater)
any additional modelling and tests undertaken to support the varied water quality parameters.</td></tr>
<tr><td>heavy metals</td><td>Australian and New Zealand Guidelines for Fresh and Marine Water Quality, with reference to Volume 1 Chapters 3 and 4 and Volume 3 Chapter 9.

The assessment should aim to derive site specific trigger values (e.g. cumulative contaminant loading limit) based on the methodology provided in the above mentioned procedure.</td></tr>
</table></td><td></td><td></td><td></td></tr>
<tr><td>Sewage treatment Waste 11.</td><td>Treated sewage effluent or greywater can be released to land provided it:
(a) meets or exceeds secondary treated class B standards for a treatment system with a daily peak design capacity of between 150 EP and 1500 EP; or
(b) meets or exceeds secondary treated class C standards for a treatment system with a daily peak design capacity of less than 150 EP.</td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2">Similar / Equivalent Condition:

I15 is required to allow the release of treated sewage effluent to land where appropriate. The conditions are slightly different to SMC because of the remote and isolated location of SWQ

The requirement to fence irrigation areas has been removed. This measure is considered impracticable given the remote location of Cooper Basin operations and lack of public access to sites. It is also noted that there is no requirement to fence effluent irrigation areas in ESR/2015/1710 v2 Eligibility criteria and standard conditions for sewage treatment works (ERA63). The area will be demarcated for the purposes of personnel understanding the irrigation area boundaries.

The requirement to only allow effluent irrigation to an area that is vegetated with groundcover is typically unfeasible in the hot, arid environment of the Cooper Basin. The remaining conditions are considered sufficient to ensure no harm is caused by runoff, drainage or seepage.

No conditions concerning weed management are contained within ESR/2015/1710 v2 Eligibility criteria and standard conditions for sewage treatment works (ERA63). As</td></tr>
<tr><td>Waste 12.</td><td>The release of treated sewage effluent or greywater authorised in condition (Waste 11) must:
(a) be to a fenced and signed contaminant release area(s)
(b) not result in pooling or run-off or aerosols or spray drift or vegetation die-off
(c) be to a contaminant release area(s) that is kept vegetated with groundcover, that is:
i. not a declared pest species
ii. kept in a viable state for transpiration and nutrient uptake; and
iii. grazed or harvested and removed from the contaminant release area as needed, but not less than every three months.</td><td>I15</td><td>(I15) Treated sewage effluent or greywater from a treatment system with a daily peak design capacity of less than 21 equivalent persons (EP) may be released to land provided it:
(a) be to a signed contaminant release area(s);
(b) does not contain any properties nor contain any organisms or other contaminants in concentrations that are capable of causing environmental harm;
(c) does not result in pooling or run-off or aerosols or spray drift or vegetation die-off;
(d) minimises deep drainage below the root zone of any vegetation; and
(e) does not adversely affect the quality of shallow aquifers.</td></tr>
</table>

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
				per the above point, Santos will not be maintaining a groundcover for irrigation purposes and therefore will not be supporting a groundcover of pest species for this purpose. Any weeds identified occurring as a result of activities would be removed / treated.
Waste 13.	Notwithstanding condition (Waste 11), treated sewage effluent that meets or exceeds secondary treated class A standards may be used for dust suppression or construction activities, provided the use meets the criteria in condition (Waste 8) or (Waste 9), as relevant to the use.	**N/A**	N/A	The use of treated sewage effluent for dust suppression in PL 1055 is not proposed.
Waste 14.	Sewage pump stations must be fitted with a: (a) stand-by pump; and (b) high level alarm to warn of imminent pump station overflow, that operates without mains power or with a back-up power source that starts automatically in the event of a power failure.	**N/A**	N/A	No sewage pump stations are proposed for PL 1055
Residual drilling material **Waste 15.**	If sumps are used to store residual drilling material or drilling fluids, they must only be used for the duration of drilling activities.	**I3**	(I3) Sumps not required for the management of residual drilling material in accordance with condition (I4), must only be used to store residual drilling material during drilling activities and work over processes.	Similar / Equivalent Condition: This condition was negotiated for clarity, and to recognise authorisations under blueprint condition I4
Waste 16.	Residual drilling material can only be disposed of on-site: (a) by mix-bury-cover method if the residual drilling material meets the approved quality criteria; or (b) if it is certified by a suitably qualified third party as being of acceptable quality for disposal to land by the proposed method and that environmental harm will not result from the proposed disposal.	**I4**	(I4) From [insert date of amended EA], residual drilling material can only be disposed of on-site: (a) by mix-bury cover method if the residual drilling material meets the approved quality criteria; or (b) if it is certified by a suitably qualified third party as being of acceptable quality for disposal to land by the proposed method and that environmental harm will not result from the proposed disposal.	Same Condition. Date range has been included to recognise existing activities.
Waste 17.	Records must be kept to demonstrate compliance with condition (Waste 15) and (Waste 16). << Use conditions (Waste 18) to (Waste 21) where the environmental authority application requests and provides an environmental assessment of onsite waste disposal. >>	**I6**	(I6) Records must be kept to demonstrate compliance with conditions (I3) and (I4).	Same Condition
Onsite waste disposal—General waste **Waste 18.**	General waste may be disposed of onsite at a dedicated landfill facility provided that the general waste: (a) is not a liquid (b) does not contain, or is not comingled with regulated waste (c) does not contain an organic fraction of more than 5% of the general waste stream (d) was generated from activities permitted under this environmental authority; and (e) does not exceed 10 000 tonnes in any year.	**N/A**	N/A	General waste disposal to a landfill facility is not proposed in PL 1055
Waste 19.	The landfill used for the disposal of general waste must be: (a) on land owned by the holder of the relevant resource authority(ies) (b) designed by a suitably qualified person and certified as being suitable for the containment of the waste (c) designed and located so that the landfill is protected from any potential adverse consequences of regional or local flooding to the probable maximum flood level (d) designed and operated to exclude stormwater runoff from entering the landfill (e) capped upon closure with capping methodology certified by a suitably qualified person as being suitable for containing the waste.	**N/A**	N/A	
Waste 20.	Waste disposal activities must not result in any negative effect on public health particularly in relation to propagation of diseases and the breeding and harbourage of flies, mosquitoes, rats and other pest organisms.	**N/A**	N/A	

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
Waste 21.	Waste disposal must not result in litter escaping the boundary of the landfill facility.	**N/A**	N/A	
N/A	No applicable SMC	**I5**	(I5) In accordance with condition B1, the disposal of residual drilling material must not result in a direct or indirect release of contaminants to any waters	Condition is required to ensure appropriate disposal of residual drilling material in relation to waters.
N/A	No applicable SMC	**I10**	(I10) Associated water produced from the authorised petroleum activity(ies) may be transferred to a third party to be used for the following purposes subject to compliance with conditions (I11) and (I12): (a) dust suppression; (b) construction and operational purposes; (c) livestock watering purposes.	Blueprint Conditions I10 to I13 are required to ensure beneficial use of co-produced water in SWQ by third parties. Santos' SWQ tenures are very large and remote, and groundwater bores are not prevalent. As such these conditions benefit landholders / local governments where suitable stock or other water sources may be limited.
N/A	No applicable SMC	**I11**	(I11) By [insert date 6 months from grant of EA], any associated water supplied to a third party for livestock watering purposes in accordance with condition (I10)(c) must meet the ANZECC and ARMCANZ Water Quality Guidelines 2000 for livestock watering purposes, as amended from time to time.	
N/A	No applicable SMC	**I12**	(I12) If the responsibility of associated water is given or transferred to a third party in accordance with condition (I10), the holder of environmental authority must ensure that: (a) the responsibility of the associated water is given or transferred in accordance with a written agreement (the third party agreement); and (b) the third party is made aware of the General Environmental Duty under section 319 of the *Environmental Protection Act 1994*.	
N/A	No applicable SMC	**I13**	(I13) A record of all written agreements as required by section (I12)(a) must be kept for the life of the authority and be made available to the administering authority upon request within the stated time period	Condition is required to ensure records are kept in relation to agreements made under Blueprint Condition I12.
N/A	No applicable SMC	**I16**	(I16) Temporary landfarms are authorised under this environmental authority in non-floodplain areas.	Conditions are to enable the temporary on-site remediation of soils in response to incidents of releases of hydrocarbons to land. Conditions prescribe the activity to occur outside of the floodplain. Contaminated soils will be preferentially taken to centralised facilities where feasible. However there are very few permanent landfills across the basin. Therefore, the proposed conditions are required to minimise the requirement to truck soils for small / manageable spills over very large distances, and at a very large expense.
N/A	No applicable SMC	**I17**	(I17) A record of land farm locations must be kept for the life of the authority.	
N/A	No applicable SMC	**I18**	(I18) Landfarms must be designed, constructed and maintained to: (a) Prevent the release of contaminants from the containment system; (b) and exclude stormwater from entering the containment system	
N/A	No applicable SMC	**I19**	(I19) Bio remediated soil from land farms may be used for petroleum activities where the soil quality criteria for the intended land use is achieved in accordance with National Environmental Protection measures (NEPMs) as amended from time to time.	
Streamlined Conditions—Protecting Acoustic Values		**SCHEDULE G - ACOUSTIC**		

<table>
<tr><th>SMC Reference</th><th>Streamlined Model Condition</th><th>Blueprint Reference</th><th>Blueprint Condition</th><th>Blueprint Justification</th></tr>
<tr><td>Noise 1.</td><td>Notwithstanding condition (General 21), emission of noise from the petroleum activity(ies) at levels less than those specified in Protecting acoustic values, Table 1—Noise nuisance limits are not considered to be environmental nuisance.
Protecting acoustic values, Table 1—Noise nuisance limits
<table>
<tr><th>Time period</th><th>Metric</th><th>Short term noise event</th><th>Medium term noise event</th><th>Long term noise event</th></tr>
<tr><td>7:00am—6:00pm</td><td>$L_{Aeq,adj,15\ min}$</td><td>45 dBA</td><td>43 dBA</td><td>40 dBA</td></tr>
<tr><td>6:00pm—10:00pm</td><td>$L_{Aeq,adj,15\ min}$</td><td>40 dBA</td><td>38 dBA</td><td>35 dBA</td></tr>
<tr><td rowspan="2">10:00pm—6:00am</td><td>$L_{Aeq,adj,15\ min}$</td><td>28 dBA</td><td>28 dBA</td><td>28 dBA</td></tr>
<tr><td>Max $L_{pA,\ 15\ mins}$</td><td>55 dBA</td><td>55 dBA</td><td>55 dBA</td></tr>
<tr><td>6:00am—7:00am</td><td>$L_{Aeq,adj,15\ min}$</td><td>40 dBA</td><td>38 dBA</td><td>35 dBA</td></tr>
</table>
1. The noise limits in Table 1 have been set based on the following deemed background noise levels (L_{ABG}):
7:00am—6:00 pm: 35 dBA
6:00pm—10:00 pm: 30 dBA
10:00pm—6:00 am: 25 dBA
6:00am—7.00 am: 30 dBA</td><td>G1</td><td>(G1) Notwithstanding condition (A20), emission of noise from the petroleum activity(ies) at levels less than those specified in Schedule G, Table 1—Noise nuisance limits are not considered to be environmental nuisance.
G1, Table 1 as per Noise 1,Table 1.</td><td>Same Condition</td></tr>
<tr><td>Noise 2.</td><td>If the noise subject to a valid complaint is tonal or impulsive, the adjustments detailed in Protecting acoustic values, Table 2—Adjustments to be added to noise levels at sensitive receptors are to be added to the measured noise level(s) to derive LAeq, adj, 15 min.
Protecting acoustic values, Table 2—Adjustments to be added to noise levels at sensitive receptors
<table>
<tr><th>Noise characteristic</th><th>Adjustment to noise</th></tr>
<tr><td>Tonal characteristic is just audible</td><td>+ 2 dBA</td></tr>
<tr><td>Tonal characteristic is clearly audible</td><td>+ 5 dBA</td></tr>
<tr><td>Impulsive characteristic is detectable</td><td>+ 2 to + 5 dBA</td></tr>
</table></td><td>G2</td><td>(G2) If the noise subject to a valid complaint is tonal or impulsive, the adjustments detailed in Schedule G, Table 2—Adjustments to be added to noise levels at sensitive receptors are to be added to the measured noise level(s) to derive LAeq, adj, 15 min.
Table 2 as per Noise 2 Table 2</td><td>Same Condition</td></tr>
<tr><td>Noise 3.</td><td>Notwithstanding condition (Noise 1), emission of any low frequency noise must not exceed either (Noise 3(a)) and (Noise 3(b)), or (Noise 3(c)) and (Noise 3(d)) in the event of a valid complaint about low frequency noise being made to the administering authority:
(a) 60 dB(C) measured outside the sensitive receptor; and
(b) the difference between the external A-weighted and C-weighted noise levels is no greater than 20 dB; or
(c) 50 dB(Z) measured inside the sensitive receptor; and
(d) the difference between the internal A-weighted and Z-weighted (Max LpZ, 15 min) noise levels is no greater than 15 dB.</td><td>G3</td><td>(G3) Notwithstanding condition (G1), emission of any low frequency noise must not exceed either (G3)(a) and (G3)(b), or (G3)(c) and (G3)(d) in the event of a valid complaint about low frequency noise being made to the administering authority:
(a) 60 dB(C) measured outside the sensitive receptor; and
(b) the difference between the external A-weighted and C-weighted noise levels is no greater than 20 dB; or
(c) 50 dB(Z) measured inside the sensitive receptor; and
(d) the difference between the internal A-weighted and Z-weighted (Max LpZ, 15 min) noise levels is no greater than 15dB.</td><td>Same Condition</td></tr>
<tr><td>Noise 4.
PESCC 21.</td><td>A Blast Management Plan must be developed for each blasting activity in accordance with Australian Standard 2187.</td><td>G4</td><td>(G4) A Blast Management Plan must be developed for each blasting activity in accordance with Australian Standard 2187.</td><td>Same Condition</td></tr>
<tr><td>Noise 5.
PESCC 22.</td><td>Blasting operations must be designed to not exceed an airblast overpressure level of 120 dB (linear peak) at any time, when measured at or extrapolated to any sensitive place.</td><td>G5</td><td>(G5) Blasting operations must be designed to not exceed an airblast overpressure level of 120 dB (linear peak) at any time, when measured at or extrapolated to any sensitive place.</td><td>Same Condition</td></tr>
<tr><td>Noise 6.
PESCC 23.</td><td>Blasting operations must be designed to not exceed a ground-borne vibration peak particle velocity of 10mm/s at any time, when measured at or extrapolated to any sensitive place.</td><td>G6</td><td>(G6) Blasting operations must be designed to not exceed a ground-borne vibration peak particle velocity of 10mm/s at any time, when measured at or extrapolated to any sensitive place.</td><td>Same Condition</td></tr>
<tr><td colspan="2">Streamlined Conditions—Protecting Air Values</td><td colspan="3">SCHEDULE H - AIR</td></tr>
<tr><td>Venting and flaring
Air 1.</td><td>Unless venting is authorised under the Petroleum and Gas (Production and Safety) Act 2004 or the Petroleum Act 1923, waste gas must be flared in a manner that complies with all of (Air 1(a)) and (Air 1(b)) and (Air 1(c)), or with (Air 1(d)):
(a) an automatic ignition system is used, and
(b) a flame is visible at all times while the waste gas is being flared, and
(c) there are no visible smoke emissions other than for a total period of no more than 5 minutes in any 2 hours, or
(d) it uses an enclosed flare.</td><td>H1</td><td>(H1) Unless venting is authorised under the Petroleum and Gas (Production and Safety) Act 2004 or the Petroleum Act 1923, waste gas must be flared in a manner that complies with all of (H1)(a) and (H1)(b) and (H1)(c), or with (H1)(d):
(a) an automatic ignition system is used, and
(b) a flame is visible at all times while the waste gas is being flared, and
(c) there are no visible smoke emissions other than for a total period of no more than 5 minutes in any 2 hours, or
(d) it uses an enclosed flare.</td><td>Same Condition</td></tr>
<tr><td>Fuel burning and combustion facilities—</td><td>A fuel burning or combustion facility must not be operated unless it is listed in Protecting air values, Table 1–Authorised point sources.</td><td>N/A</td><td>N/A</td><td>Fuel burning is not proposed in PL 1055</td></tr>
</table>

<table>
<tr><th>SMC Reference</th><th>Streamlined Model Condition</th><th>Blueprint Reference</th><th>Blueprint Condition</th><th>Blueprint Justification</th></tr>
<tr><td>authorised point sources
Air 2A.</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Air 2B.</td><td>If a fuel burning or combustion facility is listed in Protecting air values, Table 1—Authorised point sources, the fuel burning or combustion facility must be operated so that the releases to air do not exceed the limits specified in Protecting air values, Table 1—Authorised point sources at the specified release point reference.
Protecting air values, Table 1—Authorised point sources
<table><tr><th rowspan="2">Resource Authority</th><th rowspan="2">Facility</th><th rowspan="2">Release Point Reference</th><th rowspan="2">Equipment Description</th><th rowspan="2">Minimum Release Height (m)</th><th rowspan="2">Minimum Efflux Velocity (m / sec)</th><th colspan="2">NOx as Nitrogen Dioxide</th><th colspan="2">Carbon Monoxide</th></tr><tr><th>Maximum concentration (mg / Nm³)</th><th>Maximum Mass emission rate (g / sec)</th><th>Maximum concentration (mg / Nm³)</th><th>Maximum Mass emission rate (g / sec)</th></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table></td><td>N/A</td><td>N/A</td><td>Fuel burning is not proposed in PL 1055</td></tr>
<tr><td>Point source air monitoring
Air 3.</td><td>Point source air monitoring for each fuel burning or combustion facility listed in Protecting air values, Table 1—Authorised point sources must:
(a) be undertaken once:
i. in the first three months after each facility is first commissioned, and then
ii. every year thereafter
(b) be carried out when the facility the subject of the sampling is operating under maximum operating conditions for the annual period; and
(c) demonstrate compliance with the limits listed in Protecting air values, Table 1—Authorised point sources at each release point reference.</td><td>N/A</td><td>N/A</td><td>Fuel burning is not proposed in PL 1055</td></tr>
<tr><td>Fuel burning and combustion facilities—ambient air quality monitoring
Air 4.</td><td>The operation of fuel burning or combustion facilities must not result in ground level concentrations of contaminants exceeding the maximum limits specified in Protecting air values, Table 2—Maximum ground level concentration of contaminants to air.
Protecting air values, Table 2—Maximum ground level concentration of contaminants to air
<table><tr><th>Contaminant</th><th>EPP Air Quality Objective / Maximum ground level concentration at 0° Celsius</th><th>Units</th><th>Averaging time</th></tr><tr><td>e.g. Nitrogen Dioxide</td><td>e.g. 250</td><td>µg/m³</td><td>1 hour</td></tr><tr><td>e.g. Nitrogen Dioxide</td><td>e.g. 62</td><td>µg/m³</td><td>1 year</td></tr><tr><td>e.g. Sulphur Dioxide</td><td>e.g. 570</td><td>µg/m³</td><td>1 hour</td></tr><tr><td>e.g. Carbon Monoxide</td><td>e.g. 11</td><td>mg/ m³</td><td>8 hours</td></tr></table></td><td>N/A</td><td>N/A</td><td>Fuel burning is not proposed in PL 1055</td></tr>
<tr><td>Air receiving environment monitoring program
Air 5.</td><td>An air receiving environment monitoring program (AREMP) must be developed to demonstrate compliance with the limits in Protecting Air Values, Table 2—Maximum ground level concentration of contaminants to air.</td><td>N/A</td><td>N/A</td><td>Fuel burning is not proposed in PL 1055</td></tr>
<tr><td>Air 6.</td><td>The AREMP must include, but not necessarily be limited to:
(a) the delineation of the relevant air shed(s)
(b) the identification of background reference sites and impact monitoring sites within the relevant air shed(s), including sensitive places
(c) a monitoring program to be carried out annually that:
i. includes background reference and impact monitoring sites
ii. includes an assessment of meteorological conditions (wind speed and direction)
iii. is sufficient to determine compliance with the limits listed in Protecting Air Values, Table 2—Maximum ground level concentration of contaminants to air
iv. identifies the effects of the authorised contaminants released to air in the relevant air shed(s)
v. is representative of when the fuel burning or combustion facilities are operating under maximum operating conditions for the annual period</td><td>N/A</td><td>N/A</td><td>Fuel burning is not proposed in PL 1055</td></tr>
</table>

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
	(d) an assessment of the condition of each fuel burning or combustion facility; and (e) a description of other significant point sources in the air shed and surrounding land use including sensitive places.			
Air 7.	An AREMP report must be written annually which includes the information required by condition (Air 6) and an assessment of the extent to which monitoring data for ground level concentrations complies with the air contaminant limits listed in Protecting air values, Table 2—Maximum ground level concentration of contaminants to air.	**N/A**	N/A	Fuel burning is not proposed in PL 1055
Air 8.	Where monitoring data indicates that ground level concentrations listed in Protecting air values, Table 2—Maximum ground level concentration of contaminants to air have not been met, the AREMP report required by condition (Air 7) must also include an assessment of: (a) the extent to which the values of the air environment in the relevant air shed(s) are being protected (b) an assessment of whether contaminant releases to the air environment are consistent with the air management hierarchy in the Environmental Protection (Air) Policy 2008, and (c) any corrective actions that have been implemented or proposed to be implemented to become consistent with the air management hierarchy and achieve compliance with Protecting air values, Table 2—Maximum ground level concentration of contaminants to air.	**N/A**	N/A	Fuel burning is not proposed in PL 1055
Air 9.	A statement of compliance prepared by a suitably qualified person must accompany each AREMP report required by condition (Air 7) and if applicable, condition (Air 8) stating: (a) whether the AREMP as most recently implemented complies with the requirements of conditions (General 7 / PESCD1), condition (General 11(d)), (Air 5) and (Air 6) (b) that, to the best of the suitably qualified person's knowledge, the assessment required by condition (Air 7) and if applicable, condition (Air 8) is true, correct and complete, and (c) that, to the best of the suitably qualified person's knowledge, all information provided as part of the statement of compliance, including attachments, is true, correct and complete.	**N/A**	N/A	Fuel burning is not proposed in PL 1055
Air 10.	Where condition (Air 8) applies, the documents required by conditions (Air 7), (Air 8) and (Air 9) must be given to the administering authority within 5 business days after the AREMP report is written.	**N/A**	N/A	Fuel burning is not proposed in PL 1055
Streamlined Conditions—Protecting Land Values		**SCHEDULE E - LAND**		
General **Land 1.**	Contaminants must not be directly or indirectly released to land except for those releases authorised by conditions <<insert relevant waste to land conditions>>.	**E1**	(E1) Contaminants must not be directly or indirectly released to land except for those releases authorised by conditions <<insert relevant waste to land conditions>>.	Similar / Equivalent Condition:
Top soil management **Land 2.**	Top soil must be managed in a manner that preserves its biological and chemical properties.	**E2**	(E2) Top soil must be managed in a manner that preserves its biological and chemical properties.	Same Condition

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
Land management **Land 3.**	Land that has been significantly disturbed by the petroleum activities must be managed to ensure that mass movement, gully erosion, rill erosion, sheet erosion and tunnel erosion do not occur on that land.	**A20**	(A20) For activities involving significant disturbance to land, control measures that are commensurate to the site-specific risk of erosion, and risk of sediment release to waters must be implemented to: (a) allow stormwater to be diverted around or pass through the site in a controlled manner (b) minimise soil erosion resulting from wind, rain, and flowing water (c) minimise the duration that disturbed soils are exposed to the erosive forces of wind, rain, and flowing water (d) minimise work-related soil erosion and sediment runoff; and (e) minimise negative impacts to land or properties adjacent to the activities (including roads). Refer to Blueprint Condition J5	Similar / Equivalent Conditions: Blueprint conditions A20 and J5 aim to minimise the potential for erosion to occur, and ensure significant disturbance land is rehabilitated to be stable on cessation of activities.
Acid sulfate soils **Land 4.**	Acid sulfate soils must be treated and managed in accordance with the latest edition of the Queensland Acid Sulfate Soil Technical Manual.	**N/A**	N/A	Condition is not applicable to SWQ soils
Chemical storage **Land 5.**	Chemicals and fuels stored, must be effectively contained and where relevant, meet Australian Standards, where such a standard is applicable.	**E3**	(E3) Chemicals and fuels stored, must be effectively contained and where relevant, meet Australian Standards, where such a standard is applicable.	Same Condition
Pipeline operation and maintenance **Land 6.**	Pipeline operation and maintenance must be in accordance, to the greatest practicable extent, with the relevant section of the APIA Code of Environmental Practice: Onshore Pipelines (2009).	**N/A**	N/A	Environmental standards for pipelines are set and regulated by the conditions of approval. This could lead to conflicts with this code. The code is a guidance document only.
Pipeline reinstatement and revegetation **Land 7.** **PPSCE 17.**	Pipeline trenches must be backfilled and topsoils reinstated within three months after pipe laying.	**J7**	Refer to Blueprint Condition J7	Similar / Equivalent Conditions: Refer to discussion at blueprint condition J7 below
Land 8.	Reinstatement and revegetation of the pipeline right of way must commence within 6 months after cessation of petroleum activities for the purpose of pipeline construction.	**J7** **J8**	Refer to Blueprint Conditions J7 and J8	Similar / Equivalent Conditions: Refer to discussion at blueprint condition J7 and J8 below
Land 9.	Backfilled, reinstated and revegetated pipeline trenches and right of ways must be: (a) a stable landform (b) re-profiled to a level consistent with surrounding soils (c) re-profiled to original contours and established drainage lines; and	**J8**	Refer to Blueprint Condition J8	Similar / Equivalent Condition Refer to discussion at blueprint condition J8 below.

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
	(d) vegetated with groundcover which is not a declared pest species, and which is established and growing.			
Streamlined Conditions—Protecting Biodiversity Values		**SCHEDULE F – BIODIVERSITY**		
Confirming biodiversity values **Biodiversity 1.**	Prior to undertaking activities that result in significant disturbance to land in areas of native vegetation, confirmation of on-the-ground biodiversity values of the native vegetation communities at that location must be undertaken by a suitably qualified person.	**F2**	(F2) Prior to undertaking activities that result in significant disturbance to land in areas of native vegetation, confirmation of on-the-ground biodiversity values of the native vegetation communities at that location must be undertaken by a suitably qualified person.	Same Condition
Biodiversity 2.	A suitably qualified person must develop and certify a methodology so that condition (Biodiversity 1) can be complied with and which is appropriate to confirm on-the-ground biodiversity values.	**F3**	(F3) A suitably qualified person must develop and certify a methodology so that condition (F2) can be complied with and which is appropriate to confirm on-the-ground biodiversity values by [Insert date 6 months after the grant of the EA].	Same Condition
Biodiversity 3.	For conditions (Biodiversity 4) to (Biodiversity 9), where mapped biodiversity values differ from those confirmed under conditions (Biodiversity 1) and (Biodiversity 2), petroleum activities may proceed in accordance with the conditions of the environmental authority based on the confirmed on-the-ground biodiversity value.	**F4**	(F4) Where mapped biodiversity values differ from those confirmed under conditions (F2) and (F3), petroleum activities may proceed in accordance with the conditions of the environmental authority based on the confirmed on-the-ground biodiversity value.	Same Condition
Planning for land disturbance **Biodiversity 4.**	The location of the petroleum activity(ies) must be selected in accordance with the following site planning principles: (a) maximise the use of areas of pre-existing disturbance (b) in order of preference, avoid, minimise or mitigate any impacts, including cumulative impacts, on areas of native vegetation or other areas of ecological value (c) minimise disturbance to land that may result in land degradation (d) in order of preference, avoid then minimise isolation, fragmentation, edge effects or dissection of tracts of native vegetation; and (e) in order of preference, avoid then minimise clearing of native mature trees.	**F5**	(F5) The location of the petroleum activity(ies) must be selected in accordance with the following site planning principles: (a) maximise the use of areas of pre-existing disturbance; (b) in order of preference, avoid, minimise or mitigate any impacts, including cumulative impacts, on areas of native vegetation or other areas of ecological value; (c) minimise disturbance to land that may result in land degradation; (d) in order of preference, avoid then minimise isolation, fragmentation, edge effects or dissection of tracts of native vegetation; and (e) in order of preference, avoid then minimise clearing of native mature trees.	Same Condition
Planning for land disturbance—linear infrastructure **Biodiversity 5.**	Linear infrastructure construction corridors must: (a) maximise co-location (b) be minimised in width to the greatest practicable extent; and (c) for linear infrastructure that is an essential petroleum activity authorised in an environmentally sensitive area or its protection zone, be no greater than 40m in total width.	**F6**	(F6) Linear infrastructure construction corridors must: (a) maximise co-location (b) be minimised in width to the greatest practicable extent; and (c) for linear infrastructure that is an essential petroleum activity authorised in an environmentally sensitive area or its protection zone, be no greater than 40m in total width.	Same Condition
Authorised disturbance to Environmentally Sensitive Areas	*<< Use conditions (Biodiversity 6) and (Biodiversity 7) where the environmental authority application does not request access to Category A, B or C environmentally sensitive areas or their protection zones, or is silent on impacts to these values. >>*	**N/A**	N/A	N/A – in accordance with the SMC Guideline (DES, 2016) this application requests access to ESAs and ESA protection zones with regard to the requirements of proposed conditions F7, F8 and F9.
Biodiversity 6.	Petroleum activities are not permitted in Category A, B or C environmentally sensitive areas.	**N/A**	N/A	
Biodiversity 7.	Essential petroleum activities may be undertaken in areas of pre-existing disturbance in the primary protection zones of Category B environmentally sensitive areas that are 'endangered' regional ecosystems and Category C environmentally sensitive areas other than 'nature refuges' or 'koala habitat' areas, providing those activities do not have a measurable negative impact on the adjacent environmentally sensitive area. *<< Or, if access to Category A, B or C environmentally sensitive areas or their protection zones is requested in the application and approved, delete conditions (Biodiversity 6) and (Biodiversity 7) and insert (Biodiversity 8) as relevant to the scope of the approval request. >>*	**N/A**	N/A	
Biodiversity 8.	Where petroleum activities are to be carried out in environmentally sensitive areas or their protection zones, the petroleum activities must be carried out in accordance with Protection of Biodiversity Values, Table 1—Authorised petroleum activities in environmentally sensitive areas and their protection zones.	**F7**	(F7) Where petroleum activities are to be carried out in environmentally sensitive areas or their protection zones, the petroleum activities must be carried out in accordance with Schedule F, Table 1 - Authorised petroleum activities in environmentally sensitive areas and their protection zones. Note: Approvals may be required under the *Forestry Act 1959* where the petroleum activity(ies) is proposed to be carried out in ESAs that are State Forests or Timber Reserves.	Similar / Equivalent Conditions: Refer to discussion above. Proposed conditions F7, F8 and F9 are largely consistent with Biodiversity 7 and 8, and were negotiated with DES as

<table>
<tr><th>SMC Reference</th><th>Streamlined Model Condition</th><th>Blueprint Reference</th><th>Blueprint Condition</th><th>Blueprint Justification</th></tr>
<tr><td></td><td>
Protecting biodiversity values, Table 1—Authorised petroleum activities in environmentally sensitive areas and their protection zones
<table>
<tr><th>Environmentally sensitive area</th><th>Within the environmentally sensitive area</th><th>Primary protection zone of the environmentally sensitive area</th><th>Secondary protection zone of the environmentally sensitive area</th></tr>
<tr><td>Category A environmentally sensitive areas</td><td>No petroleum activities permitted.</td><td>Only low impact petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td></tr>
<tr><td>Category B environmentally sensitive areas that are other than ‘endangered’ regional ecosystems</td><td>Only low impact petroleum activities permitted.</td><td>Only low impact petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td></tr>
<tr><td>Category B environmentally sensitive areas that are ‘endangered’ regional ecosystems</td><td>Only low impact petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td></tr>
<tr><td>Category C environmentally sensitive areas that are ‘nature refuges’ or ‘koala habitat’</td><td>Only low impact petroleum activities permitted.</td><td>Only low impact petroleum activities permitted.</td><td></td></tr>
<tr><td>Category C environmentally sensitive areas that are ‘essential habitat’, ‘essential regrowth habitat’, or ‘of concern’ regional ecosystems</td><td>Only low impact petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td><td></td></tr>
<tr><td>Category C environmentally sensitive areas that are ‘regional parks’ (previously known as ‘resources reserves’)</td><td>Only essential petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td><td></td></tr>
<tr><td>Category C environmentally sensitive areas that are ‘state forests’ or ‘timber reserves’</td><td>Only essential petroleum activities permitted.</td><td>Petroleum activities permitted.</td><td></td></tr>
<tr><td>Areas of vegetation that are ‘critically limited’</td><td>Only low impact petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td><td></td></tr>
</table>
</td><td></td><td>
Schedule F, Table 1 – Authorised petroleum activities in environmentally sensitive areas and their protection zones
<table>
<tr><th>Environmentally sensitive areas</th><th>Within the environmentally sensitive area</th><th>Primary protection zone of the environmentally sensitive area</th><th>Secondary protection zone of the environmentally sensitive area</th></tr>
<tr><td>Category A environmentally sensitive area</td><td>No Petroleum activities permitted</td><td>Only low impact petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td></tr>
<tr><td>Category B environmentally sensitive areas that are other than ‘endangered’ regional ecosystems</td><td>Only low impact petroleum activities permitted.</td><td>Only low impact petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td></tr>
<tr><td>Category B environmentally sensitive areas that are ‘endangered’ regional ecosystems</td><td>Only low impact petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td></tr>
<tr><td>Category C environmentally sensitive areas that are ‘nature refuges’ or ‘koala habitat’</td><td>Only low impact petroleum activities permitted.</td><td>Only low impact petroleum activities permitted.</td><td></td></tr>
<tr><td>Category C environmentally sensitive areas that are ‘essential habitat’, ‘essential regrowth habitat’, or ‘of concern’ regional ecosystems</td><td>Only low impact petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td><td></td></tr>
<tr><td>Category C environmentally sensitive areas that are ‘regional parks’ (previously known as resources reserves’)</td><td>Only essential petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td><td></td></tr>
<tr><td>Category C environmentally sensitive areas that are ‘state forests’ or ‘timber reserves’</td><td>Only essential petroleum activities permitted.</td><td>Petroleum activities permitted.</td><td></td></tr>
</table>
</td><td>part of the Blueprint condition process.
Proposed condition F7 - Table 1 is consistent with Biodiversity 8 - Table 1, with the exception of “areas of vegetation that are ‘critically limited’. Areas of vegetation that are ‘critically limited’ are not present in SWQ.</td></tr>
<tr><td>Biodiversity 9.</td><td>A report must be prepared for each annual return period for all petroleum activities that involved clearing of any environmentally sensitive area or protection zone which includes:
(a) records able to demonstrate compliance with conditions (Biodiversity 4), (Biodiversity 5) and (Biodiversity 8)
(b) a description of the works</td><td>N/A</td><td>N/A</td><td>This condition is overly burdensome resulting in high administration.
Disturbance and rehabilitation is reported in annual returns and via plans of operations which is also now spatial</td></tr>
</table>

<table>
<tr><th>SMC Reference</th><th>Streamlined Model Condition</th><th>Blueprint Reference</th><th>Blueprint Condition</th><th>Blueprint Justification</th></tr>
<tr><td></td><td>(c) a description of the area and its pre-disturbance values (which may include maps or photographs, but must include GPS coordinates for the works); and
(d) based on the extent of environmentally sensitive areas and primary protection zones on the relevant resource authority(ies), the proportion of native vegetation cleared per environmentally sensitive area and primary protection zone, including regional ecosystem type, over the annual return period.</td><td></td><td></td><td>information, making this requirement redundant.</td></tr>
<tr><td>Impacts to prescribed environmental matters</td><td><< Note: Conditions (Biodiversity 10 to 20) were not formulated during the streamlining project. These conditions were developed separately by DES in consultation with QRC, APPEA and AMEC to reflect the requirements of the Environmental Offsets Act 2014 following its introduction in July 2014. These conditions have replaced conditions (Biodiversity 8B), and (Biodiversity 10 to 13) from Version 1 of this guideline. >>
<< Include condition (Biodiversity 10) in all environmental authorities. However, if significant residual impacts to a prescribed environmental matter were not proposed or authorised, there is no need to include Protecting biodiversity values, Table 2—Significant residual impacts to prescribed environmental matters or a reference to Table 2 in condition (Biodiversity 10). Or, if significant residual impacts to a prescribed environmental matter were proposed and authorised, include the full condition (Biodiversity 10) and Table 2, populated as per the instructions given in Appendix 1. >></td><td>N/A</td><td>N/A</td><td>No significant residual impact to MSES is proposed as part of this application. Refer to Section 6.2.</td></tr>
<tr><td>Biodiversity 10.</td><td>Significant residual impacts to prescribed environmental matters < other than if the impacts were authorised by an existing authority issued before the commencement of the Environmental Offsets Act 2014 >>, are not authorised under this environmental authority or the Environmental Offsets Act 2014 << unless the impact(s) is specified in Protecting biodiversity values, Table 2—Significant residual impacts to prescribed environmental matters >>.
Protecting biodiversity values, Table 2—Significant residual impacts to prescribed environmental matters
<table>
<tr><th>Prescribed environmental matter</th><th>Location of impact</th><th><u>Maximum extent of impact</u> <<i>OR</i>
<i><u>Maximum extent of impact</u> – stage 1</i>>></th></tr>
<tr><td colspan="3">REGULATED VEGETATION</td></tr>
<tr><td>Endangered regional ecosystem – insert RE ID</td><td>e.g., maps/figures, coordinates, lot(s) on plan(s), resource authorities or project areas.</td><td>X ha</td></tr>
<tr><td>Of concern regional ecosystem (not within an urban area) – insert RE ID</td><td>as per above</td><td>X ha</td></tr>
<tr><td>Regional ecosystems (not within an urban area) that intersect a wetland on the vegetation management wetlands map – insert RE ID</td><td>as per above</td><td>X ha</td></tr>
<tr><td>Regional ecosystems (not within an urban area) within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map – insert RE ID and Broad Vegetation Group</td><td>as per above</td><td>X ha</td></tr>
<tr><td>Essential habitat (not in an urban area) for endangered wildlife – insert species name</td><td>as per above</td><td>X ha</td></tr>
<tr><td>Essential habitat (not in an urban area) for vulnerable wildlife – insert species name</td><td>as per above</td><td>X ha</td></tr>
<tr><td colspan="3">Connectivity areas</td></tr>
<tr><td>Connectivity area that is a regional ecosystem (not in urban area) – insert RE ID</td><td>as per above</td><td>X ha</td></tr>
<tr><td colspan="3">Wetlands and watercourses</td></tr>
<tr><td>A wetland in a wetland protection area shown on the Map of referable wetlands (HES wetlands in GBR) – insert reference</td><td>as per above</td><td>X ha</td></tr>
</table></td><td>F10</td><td>(F10) Significant residual impacts to prescribed environmental matters are not authorised under this environmental authority or the Environmental Offsets Act 2014.</td><td>Same Condition
No significant residual impact to MSES is proposed as part of this application.</td></tr>
</table>

<table>
<tr><th>SMC Reference</th><th>Streamlined Model Condition</th><th>Blueprint Reference</th><th>Blueprint Condition</th><th>Blueprint Justification</th></tr>
<tr><td></td><td>
<table>
<tr><th>Prescribed environmental matter</th><th>Location of impact</th><th><u>Maximum extent of impact</u> <<OR <u>Maximum extent of impact</u> – stage 1>></th></tr>
<tr><td>A wetland of high ecological significance shown on the Map of referable wetlands – insert reference</td><td>as per above</td><td>X ha</td></tr>
<tr><td colspan="3">Designated precincts in strategic environmental areas</td></tr>
<tr><td>Designated precinct in a strategic environmental areas – insert reference</td><td>as per above</td><td>X ha</td></tr>
<tr><td colspan="3">Protected wildlife habitat</td></tr>
<tr><td>An area shown as a high risk area on the flora survey trigger map that contains plants that are endangered or vulnerable wildlife – insert area and species names</td><td>as per above</td><td>X ha</td></tr>
<tr><td>An area not shown as a high risk area on the flora survey trigger map that contains plants that are endangered or vulnerable wildlife – insert area and species names</td><td>as per above</td><td>X ha</td></tr>
<tr><td>A non-juvenile koala habitat tree located in an area shown as a bushland habitat, high value rehabilitation habitat or medium value rehabilitation habitat in the 'Map of Assessable Development Area Koala Habitat Values' – insert reference</td><td>as per above</td><td>X ha</td></tr>
<tr><td>Habitat for an animal that is endangered wildlife – insert area and species name</td><td>as per above</td><td>X ha</td></tr>
<tr><td>Habitat for an animal that is vulnerable wildlife – insert area and species name</td><td>as per above</td><td>X ha</td></tr>
<tr><td>Habitat for an animal that is special least concern wildlife – insert area and species name</td><td>as per above</td><td>X ha</td></tr>
<tr><td colspan="3">Protected areas</td></tr>
<tr><td>National park – insert reference</td><td>as per above</td><td>X ha</td></tr>
<tr><td>Regional park – insert reference</td><td>as per above</td><td>X ha</td></tr>
<tr><td>Nature refuge – insert reference</td><td>as per above</td><td>X ha</td></tr>
<tr><td colspan="3">Highly protected zones of State marine parks</td></tr>
<tr><td>Conservation park zone – insert reference</td><td>as per above</td><td>X ha</td></tr>
<tr><td>Marine national park zone – insert reference</td><td>as per above</td><td>X ha</td></tr>
<tr><td>Preservation zone – insert reference</td><td>as per above</td><td>X ha</td></tr>
<tr><td>Other zones – insert reference</td><td>as per above</td><td>X ha</td></tr>
<tr><td colspan="3">Fish habitat areas</td></tr>
<tr><td>A declared fish habitat area – insert reference</td><td>as per above</td><td>X ha</td></tr>
<tr><td colspan="3">Waterway providing for fish passage</td></tr>
<tr><td>Fish passage (not in an urban area) – insert reference</td><td>as per above</td><td>X ha</td></tr>
<tr><td colspan="3">Marine plants</td></tr>
<tr><td>Marine plant (not in an urban area) – insert reference</td><td>as per above</td><td>X ha</td></tr>
<tr><td colspan="3">Legally secured offset area</td></tr>
<tr><td>Legally secured offset area – insert reference</td><td>as per above</td><td>X ha</td></tr>
</table>
</td><td></td><td></td><td></td></tr>
<tr><td>Biodiversity 11.</td><td><< Include condition (Biodiversity 11) in all environmental authorities. If Table 2 is not needed to be included in the environmental authority, then delete all grey text from the condition. >>
Records demonstrating that each impact to a prescribed environmental matter << not listed in Protecting biodiversity values, Table 2—Significant residual impacts to prescribed environmental matters >> did not, or is not likely to, result in a significant residual impact to that matter must be:
(a) completed by an appropriately qualified person; and
(b) kept for the life of the environmental authority.</td><td>F11</td><td>(F11) Records demonstrating that each impact to a prescribed environmental matter did not, or is not likely to, result in a significant residual impact to that matter must be:
(a) Completed by an appropriately qualified person; and
(b) Kept for the life of the <u>administering authority</u>.</td><td>Same Condition</td></tr>
<tr><td>Biodiversity 12.</td><td><< Include condition (Biodiversity 12) in all environmental authorities that authorise a significant residual impact to a prescribed environmental matter. Include the relevant condition reference, depending on whether staging will be undertaken. >>
An environmental offset made in accordance with the Environmental Offsets Act 2014 and Queensland Environmental Offsets Policy, as amended from time to time, must be undertaken for the maximum extent of impact to each prescribed environmental matter authorised in Protecting biodiversity values, Table 2—Significant residual impacts to prescribed environmental matters, unless a lesser extent of the impact has been approved in accordance with condition (Biodiversity 14) [for staged offsets] OR condition (Biodiversity 18) [for non-staged offsets].</td><td rowspan="2">F10</td><td rowspan="2"><u>Relevant Condition</u>
(F10) Significant residual impacts to prescribed environmental matters are not authorised under this environmental authority or the Environmental Offsets Act 2014.</td><td rowspan="2">No significant residual impact to MSES is proposed as part of this application. Santos proposes Blueprint Condition F10 in this circumstance.</td></tr>
<tr><td>Staged impacts</td><td><< Insert conditions (Biodiversity 13 to 17) if the environmental authority application, or a notice of election provided prior to the environmental authority application being decided, proposed to carry out the activities that will, or are likely to, result in a significant residual impact to a prescribed environmental matter in stages, as well as the undertaking of environmental offsets in stages. >></td></tr>
</table>

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
Biodiversity 13.	The significant residual impacts to a prescribed environmental matter authorised in condition (Biodiversity 10) for which an environmental offset is required by condition (Biodiversity 12) may be carried out in stages. An environmental offset can be delivered for each stage of the impacts to prescribed environmental matters.			
Biodiversity 14.	Prior to the commencement of each stage, a report completed by an appropriately qualified person, that includes an analysis of the following must be provided to the administering authority: (a) for the forthcoming stage—the estimated significant residual impacts to each prescribed environmental matter; and (b) for the previous stage, if applicable—the actual significant residual impacts to each prescribed environmental matter, to date.			
Biodiversity 15.	The report required by condition (Biodiversity 14) must be approved by the administering authority before a notice of election for the forthcoming stage, if applicable, is given to the administering authority.			
Biodiversity 16.	A notice of election for the staged environmental offset referred to in condition (Biodiversity 15), if applicable, must be provided to the administering authority no less than three months before the proposed commencement of that stage, unless a lesser timeframe has been agreed to by the administering authority.			
Biodiversity 17.	Within six months from the completion of the final stage of the project, a report completed by an appropriately qualified person, that includes the following matters must be provided to the administering authority: (a) an analysis of the actual impacts on prescribed environmental matters resulting from the final stage; and (b) if applicable, a notice of election to address any outstanding offset debits for the authorised impacts.			
Non-staged impacts	*<< Insert conditions (Biodiversity 18 to 20) if the environmental authority application, or a notice of election provided prior to the environmental authority application being decided, did not propose to carry out the activities that will, or are likely to, result in significant residual impacts to a prescribed environmental matter, or the undertaking of environmental offsets in stages. Offset debits are not allowed for non-staged impacts and any exceedances of the maximum extent of impact authorised in Table 2 are likely to be investigated further as a compliance matter. >>* *<< If the administering authority is satisfied that conditions (Biodiversity 18) and (Biodiversity 19) are not required, i.e., because sufficient information has been provided in the environmental authority application, then these conditions are not necessary for inclusion in the environmental authority. >>*			
Biodiversity 18.	Prior to the commencement of any impacts to a prescribed environmental matter for which an environmental offset is required by condition (Biodiversity 12), a report completed by an appropriately qualified person that contains an analysis of the estimated maximum extent of impact to each prescribed environmental matter must be provided to the administering authority.			
Biodiversity 19.	The report required by condition (Biodiversity 18) must be approved by the administering authority before the notice of election, if applicable, is given to the administering authority.			
Biodiversity 20.	The notice of election for the environmental offset required by condition (Biodiversity 12), if applicable, must be provided to the administering authority no less than three months before the proposed commencement of the significant residual impacts for which the environmental offset is required.			
N/A	No applicable SMC	**F1**	(F1) Conditions (F2) to (F9) inclusive in Schedule F – Biodiversity do not apply to the petroleum activity(ies) which commenced prior to [insert date of amended EA grant].	This condition is designed to ensure existing infrastructure is compliant with conditions of approval.
N/A	No applicable SMC	**F8**	(F8) If essential petroleum activity(ies) are located within a primary protection zone or secondary protection zone of an environmentally sensitive area, the activity(ies) must not negatively affect the adjacent environmentally sensitive area.	This condition provides an extra level of protection to the ESA if activities are

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
				conducted within prescribed ESA protection zones.
N/A	No applicable SMC	**F9**	(F9) Prior to carrying out essential petroleum activities within environmentally sensitive areas in accordance with Schedule F, Table 1 – Authorised petroleum activities in environmentally sensitive areas and their protection zones, it must be demonstrated, in the following order of preference that: (a) No reasonable or practicable alternative exists for carrying out the essential petroleum activities within the environmentally sensitive area; and (b) The essential petroleum activities are preferentially located in pre-existing areas of clearing or significant disturbance.	Refer to discussion at proposed conditions F7 and F8.
Streamlined Conditions—Protecting Water Values		**Schedule C – Groundwater and Schedule B - Water**		
Authorised impacts to waters **Water 1.**	*<< Insert site-specific conditions authorising impacts to waters, if approved. >>*	**N/A**	N/A	N/A
Authorised impacts to wetlands **Water 2.**	The extraction of groundwater as part of the petroleum activity(ies) from underground aquifers must not directly or indirectly cause environmental harm to a wetland.	**C1**	(C1) The extraction of groundwater as part of the petroleum activity(ies) from underground aquifers must not directly or indirectly cause environmental harm to any watercourse, lake, wetland or spring.	Similar / Equivalent Condition: Blueprint condition C1 is equivalent to Water 2, and also includes reference to watercourses, lakes and springs in addition to wetlands.
Authorised activities in waters **Water 3.**	Petroleum activities must not occur in or within 200m of a: (a) wetland of high ecological significance (b) Great Artesian Basin Spring (c) subterranean cave GDE.	**N/A**	N/A	This condition was excluded from the Blueprint conditions because large areas of SWQ tenures are located in areas mapped to be wetlands of High Ecological Significance (HES). There are no HES wetlands, GAB springs and Subterranean GDEs in PL 1055 and are therefore not relevant. The management of activities in wetland is covered in proposed conditions B6 – B16
Water 4.	Only construction or maintenance of linear infrastructure is permitted in or within any wetland of other environmental value or in a watercourse.	**B3**	(B3) Only linear infrastructure is permitted in a watercourse.[1] [1] *For the purposes of condition B3, a watercourse does not include a floodplain.*	Similar / Equivalent Condition Given the braided nature of watercourses associated with the Cooper Creek floodplain, this footnote is necessary to ensure the greater floodplain area is not considered a 'watercourse' for purposes of this EA. As discussed above, the application contemplates activities other than linear infrastructure in 'wetlands'. These activities are addressed by proposed conditions B6 – B16.
Water 5A.	The construction or maintenance of linear infrastructure in a wetland of other environmental value must not result in the: (a) clearing of riparian vegetation outside of the minimum area practicable to carry out the works; or	**N/A**	N/A	Water 5A has been excluded, but its requirements are addressed in blueprint

<table>
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<tr><td></td><td>(b) ingress of saline water into freshwater aquifers; or
(c) draining or filling of the wetland beyond the minimum area practicable to carry out the works.</td><td></td><td></td><td>conditions B3, B4, B5, B6, B7, B8, B9, B10, B14 and B15.</td></tr>
<tr><td>Water 5B.</td><td>After the construction or maintenance works for linear infrastructure in a wetland of other environmental value are completed, the linear infrastructure must not:
(a) drain or fill the wetland
(b) prohibit the flow of surface water in or out of the wetland
(c) lower or raise the water table and hydrostatic pressure outside the bounds of natural variability that existed before the activities commenced
(d) result in ongoing negative impacts to water quality
(e) result in bank instability; or
(f) result in fauna ceasing to use adjacent areas for habitat, feeding, roosting or nesting.</td><td>B15</td><td>(B15) After the construction or maintenance works for petroleum activities in a general ecologically significant wetland or a wetland of high ecological significance are completed, the petroleum infrastructure must not:
(a) drain or fill the wetland;
(b) prohibit the flow of surface water in or out of the wetland;
(c) lower or raise the water table and hydrostatic pressure outside the bounds of natural variability that existed before the activities commenced;
(d) result in ongoing negative impacts to water quality;
(e) result in bank instability; or
(f) result in fauna ceasing to use adjacent areas for habitat, feeding, roosting or nesting.</td><td>Similar / Equivalent Condition:
Blueprint Condition B14 has been modified to recognise the additional types of infrastructure authorised in wetlands as per Blueprint Conditions B6, B7, B8, B9 and B10.</td></tr>
<tr><td>Water 6.</td><td>The construction or maintenance of linear infrastructure activities in a watercourse must be conducted in the following preferential order:
(a) firstly, in times where there is no water present
(b) secondly, in times of no flow
(c) thirdly, in times of flow, providing a bankfull situation is not expected and that flow is maintained.</td><td>B5</td><td>(B5) The construction or maintenance of linear infrastructure activities in a watercourse must be conducted in the following preferential order:
(a) firstly, in times where there is no water present;
(b) secondly, in times of no flow; and
(c) thirdly in times of flow, but in a way that does not impede low flow.</td><td>Similar / Equivalent Condition
B5 (c) was changed to ensure low flows in SWQ watercourses are not impeded.</td></tr>
<tr><td>Water 7.</td><td>The construction or maintenance of linear infrastructure authorised under condition (Water 4) must comply with the water quality limits as specified in Protecting water values, Table 1—Release limits for construction or maintenance of linear infrastructure.
Protecting water values, Table 1—Release limits for construction or maintenance of linear infrastructure
<table>
<tr><th>Water quality parameters</th><th>Units</th><th>Water quality limits</th></tr>
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For a watercourse, if background water turbidity is above 45 NTU, no greater than 25% above background water turbidity measured within 50m downstream of the construction or maintenance activity.</td></tr>
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B13</td><td>(B12) Construction or maintenance of linear infrastructure that will result in significant disturbance in or on the bed and banks of a watercourse must not release from the site any contaminants to any waters that exceed the water quality limits specified in Schedule B, Table 1 – Release Limits to Waters.
(B13) Construction or maintenance activities within a general ecologically significant wetland or wetland of high ecological significance must not release from the site any contaminants to any waters that exceed the water quality limits specified in Schedule B, Table 1 – Release Limits to Waters.
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Blueprint Conditions B11 and B12 have been modified to address Blueprint Conditions B6, B7, B8, B9 and B10 and the additional types of values authorised to be impacted.</td></tr>
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SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition			Blueprint Justification
					construction or maintenance activity.	
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			Hydrocarbons	-	For a general ecologically significant wetland, wetland of high ecological significance, or watercourse, no visible sheen or slick.	
Water 8.	Monitoring must be undertaken at a frequency that is appropriate to demonstrate compliance with condition (Water 7).	**B14**	(B14) Monitoring must be undertaken at a frequency that is appropriate to demonstrate compliance with conditions (B12) and (B13).			Same Condition
Register of activities in wetlands and watercourses **Water 9.**	A register must be kept of all linear infrastructure construction and maintenance activities in a wetland of other environmental value and watercourses, which must include: (a) location of the activity (e.g. GPS coordinates (GDA94) and watercourse name) (b) estimated flow rate of surface water at the time of the activity (c) duration of works, and (d) results of impact monitoring carried out under condition (Water 8).	**B16**	(B16) From [insert date of amended EA], records must be kept of all significant construction and maintenance activities causing disturbance and conducted in a general ecologically significant wetland, a wetland of high ecological significance or a watercourse during times of flow, which must include: (a) location of the activity (e.g. GPS coordinates (GDA94)); and (b) duration of works.			Similar Condition: Blueprint Condition B15 is similar to Water 9, but has been modified to accommodate Blueprint Conditions contained in Schedule B – Water. The condition has been modified to be more practical in its implementation. Register has been changed to records. Records should be sufficient, without having to maintain another specific register which increases administration. Records referred to in (d) are a duplicate of the requirements in condition B12 and (b) is not information considered necessary / did not influence any outcome or affect compliance with any other condition.

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
Activities in river improvement areas **Water 10.**	Measures must be taken to minimise negative impacts to, or reversal of, any river improvement works carried out in River Improvement Areas by Queensland's River Improvement Trusts.	**N/A**	N/A	There are no River Improvement Areas by Queensland's River Improvement Trusts located within PL 1055.
Activities in floodplains **Water 11.**	Petroleum activity(ies) on floodplains must be carried out in a way that does not: (a) concentrate flood flows in a way that will or may cause or threaten a negative environmental impact; or (b) divert flood flows from natural drainage paths and alter flow distribution; or (c) increase the local duration of floods; or (d) increase the risk of detaining flood flows.	**B17**	(B17) Where the petroleum activity(ies) is carried out on floodplains the petroleum activity(ies) must be carried out in a way that does not: (a) concentrate flood flows in a way that will or may cause environmental harm; or (b) divert or impede flood flows from natural drainage paths and alter flow distribution; or (c) increase the local duration of floods; or (d) increase the risk of detaining flood flows.	Similar / Equivalent Condition:
Seepage monitoring program **Water 12.**	A seepage monitoring program must be developed by a suitably qualified person which is commensurate with the site-specific risks of contaminant seepage from containment facilities, and which requires and plans for detection of any seepage of contaminants to groundwater as a result of storing contaminants by << Insert the specified date no longer than 3 months from date of grant of this environmental authority >>.	**C2**	(C2) A Seepage Monitoring Program must be developed by a suitably qualified person that is commensurate with the site-specific risk of contaminant seepage from containment facilities and able to determine if seepage of contaminants to groundwater is occurring as a result of storing contaminants in containment facilities by [Insert date 12 months after the grant of the EA here].	Similar / Equivalent Condition: Same condition apart from minor changes in language.
Water 13.	The seepage monitoring program required by condition (Water 12) must include but not necessarily be limited to: (a) identification of the containment facilities for which seepage will be monitored (b) identification of trigger parameters that are associated with the potential or actual contaminants held in the containment facilities (c) identification of trigger concentration levels that are suitable for early detection of contaminant releases at the containment facilities (d) installation of background seepage monitoring bores where groundwater quality will not have been affected by the petroleum activities authorised under this environmental authority to use as reference sites for determining impacts (e) installation of seepage monitoring bores that: i. are within formations potentially affected by the containment facilities authorised under this environmental authority (i.e. within the potential area of impact) ii. provide for the early detection of negative impacts prior to reaching groundwater dependent ecosystems, landholder's active groundwater bores, or water supply bores iii. provide for the early detection of negative impacts prior to reaching migration pathways to other formations (i.e. faults, areas of unconformities known to connect two or more formations) (f) monitoring of groundwater at each background and seepage monitoring bore at least quarterly for the trigger parameters identified in condition (Water 13(b)) (g) seepage trigger action response procedures for when trigger parameters and trigger levels identified in conditions (Water 13(b)) and (Water 13(c)) trigger the early detection of seepage, or upon becoming aware of any monitoring results that indicate potential groundwater contamination (h) a rationale detailing the program conceptualisation including assumptions, determinations, monitoring equipment, sampling methods and data analysis; and (i) provides for annual updates to the program for new containment facilities constructed in each annual return period.	**C3**	(C3) The Seepage Monitoring Program required by Condition (C2), must include, but not necessarily be limited to: (a) identification of the containment facilities for which seepage will be monitored; (b) identification of the trigger parameters that are associated with the potential or actual contaminants stored in the containment facility; (c) identification of trigger concentration levels that are suitable for early detection of contaminant releases at the containment facilities; (d) Installation of background seepage monitoring bores where groundwater quality will not have been affected by the petroleum activities authorised under this environmental authority to use as reference sites for determining impacts (e) Installation of seepage monitoring bores that: (i) are within the upper-most aquifer potentially affected by the containment facilities authorised under this environmental authority (i.e. within the potential area of impact) (ii) provide for the early detection of negative impacts prior to reaching sensitive receptors (i.e. groundwater dependent ecosystems, water supply bores) (iii) provide for the early detection of negative impacts prior to reaching migration pathways to other aquifers and formations (i.e. faults, areas of unconformities known to connect two or more formations) (f) monitoring of groundwater at each background and seepage monitoring bore at a sufficient frequency that will allow for early detection of contaminants for the trigger parameters identified in Condition (C3(b)); (g) seepage trigger action response procedures for when trigger parameters and trigger levels identified in conditions (C3(b)) and (C3(c)) trigger the early detection of seepage, or upon becoming aware of any monitoring results that indicate potential groundwater contamination; (h) a rationale detailing the program conceptualisation including assumptions, determinations, monitoring equipment, sampling methods and data analysis; and (i) provides for annual updates to the program for new containment facilities constructed in each annual return period.	Same Condition

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Seepage monitoring bore drill logs **Water 14.**	A bore drill log must be completed for each seepage monitoring bore in condition (Water 13) which must include: (a) bore identification reference and geographical coordinate location (b) specific construction information including but not limited to depth of bore, depth and length of casing, depth and length of screening and bore sealing details (c) standing groundwater level and water quality parameters including physical parameter and results of laboratory analysis for the possible trigger parameters (d) lithological data, preferably a stratigraphic interpretation to identify the important features including the identification of any aquifers; and (e) target formation of the bore.	**C4**	(C4) A drill bore log must be completed for each seepage monitoring bore in condition (C3), which must include: (a) bore identification reference and geographical coordinate location (b) specific construction information including but not limited to depth of bore, depth and length of casing, depth and length of screening and bore sealing details (c) standing groundwater level and water quality parameters including physical parameter and results of laboratory analysis for the possible trigger parameters (d) lithological data, preferably a stratigraphic interpretation to identify the important features including the identification of any aquifers; and (e) target formation of the bore.	Same Condition
N/A	No applicable SMC	**B1**	(B1) Contaminants must not be directly or indirectly released to any waters except as permitted under this environmental authority.	Condition is required to ensure contaminants are not released to waters unless explicitly authorised by the EA
N/A	No applicable SMC	**B2**	(B2) Conditions (B3), (B4), (B6), and (B7) in Schedule B - Water do not apply to petroleum activity(ies) which commenced prior to [insert date of amended EA].	Condition is to ensure that existing infrastructure remains compliant with new conditions of EA.
N/A	No applicable SMC	**B4**	(B4) Prior to the construction of any linear infrastructure that will result in significant disturbance in or on the bed and banks of a watercourse, it must be demonstrated that: (a) no reasonable or practicable alternative exists; and (b) the activity is preferentially located in pre-existing areas of clearing or significant disturbance.	Condition is required to ensure significant disturbance to watercourses is firstly avoided and then impacts mitigated where reasonably practicable.
N/A	No applicable SMC	**B6**	(B6) Only essential petroleum activities (excluding temporary campsites / workforce accommodation) and borrow pits are permitted within a wetland of high ecological significance.	Large areas of SWQ tenures are covered in GES and HES wetlands. As such, avoidance is impossible in many instances. No HES wetlands are present in PL 1055, however GES wetlands are present across approximately 80% of the PL. Conditions are required to ensure only essential petroleum activities are permitted in GES / HES wetlands, excluding temporary campsites/workforce accommodation in HES wetlands. This is to enable activities in these environments, but limit activities to those essential for the extraction of the petroleum product (e.g. wells, pipes, roads, borrow pits etc.)
N/A	No applicable SMC	**B7**	(B7) Only essential petroleum activities and borrow pits are permitted within a wetland of general ecological significance.	
N/A	No applicable SMC	**B8**	(B8) Prior to carrying out essential petroleum activities within a general ecologically significant wetland or wetland of high ecological significance it must be demonstrated, in the following order of preference that:	Condition is required to ensure disturbance to HES/GES wetlands only occurs where no reasonable or practicable alternative

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
			(a) no reasonable or practicable alternative exists for carrying out the essential petroleum activities within the general ecologically significant wetland or wetland of high ecological significance; (b) the essential petroleum activities are preferentially located in pre-existing areas of clearing or significant disturbance.	exists, and preferentially in areas of pre-existing disturbance.
N/A	No applicable SMC	**B9**	(B9) Prior to the establishment of a borrow pit within a wetland of high ecological significance or a general ecologically significant wetland it must be demonstrated, in the following order of preference that: (a) no reasonable or practicable alternative exists for establishing a borrow pit within the wetland of high ecological significance or general ecologically significant wetland; (b) the borrow pit is preferentially located in pre-existing areas of clearing or significant disturbance.	Condition is required to ensure disturbance to HES/GES wetlands only occurs where no reasonable or practicable alternative exists, and preferentially in areas of pre-existing disturbance.
N/A	No applicable SMC	**B10**	(B10) Petroleum activities other than construction and maintenance activities carried out within any general ecologically significant wetland or wetland of high ecological significance must not: (a) change the existing surface water hydrological regime; or (b) impact bank stability.	Condition required to ensure activities in GES/HES wetlands do not affect surface water hydrology or bank stability.
N/A	No applicable SMC	**B11**	(B11) Construction or maintenance of petroleum activities in a general ecologically significant wetland or a wetland of high ecological significance must not: (a) prohibit the flow of surface water in or out of the wetland; (b) impact surface water quality in the wetland unless specifically authorised by this environmental authority; (c) drain or fill the wetland; (d) impact bank stability; or (e) result in the clearing of riparian vegetation outside of the minimum area practicable to carry out the works.	Condition required to ensure construction and maintenance activities in GES/HES wetlands do not impact wetland values and natural processes (unless authorised by the EA).
Streamlined Conditions—Rehabilitation		**SCHEDULE J – Rehabilitation** **Blueprint Condition Requirement - Summary** Rehabilitation of petroleum activities in SWQ are typically staged and decisions on areas to be rehabilitated are dependent on the findings of drilling and initial production testing operations. Rehabilitation activities are typically scheduled to occur as larger programs due to the remote nature of the tenure areas i.e. mobilisation costs are very high. Furthermore, sufficient time is required to allow for natural processes to occur before rehabilitation can occur e.g. sufficient time is required to allow drilling sump contents to dry out prior to mix-bury cover / disposal to land. Existing infrastructure is limited in the region, and new infrastructure is expensive to construct in the remote areas of SWQ. Blueprint condition J3 is required to allow appropriate beneficial use of Santos infrastructure (e.g. access tracks) by landholders. Also required to ensure compliance with J5 and J8. The blueprint conditions are outcome focussed, and the criteria have been developed to be consistent with the SWQ environment i.e. SWQ is a semi-arid environment subject to climatic extremes including long periods of drought and ephemeral flooding. Rehabilitation of disturbances in these land systems must focus on preparing land to be stable and non-polluting, and if this occurs, the land will naturally rehabilitate over time subject to natural processes and associated timeframes. Significantly disturbed land in SWQ environments can often require several years to achieve natural groundcover consistent with surrounding land due to the ephemeral nature of the environment i.e. long periods of drought are normal.		
Rehabilitation planning **Rehabilitation 1.**	A Rehabilitation Plan must be developed by a suitably qualified person and must include the: (a) rehabilitation goals; and (b) procedures to be undertaken for rehabilitation that will: i. achieve the requirements of conditions (Rehabilitation 2) to (Rehabilitation 8), inclusive; and ii. provide for appropriate monitoring and maintenance.	**N/A**	N/A	This is not an outcomes focussed condition. A lot of work has been completed with Department in the past to remove the requirement for management plans. The

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
				prescriptiveness of the rehabilitation conditions defines the rehabilitation outcomes. Rehabilitation plans will be developed for individual sites or programs of work on a case by case basis and nearing the time rehabilitation is required. These site-specific plans will account for location conditions as well as practices, methods and standards relevant to the time of undertaking works. Refer to summary Rehabilitation discussion above
Transitional rehabilitation **Rehabilitation 2.**	Significantly disturbed areas that are no longer required for the on-going petroleum activities, must be rehabilitated within 12 months (unless an exceptional circumstance in the area to be rehabilitated (e.g. a flood event) prevents this timeframe being met) and be maintained to meet the following acceptance criteria: (a) contaminated land resulting from petroleum activities is remediated and rehabilitated (b) the areas are: i. non-polluting ii. a stable landform iii. re-profiled to contours consistent with the surrounding landform (c) surface drainage lines are re-established (d) top soil is reinstated; and (e) either: i. groundcover, that is not a declared pest species, is growing; or ii. an alternative soil stabilisation methodology that achieves effective stabilisation is implemented and maintained.	**J1** **J3** **J4** **J5**	(J1) Rehabilitation of disturbed areas must take place progressively as works are staged. (J3) Significantly disturbed areas, other than those being or intended to be utilised by the landholder or overlapping tenure holder must be rehabilitated in accordance with conditions (J5) to (J8). (J4) Rehabilitation of significantly disturbed areas in accordance with condition (J5) that are no longer required for on-going petroleum activities must commence within 12 months (unless an exceptional circumstance in the area to be rehabilitated (e.g. a flood event) prevents this timeframe being met). (J5) Rehabilitation of significantly disturbed areas must meet the following acceptance criteria: (a) contaminated land resulting from petroleum activities is remediated (b) the areas are: (i) non-polluting (ii) a stable landform (iii) re-profiled to contours consistent with the surrounding landform (c) surface drainage lines are re-established; (d) top soil where present, is reinstated; and (e) plant pest species (restricted matter) are not present, or are consistent with the surrounding areas.	Similar / Equivalent Conditions: Refer to summary Rehabilitation discussion above. Main changes to J5 (d) and (e) are to recognise the SWQ landscape: (d) depending on the landform, topsoil is not always present to firstly strip and then reinstate – therefore the condition has been modified so that this requirements only applies where topsoil is available. (e) has been modified to firstly recognise that maintaining groundcover in SWQ is not always possible (dependent on climatic conditions) and secondly to reflect terminology in the Biosecurity legislation. Similarly it seeks to acknowledge that having no weeds in a rehabilitated area is impossible if the surrounding areas are infested. The proposed condition seeks an outcome that our disturbance has not propagated new species or an infestation of an existing species that is not consistent with the surroundings. Stability is covered by (b)
Final rehabilitation acceptance criteria **Rehabilitation 3.**	All significantly disturbed areas caused by petroleum activities which are not being or intended to be utilised by the landholder or overlapping tenure holder, must be rehabilitated to meet the following final acceptance criteria measured either against the highest ecological value **analogue site(s)** or the pre-disturbed land use: (a) greater than or equal to 70% of native ground cover species richness (b) greater than or equal to the total per cent of ground cover	**N/A**	N/A	Refer to summary Rehabilitation discussion above Santos is proposing to use the criteria prescribed in the condition above as the final

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
	(c) less than or equal to the per cent species richness of declared plant pest species; and (d) where the adjacent land use contains, or the pre-clearing land use contained, one or more regional ecosystem(s), then at least one regional ecosystem(s) from the same broad vegetation group, and with the equivalent biodiversity status or a biodiversity status with a higher conservation value as any of the regional ecosystem(s) in either the adjacent land or pre-disturbed land, must be present.			acceptance criteria for disturbances in SWQ. These criteria focus on the critical factors for long-term success in the landscape – namely stability and correct groundwork for vegetation regrowth (when suitable conditions arise) that can be visually assessed. In the SWQ environment, the outcomes as prescribed in the SMCs are not possible all of the time and at best may be possible some of the time within reasonable timeframes. This is predominantly a function of the dry and unreliable rainfall – rainfall variability is amongst the highest in Australia, while average annual totals are amongst the lowest. The South Australian government has a long history of regulating petroleum activities in the Cooper Basin. Throughout this period and through an evaluation process, they identified the critical pieces for successful and long-term rehabilitation in the Cooper Basin as the following: There has been appropriate preparation of the ground surface to promote revegetation, stabilise against erosion and to minimise the visual impact through earthwork restoration If rehabilitation is less than 5 years old, a reliable short-term indicator for long-term revegetation outcomes is the colonisation of the original species are starting to occur (provided that earthwork restoration is effective); Field observations of rehabilitation greater than 5 years showed that revegetation can occur within this period – that being revegetation consists of annuals, biennials and perennials; but there are some bare patches which are inconsistent with the surroundings.

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				Obviously revegetation is dependent on the vegetation type, soil type and moisture content in the soil which, in turn, is dependent on the timing and amount of rainfall in the region after earthwork restoration.
Final rehabilitation acceptance criteria in environmentally sensitive areas **Rehabilitation 4.**	Where significant disturbance to land has occurred in an environmentally sensitive area, the following final rehabilitation criteria as measured against the pre-disturbance biodiversity values assessment (required by conditions (Biodiversity 1) and (Biodiversity 2)) must be met: (a) greater than or equal to 70% of native ground cover species richness (b) greater than or equal to the total per cent ground cover (c) less than or equal to the per cent species richness of declared plant pest species (d) greater than or equal to 50% of organic litter cover (e) greater than or equal to 50% of total density of coarse woody material; and (f) all predominant species in the ecologically dominant layer, that define the pre-disturbance regional ecosystem(s) are present.	**N/A**	N/A	No special criteria is proposed to be applied to ESA. Refer to summary Rehabilitation discussion and justification above.
Continuing conditions **Rehabilitation 5.**	Conditions (Rehabilitation 2), (Rehabilitation 3) and (Rehabilitation 4) continue to apply after this environmental authority has ended or ceased to have effect.	**N/A**	N/A	Legislative powers under the Environmental Protection Act already account for rehabilitation following the cessation of an EA. Residual risk payments exist for where there is a likelihood that rehabilitation action may be required post EA period. Post-surrender conditions are duplicating the EP Act and provide no benefit to the EA or environmental outcomes.
Rehabilitation 6.	Prior to relinquishing all or part of an authority to prospect area, a rehabilitation report must be prepared which specifically relates to the area to be relinquished and demonstrates condition (Rehabilitation 2), (Rehabilitation 3) and (Rehabilitation 4) has been met.	**N/A**	N/A	Not applicable – application is for a PL
Rehabilitation 7.	The report required under condition (Rehabilitation 6) must be submitted to the administering authority at least 40 business days prior to the relinquishment notice being lodged with the administering authority for the Petroleum and Gas (Production and Safety) Act 2004.	**N/A**	N/A	Not applicable – application is for a PL
Remaining dams **Rehabilitation 8.**	Where there is a dam (including a low consequence dam) that is being or intended to be utilised by the landholder or overlapping tenure holder, the dam must be decommissioned to no longer accept inflow from the petroleum activity(ies) and the contained water must be of a quality suitable for the intended on-going uses(s) by the landholder or overlapping tenure holder.	**J2**	(J2) Remaining dams Where there is a dam (including a low consequence dam) that is being or intended to be utilised by the landholder or overlapping tenure holder, the dam must be decommissioned to no longer accept inflow from the petroleum activity(ies) and the contained water must be of a quality suitable for the intended on-going uses(s) by the landholder or overlapping tenure holder at the time of handover.	Same Condition
N/A	N/A	**J6**	(J6) Decommissioning of pipelines Pipeline decommissioning must meet Australian Standards where such a standard is applicable.	
N/A	N/A	**J7**	(J7) Progressive rehabilitation Pipelines trenches must be backfilled in accordance with Condition (J8) after pipe laying and rehabilitated as soon as practicable but not longer than three (3) months after completion.	Blueprint condition J7 and J8 outline the transitional rehabilitation requirements for pipelines post construction, and during the operational phase. Natural revegetation of disturbed areas in SWQ can
N/A	N/A	**J8**	(J8) For the life of the operational pipeline, backfilled pipeline trenches must:	

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			(a) be a stable landform, exhibiting no subsidence or erosion gullies for the life of the operational pipeline; and (b) be re-profiled to a level consistent with surrounding soils; and (c) be re-profiled to original contours and established drainage lines; and (d) plant pest species (restricted matter) are not present, or are consistent with the surrounding areas.	require extended periods of time due to very high rainfall variability i.e. extended periods of drought are common. Direct seeding is not applicable to SWQ. Revegetation of disturbed areas is largely dependent on the occurrence of sufficient rainfall.
Streamlined Conditions—Well construction, maintenance and stimulation activities		**Schedule K - Well construction, maintenance and stimulation**		
<< Note: Stimulation conditions were not part of the streamlining project, however DES still conditions in relation to stimulation activities. Therefore the most recent version of the stimulation conditions have been inserted for completeness. >>		**N/A**		
Drilling activities **Well activities 1.**	Oil based or synthetic based drilling muds must not be used in the carrying out of the petroleum activity(ies).	**K1**	(K1) Oil based or synthetic based drilling muds must not be used in the carrying out of the petroleum activity(ies).	Same Condition
Well activities 2.	Drilling activities must not result in the connection of the target gas producing formation and another aquifer.	**K2**	(K2) Drilling activities and stimulation activities must not cause the connection of the target formation and another aquifer.	Similar / Equivalent Condition
Well activities 3.	Practices and procedures must be in place to detect, as soon as practicable, any fractures that have or may result in the connection of a target formation and another aquifer as a result of drilling activities.	**K3**	(K3) Practices and procedures must be in place to detect, as soon as practicable, any fractures that have or may result in the connection of a target formation and another aquifer as a result of drilling activities.	Same Condition
Stimulation activities	*<< Where the EA application does not request authorisation of stimulation activities, insert condition (Well activities 4), otherwise insert conditions (Well activities 5) to (Well activities 18). >>*	**Refer to blue print conditions K1 to K15**	N/A	N/A
Well activities 4.	Stimulation activities are not permitted. *<< OR >>*			
Well activities 5.	Polycyclic aromatic hydrocarbons or products that contain polycyclic aromatic hydrocarbons must not be used in stimulation fluids in concentrations above the reporting limit.	**K14**	(K14) Polycyclic aromatic hydrocarbons or products that contain polycyclic aromatic hydrocarbons must not be used in stimulation fluids in concentrations above the reporting limit.	Same Condition
Well activities 6.	Stimulation activities must not negatively affect water quality, other than that within the stimulation impact zone of the target gas producing formation.	**K15**	(K15) Stimulation activities must not negatively affect water quality, other than that within the stimulation impact zone of the target formation.	Same Condition
Well activities 7.	Stimulation activities must not cause the connection of the target gas producing formation and another aquifer.	**K2** **K5**	Refer to Blueprint Condition (K2) above. (K5) Practices and procedures must be in place to detect, as soon as practicable, any fractures that cause the connection of a target formation and another aquifer if an aquifer is present within 200 metres above or below the target formation(s) and is spatially located with a two (2) kilometre radius from the location of the stimulation initiation point.	Similar / Equivalent Condition: Condition was modified to place parameters around the reasonable extent to which this condition would apply. The SMCs were developed for CSG where the target formations (coal seams) and aquifers are shallower and potentially hydraulically connected and/or the same formation. This is not the case with conventional oil and gas in SWQ whereby there are significant vertical extents/depths between the shallow aquifers and the deeper hydrocarbon bearing formations.

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
Well activities 8.	The internal and external mechanical integrity of the well system prior to and during stimulation must be ensured such that there is: (a) no significant leakage in the casing, tubing, or packer; and (b) there is no significant fluid movement into another aquifer through vertical channels adjacent to the well bore hole.	**K4**	(K4) The holder of this environmental authority must ensure internal and external mechanical integrity of the well system prior to and during stimulation such that there is: (a) no significant leakage in the casing, tubing, or packer; and (b) there is no significant fluid movement into another aquifer through vertical channels adjacent to the well bore hole.	Same Condition
Well activities 9.	Practices and procedures must be in place to detect, as soon as practicable, any fractures that cause the connection of a target gas producing formation and another aquifer.	**K2** **K5**	Refer to Blueprint Conditions K2 and K5 above	Refer to Blueprint Conditions K2 and K5 above
Stimulation risk assessment **Well activities 10.**	Prior to undertaking stimulation activities, a risk assessment must be developed to ensure that stimulation activities are managed to prevent environmental harm.	**K6**	(K6) Prior to undertaking stimulation activities, a risk assessment must be developed to ensure that stimulation activities are managed to prevent environmental harm.	Same Condition
Well activities 11.	The stimulation risk assessment must be carried out for every well to be stimulated prior to stimulation being carried out at that well and address issues at a relevant geospatial scale such that changes to features and attributes are adequately described and must include, but not necessarily be limited to: (a) a process description of the stimulation activity to be applied, including equipment and a comparison to best international practice (b) provide details of where, when and how often stimulation is to be undertaken on the tenures covered by this environmental authority (c) a geological model of the field to be stimulated including geological names, descriptions and depths of the target gas producing formation(s) (d) naturally occurring geological faults (e) seismic history of the region (e.g. earth tremors, earthquakes) (f) proximity of overlying and underlying aquifers (g) description of the depths that aquifers with environmental values occur, both above and below the target gas producing formation (h) identification and proximity of landholder' active groundwater bores in the area where stimulation activities are to be carried out (i) the environmental values of groundwater in the area (j) an assessment of the appropriate limits of reporting for all water quality indicators relevant to stimulation monitoring in order to accurately assess the risks to environmental values of groundwater (k) description of overlying and underlying formations in respect of porosity, permeability, hydraulic conductivity, faulting and fracture propensity (l) consideration of barriers or known direct connections between the target gas producing formation and the overlying and underlying aquifers (m) a description of the well mechanical integrity testing program (n) process control and assessment techniques to be applied for determining extent of stimulation activities (e.g. microseismic measurements, modelling etc.) (o) practices and procedures to ensure that the stimulation activities are designed to be contained within the target gas producing formation (p) groundwater transmissivity, flow rate, hydraulic conductivity and direction(s) of flow (q) a description of the chemical compounds used in stimulation activities (including estimated total mass, estimated composition, chemical abstract service numbers and properties), their mixtures and the resultant compounds that are formed after stimulation (r) a mass balance estimating the concentrations and absolute masses of chemical compounds that will be reacted, returned to the surface or left in the target gas producing formation subsequent to stimulation (s) an environmental hazard assessment of the chemicals used including their mixtures and the resultant chemicals that are formed after stimulation including:	**K7**	(K7) The stimulation risk assessment must address issues at a relevant geospatial scale such that changes to features and attributes are adequately described and must include, but not necessarily be limited to: Points (a) to (aa) are the same as SMC Well activities 11.	Similar / Equivalent Condition The condition was modified to allow flexibility for the risk assessment to be carried out for aggregations of wells. Also, removal of references to gas producing and instead just referencing target formation through (a) – (aa)

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
	i. toxicological and ecotoxicological information of chemical compounds used ii. information on the persistence and bioaccumulation potential of the chemical compounds used; and iii. identification of the chemicals of potential concern in stimulation fluids derived from the risk assessment (t) an environmental hazard assessment of use, formation of, and detection of polycyclic aromatic hydrocarbons in stimulation activities (u) identification and an environmental hazard assessment of using radioactive tracer beads in stimulation activities (v) an environmental hazard assessment of leaving chemical compounds in stimulation fluids in the target gas producing formation for extended periods subsequent to stimulation (w) human health exposure pathways to operators and the regional population (x) risk characterisation of environmental impacts based on the environmental hazard assessment (y) potential impacts to landholder bores as a result of stimulation activities (z) an assessment of cumulative underground impacts, spatially and temporally of the stimulation activities to be carried out on the tenures covered by this environmental authority; and (aa) potential environmental or health impacts which may result from stimulation activities including but not limited to water quality, air quality (including suppression of dust and other airborne contaminants), noise and vibration.			
Water quality baseline monitoring **Well activities 12.**	Prior to undertaking any stimulation activity, a baseline bore assessment must be undertaken of the water quality of: (a) all landholder's active groundwater bores (subject to access being permitted by the landholder) that are spatially located within a two (2) kilometre horizontal radius from the location of the stimulation initiation point within the target gas producing formation; and (b) all landholders' active groundwater bores (subject to access being permitted by the landholder) in any aquifer that is within 200m above or below the target gas producing formation and is spatially located with a two (2) kilometre radius from the location of the stimulation initiation point; and (c) any other bore that could potentially be adversely impacted by the stimulation activities in accordance with the findings of the risk assessment required by conditions (Well activities 10) and (RMW026).	**K8**	**(K8) Water Quality Baseline Monitoring** Prior to undertaking any <u>stimulation</u> activity, a baseline bore assessment must be undertaken of the water quality of: (a) <u>landholders' active groundwater bores</u> (subject to access being permitted by the landholder) that are within a two (2) kilometre radius from the location of the <u>stimulation</u> initiation point within the target formation; and (b) any other bore that could potentially be adversely impacted by the <u>stimulation</u> activity(ies) in accordance with the findings of the risk assessment required by conditions (K6) and (K7).	Similar / Equivalent Condition This condition as modified to put parameters around a reasonable extent to which this condition would apply. Reflects the geology of the SWQ environment, whilst still adequately managing risks to landholders.
RMW028.	Prior to undertaking stimulation activities at a well, there must be sufficient water quality data to accurately represent the water quality in the well to be stimulated. The data must include as a minimum the results of analyses for the parameters in condition (RMW029).	**K9**	**(K9**) Baseline bore assessments required in condition (K8) must include the minimum water quality analytes and physico-chemical parameters identified in the Baseline Assessment Guideline and any <u>restricted stimulation fluids</u> as defined in the *Environmental Protection Act 1994*, as amended from time to time, in order to establish baseline water quality.	Similar / Equivalent Condition As per discussion at K8 above, and condition K9 references the water quality analytes and physico-chemical parameters identified in the Baseline Assessment Guideline and any restricted stimulation fluids as defined in the *Environmental Protection Act 1994*, which are consistent with the requirements of RMW029.
RMW029.	Baseline bore and well assessments must include relevant analytes and physico-chemical parameters to be monitored in order to establish baseline water quality and must include, but not necessarily be limited to: (a) pH (b) electrical conductivity [µS/m] (c) turbidity [NTU] (d) total dissolved solids [mg/L] (e) temperature [ºC] (f) dissolved oxygen [mg/L] (g) dissolved gases (methane, chlorine, carbon dioxide, hydrogen sulfide) [mg/L] (h) alkalinity (bicarbonate, carbonate, hydroxide and total as CaCO3) [mg/L] (i) sodium adsorption ratio (SAR) (j) anions (bicarbonate, carbonate, hydroxide, chloride, sulphate) [mg/L] (k) cations (aluminium, calcium, magnesium, potassium, sodium) [mg/L] (l) dissolved and total metals and metalloids (including but not necessarily being limited to: aluminium, arsenic, barium, borate (boron), cadmium, total chromium, copper, iron, fluoride, lead, manganese, mercury, nickel, selenium, silver, strontium, tin and zinc) [µg/L] (m) total petroleum hydrocarbons [µg/L]			

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
	(n) BTEX (as benzene, toluene, ethylbenzene, ortho-xylene, para- and meta-xylene, and total xylene) [µg/L] (o) polycyclic aromatic hydrocarbons (including but not necessarily being limited to: naphthalene, phenanthrene, benzo[a]pyrene) [µg/L] (p) sodium hypochlorite [mg/L] (q) sodium hydroxide [mg/L] (r) formaldehyde [mg/L] (s) ethanol [mg/L]; and (t) gross alpha + gross beta or radionuclides by gamma spectroscopy [Bq/L].			
Stimulation impact monitoring program **RMW030.**	A stimulation impact monitoring program must be developed prior to the carrying out of stimulation activities which must be able to detect adverse impacts to water quality from stimulation activities and must consider the findings of the risk assessment required by conditions (RMW025) and (RMW026) that relate to stimulation activities and must include, as a minimum, monitoring of: (a) the stimulation fluids to be used in stimulation activities at sufficient frequency and which sufficiently represents the quantity and quality of the fluids used (b) flow back waters from stimulation activities at sufficient frequency and which sufficiently represents the quality of that flow back water (c) flow back waters from stimulation activities at sufficient frequency and accuracy to demonstrate that 150% of the volume used in stimulation activities has been extracted from the stimulated well; and (d) all bores in accordance with condition (RMW027).	**K10**	**(K10) Stimulation Impact Monitoring Program** A Stimulation Impact Monitoring Program must be developed prior to the carrying out stimulation activities which must be able to detect adverse impacts to water quality from stimulation activities and must consider the findings of the risk assessment required by conditions (K6) and (K7) that relate to stimulation activities and must include, as a minimum, monitoring of: (a) the stimulation fluids to be used in stimulation activities at sufficient frequency and which sufficiently represents the quantity and quality of the fluids used; and (b) flow back waters from stimulation activities at sufficient frequency and which sufficiently represents the quality of that flow back water; and (c) all bores in accordance with condition (K8).	Similar / Equivalent Condition Condition was negotiated to be adequate to manage monitoring for stimulation related risks.
RMW031.	The stimulation impact monitoring program must provide for monitoring of: (a) analytes and physico-chemical parameters relevant to baseline bore and well assessments to enable data referencing and comparison including, but not necessarily being limited to the analytes and physico-chemical parameters in condition (RMW029); and (b) any other analyte or physico-chemical parameters that will enable detection of adverse water quality impacts and the inter-connection with a non-target aquifer as a result of stimulation activities including chemical compounds that are actually or potentially formed by chemical reactions with each other or coal seam materials during stimulation activities.	**K11**	(K11) The Stimulation Impact Monitoring Program must provide for monitoring of: (a) analytes and physico-chemical parameters relevant to stimulation baseline bore assessments required by conditions (K8) and (K9); and (b) any other analyte or physico-chemical parameters that will enable detection of adverse water quality impacts and the inter-connection with a non-target aquifer as a result of stimulation activities if an aquifer is present within 200 metres above or below the target formation(s) and is spatially located with a two (2) kilometre radius from the location of the stimulation initiation point.	Similar / Equivalent Condition This condition was modified to put parameters around a reasonable extent to which this condition would apply.
RMW032.	The stimulation impact monitoring program must provide for monitoring of the bores in condition (RMW030(d)) at the following minimum frequency: (a) monthly for the first six (6) months subsequent to stimulation activities being undertaken; then (b) annually for the first five (5) years subsequent to stimulation being undertaken or until analytes and physico-chemical parameters listed in conditions (RMW029(a)) to (RMW029(t)) inclusive, are not detected in concentrations above baseline bore monitoring data on two (2) consecutive monitoring occasions.	**K12**	(K12) The Stimulation Impact Monitoring Program must provide for monitoring of the bores in condition (K10)(c) at the following minimum frequency: (a) monthly for the first six (6) months subsequent to stimulation activities being undertaken; then (b) annually for the first five (5) years subsequent to stimulation activities being undertaken or until analytes and physico-chemical parameters listed in condition (K7) are not detected in concentrations above baseline bore monitoring data on two (2) consecutive monitoring occasions.	Same Condition
RMW033.	The results of the stimulation impact monitoring program must be made available to any potentially affected landholder upon request by that landholder.	**K13**	(K13) The results of the Stimulation Impact Monitoring Program must be made available to any potentially affected landholder upon request by that landholder.	Same Condition
N/A	Refer to SMC Well activities 5	**K14**	Polycyclic aromatic hydrocarbons or products that contain polycyclic aromatic hydrocarbons must not be used in stimulation fluids in concentrations above the reporting limit.	Same Condition
Conditions—Dams		**Schedule D - Dams**		

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
N/A	<< Note: Dams conditions were not part of the streamlining project, however DES still applies conditions in relation to dams. The most recent version of dam conditions can be found in the guideline 'Structures which are dams or levees constructed as part of environmentally relevant activities (ESR/2016/19346)'. >>	**N/A**	**N/A**	
X1	The consequence category of any structure must be assessed by a suitably qualified and experienced person in accordance with the Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/19335) at the following times: a) prior to the design and construction of the structure, if it is not an existing structure; or b) prior to any change in its purpose or the nature of its stored contents.	**D1**	(D1) The consequence category of any structure, other than flare pits and sumps, must be assessed by a suitably qualified and experienced person in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (ESR/2016/1933) at the following times: (a) following the design and prior to construction of the structure, if it is not an existing structure; or (b) if it is an existing structure,[insert date 12 months from date of EA grant]; or (c) prior to any change in its purpose or the nature of its stored contents.	Similar / Equivalent Condition Condition was modified to remove the requirement of consequence category assessments for flare pits and sumps. This is consistent with the standard conditions for petroleum exploration activities.
X2	A consequence assessment report and certification must be prepared for each structure assessed and the report may include a consequence assessment for more than one structure.	**D2**	(D2) A consequence assessment report and certification must be prepared for each structure assessed and the report may include a consequence assessment for more than one structure.	Same Condition
X3	Certification must be provided by the suitably qualified and experienced person who undertook the assessment, in the form set out in the Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/19335).	**D3**	(D3) Certification must be provided by the suitably qualified and experienced person who undertook the assessment, in the form set out in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (ESR/2016/1933).	Same Condition
X4	Conditions X5 to X9 inclusive do not apply to existing structures.	**N/A**	N/A	Regulated structures are not proposed for PL 1055. Blueprint condition (D4) is proposed for PL 1055:
X5	All regulated structures must be designed by, and constructed7 under the supervision of, a suitably qualified and experienced person in accordance with the requirements of the Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/19338).	**N/A**	(D4) Regulated Structures are not authorised by this environmental authority.	Regulated structures are not proposed for PL 1055.
X6	Construction of a regulated structure is prohibited unless: a) the holder has submitted a consequence category assessment report and certification to the administering authority; and b) certification for the design, design plan and the associated operating procedures has been certified by a suitably qualified and experienced person in compliance with the relevant condition of this authority.	**N/A**		
X7	Certification must be provided by the suitably qualified and experienced person who oversees the preparation of the design plan in the form set out in the Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/19338), and must be recorded in the Register of Regulated Structures.	**N/A**		
X8	Regulated structures must: a) be designed and constructed in compliance with the Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/19338); b) be designed and constructed with due consideration given to ensuring that the design integrity would not be compromised on account of: i) floodwaters from entering the regulated dam from any watercourse or drainage line; and ii) wall failure due to erosion by floodwaters arising from any watercourse or drainage line. c) [Insert only in environmental authorities for regulated dams that are dams associated with a failure to contain - seepage] have the floor and sides of the dam designed and constructed to prevent or minimise the passage of the wetting front and any entrained contaminants through either the floor or sides of the dam during the operational life of the dam and for any period of decommissioning and rehabilitation of the dam.	**N/A**		
X9	Certification by the suitably qualified and experienced person who supervises the construction must be submitted to the administering authority on the completion of construction of the regulated structure, and state that: a) the 'as constructed' drawings and specifications meet the original intent of the design plan for that regulated structure b) construction of the regulated structure is in accordance with the design plan.	**N/A**		
X10	All affected persons must be provided with a copy of the emergency action plan in place for each regulated structure a) for existing structures that are regulated structures, within 10 business days of this condition taking effect; b) prior to the operation of the new regulated	**N/A**		

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
	structure; and c) if the emergency action plan is amended, within 5 business days of it being amended.			
X11	Operation of a regulated structure, except for an existing structure, is prohibited unless the holder has submitted to the administering authority in respect of regulated structure, all of the following: a) one paper copy and one electronic copy of the design plan and certification of the 'design plan' in accordance with condition X6; b) a set of 'as constructed' drawings and specifications; c) certification of the 'as constructed drawings and specifications' in accordance with condition X9; d) where the regulated structure is to be managed as part of an integrated containment system for the purpose of sharing the DSA volume across the system, a copy of the certified system design plan; e) the requirements of this authority relating to the construction of the regulated structure have been met; f) the holder has entered the details required under this authority, into a Register of Regulated Structures; and g) there is a current operational plan for the regulated structure.	**N/A**		
X12	For existing structures that are regulated structures: a) where the existing structure that is a regulated structure is to be managed as part of an integrated containment system for the purpose of sharing the DSA volume across the system, the holder must submit to the administering authority within 12 months of the commencement of this condition a copy of the certified system design plan including that structure; and b) there must be a current operational plan for the existing structures.	**N/A**		
X13	Each regulated structure must be maintained and operated, for the duration of its operational life until decommissioned and rehabilitated, in compliance with the current operational plan and, if applicable, the current design plan and associated certified 'as constructed' drawings.	**N/A**		
X14	Conditions X15 to X18 inclusive only apply to Regulated Structures which have not been certified as low consequence category for 'failure to contain – overtopping'.	**N/A**		
X15	The Mandatory Reporting Level (the MRL) must be marked on a regulated dam in such a way that during routine inspections of that dam, it is clearly observable.	**N/A**		
X16	The holder must, as soon as practicable but within forty-eight (48) hours of becoming aware, notify the administering authority when the level of the contents of a regulated dam reaches the MRL.	**N/A**		
X17	The holder must, immediately on becoming aware that the MRL has been reached, act to prevent the occurrence of any unauthorised discharge from the regulated dam.	**N/A**		
X18	The holder must record any changes to the MRL in the Register of Regulated Structures.	**N/A**		
X19	The holder must assess the performance of each regulated dam or linked containment system over the preceding November to May period based on actual observations of the available storage in each regulated dam or linked containment system taken prior to 1 July of each year.	**N/A**		
X20	By 1 November of each year, storage capacity must be available in each regulated dam (or network of linked containment systems with a shared DSA volume), to meet the Design Storage Allowance (DSA) volume for the dam (or network of linked containment systems).	**N/A**		
X21	The holder must, as soon as practicable but within forty-eight (48) hours of becoming aware that the regulated dam (or network of linked containment systems) will not have the available storage to meet the DSA volume on 1 November of any year, notify the administering authority.	**N/A**		
X22	The holder must, immediately on becoming aware that a regulated dam (or network of linked containment systems) will not have the available storage to meet the DSA volume on 1 November of any year, act to prevent the occurrence of any unauthorised discharge from the regulated dam or linked containment systems.	**N/A**		
X23	Each regulated structure must be inspected each calendar year by a suitably qualified and experienced person.	**N/A**		
X24	At each annual inspection, the condition and adequacy of all components of the regulated structure must be assessed and a suitably qualified and experienced person must prepare an annual inspection report containing details of the assessment and include a recommendations section, with any recommended actions to ensure the integrity of the regulated structure or a positive statement that no recommendations are required.	**N/A**		

SMC Reference	Streamlined Model Condition	Blueprint Reference	Blueprint Condition	Blueprint Justification
X25	The suitably qualified and experienced person who prepared the annual inspection report must certify the report in accordance with the Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/193310).	**N/A**		
X26	The holder must within 20 business days of receipt of the annual inspection report, provide to the administering authority: a) The recommendations section of the annual inspection report; and b) If applicable, any actions being taken in response to those recommendations; and c) If, following receipt of the recommendations and (if applicable) recommended actions, the administering authority requests a copy of the annual inspection report from the holder, provide this to the administering authority within 10 business days11 of receipt of the request.	**N/A**		
X27	The holder must provide a copy of any reports, documentation and certifications prepared under this authority, including but not limited to any Register of Regulated Structures, consequence assessment, design plan and other supporting documentation, to a new holder on transfer of this authority.	**N/A**		
X28	Regulated structures must not be abandoned but be either: a) decommissioned and rehabilitated to achieve compliance with condition (X29); or b) be left in-situ for a use by the landholder provided that: i) it no longer contains contaminants that will migrate into the environment; and ii) it contains water of a quality that is demonstrated to be suitable for its intended use(s); and c) the holder of the environmental authority and the landholder agree in writing that the; i) dam will be used by the landholder following the cessation of the environmentally relevant activity(ies); and ii) landholder is responsible for the dam, on and from an agreed date.	**N/A**		
X29	Before surrendering this environmental authority the site must be rehabilitated to achieve a safe, stable, non-polluting landform and <INSERT the relevant final land use>.	**N/A**		
X30	A Register of Regulated Structures must be established and maintained by the holder for each regulated structure:	**N/A**		
X31	The holder must provisionally enter the required information in the Register of Regulated Structures when a design plan for a regulated dam is submitted to the administering authority.	**N/A**		
X32	The holder must make a final entry of the required information in the Register of Regulated Structures once compliance with condition (X11) and (X12) has been achieved.	**N/A**		
X33	The holder must ensure that the information contained in the Register of Regulated Structures is current and complete on any given day.	**N/A**		
X34	All entries in the Register of Regulated Structures must be approved by the chief executive officer for the holder of this authority, or their delegate, as being accurate and correct.	**N/A**		
X35	The holder must, at the same time as providing the annual return, supply to the administering authority a copy of the records contained in the Register of Regulated Structures, in the electronic format required by the administering authority	**N/A**		
X36	All existing structures that have not been assessed in accordance with either the Manual or the former Manual for Assessing Hazard Categories and Hydraulic Performance of Dams must be assessed and certified in accordance with the Manual within 6 months of amendment of the authority adopting this schedule.	**N/A**		
X37	All existing structures must subsequently comply with the timetable for any further assessments in accordance with the Manual specified in Table 1 (Transitional hydraulic performance requirements for existing structures), depending on the consequence category for each existing structure assessed in the most recent previous certification for that structure.	**N/A**		
X38	Table 1 ceases to apply for a structure once any of the following events has occurred: a) it has been brought into compliance with the hydraulic performance criteria applicable to the structure under the Manual; or b) it has been decommissioned; or c) it has been certified as no longer being assessed as a regulated structure.	**N/A**		
X39	Certification of the transitional assessment required by X36 and X37 (as applicable) must be provided to the administering authority within 6 months of amendment of the authority adopting this schedule.	**N/A**		

SMC Definitions		Blueprint Definitions		Justification
acceptable standards for release to land	means wastewater of the following quality as determined by monitoring results or by characterisation: (a) electrical conductivity (EC) not exceeding 3000µS/cm (b) sodium adsorption ratio (SAR) not exceeding 8 (c) pH between 6.0 and 9.0 (d) heavy metals (measured as total) meets the respective short term trigger value in section 4.2.6, Table 4.2.10—Heavy metals and metalloids in Australian and New Zealand Guidelines for Fresh and Marine Water Quality (e) does not contain biocides.	**Not Defined**	N/A	Term not used by Blueprint Conditions
acid sulfate soil(s	means a soil or soil horizon which contains sulfides or an acid soil horizon affected by oxidation of sulfides.	**Not Defined**	N/A	Not applicable to SWQ tenures, term not used by Blueprint Conditions
adjacent land use(s)	means the ecosystem function adjacent to an area of significant disturbance, or where there is no ecosystem function, the use of the land. An adjacent land use does not include an adjacent area that shows evidence of edge effect.	**Not Defined**	N/A	Term not used by Blueprint Conditions
administering authority	Same Definition	**administering authority**	means: (a) for a matter, the administration and enforcement of which has been devolved to a local government under section 514 of the *Environmental Protection Act 1994*—the local government; or (b) for all other matters—the Chief Executive of the Department of Environment and Science; or (c) another State Government Department, Authority, Storage Operator, Board or Trust, whose role is to administer provisions under other enacted legislation.	No change
alternative arrangement	Same Definition	**alternative arrangement**	means a written agreement about the way in which a particular environmental nuisance impact will be dealt with at a sensitive place, and may include an agreed period of time for which the arrangement is in place. An alternative arrangement may include, but is not limited to, a range of nuisance abatement measures to be installed at the sensitive place, or provision of alternative accommodation for the duration of the relevant nuisance impact.	No change
analogue site(s)	means an area of land which contains values and characteristics representative of an area to be rehabilitated prior to disturbance. Such values must encompass land use, topographic, soil, vegetation, vegetation community attributes and other ecological characteristics. Analogue sites can be the pre-disturbed site of interest where significant surveying effort has been undertaken to establish benchmark parameters	**Not Defined**	N/A	Term not used by Blueprint Conditions
annual return period	Same Definition	**annual return period**	means the most current 12-month period between two anniversary dates.	No change
appraisal well	means a petroleum well to test the potential of one (1) or more natural underground reservoirs for producing or storing petroleum. For clarity, an appraisal well does not include an exploration well.	**Not Defined**	N/A	Term not used by Blueprint Conditions
appropriately qualified person / suitably qualified person	means a person who has professional qualifications, training or skills or experience relevant to the nominated subject matters and can give authoritative assessment, advice and analysis about performance relevant to the subject matters using relevant protocols, standards, methods or literature. << Note: The preferred term to use for the environmental offset conditions is 'appropriately qualified person' as 'suitably qualified person' as defined under the EP Act does not relate to these conditions. However, for consistency within an existing EA, the term 'suitably qualified person' can be used at the discretion of the relevant assessment team. >>	**appropriately qualified person / suitably qualified person**	means a person who has professional qualifications, training or skills or experience relevant to the nominated subject matters and can give authoritative assessment, advice and analysis about performance relevant to the subject matters using relevant protocols, standards, methods or literature.	Same definition apart from note
approved quality criteria	Same Definition	**approved quality criteria**	for the purposes of residual drilling materials, means the residual drilling material meet the following quality standards: Part A In all cases:	No change

SMC Definitions	Blueprint Definitions	Justification

Parameter	Maximum concentration
pH	6-10.5 (range)
Electrical Conductivity	20d/Sm (20,000µS/cm)
Chloride*	8000mg/L

*Chloride analysis is only required if an additive containing chloride was used in the drilling process

The limits in Part A must be measured in the clarified filtrate of oversaturated solids prior to mixing.

Part B If any of the following metals are a component of the drilling fluids, then for that metal:

Parameter	Maximum concentration
Arsenic	20mg/kg
Selenium	5mg/kg
Boron	100mg/kg
Cadmium	3mg/kg
Chromium (total)	400mg/kg
Copper	100mg/kg
Lead	600mg/kg

The limits in Part B and Part C refer to the post soil/by-product mix.

Part C If a hydrocarbon sheen is visible, the following hydrocarbon fractions:

TPH	Maximum concentration
C6-C10	170mg/kg
C10-C16	150mg/kg
C16-C34	1300mg/kg
C34-C40	5600mg/kg
Total Polycyclic Aromatic Hydrocarbons (PAH's)	20mg/kg
Phenols (halogenated)	1mg/kg

SMC Definitions		Blueprint Definitions		Justification
			<table><tr><td>Phenols (non-halogenated)</td><td>60mg/kg</td></tr><tr><td>Monocyclic aromatic hydrocarbons *(Total sum of benzene, toluene, ethyl, benzene, xylenes (including ortho, para and meta xylenes) and styrene)*</td><td>7mg/kg</td></tr><tr><td>Benzene</td><td>1mg/kg</td></tr></table>	
areas of pre-existing disturbance	Same Definition	**areas of pre-existing disturbance**	means areas where environmental values have been negatively impacted as a result of anthropogenic activity and these impacts are still evident. Areas of pre-disturbance may include areas where legal clearing, logging, timber harvesting, or grazing activities have previously occurred, where high densities of weed or pest species are present which have inhibited re-colonisation of native regrowth, or where there is existing infrastructure (regardless of whether the infrastructure is associated with the authorised petroleum activities). The term 'areas of pre-disturbance' does not include areas that have been impacted by wildfire/s, controlled burning, flood or natural vegetation die-back.	No change
Not Defined	Not Defined	**assessed or assessment**	by a suitably qualified and experienced person in relation to a consequence assessment of a dam, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit of the assessment: (a) exactly what has been assessed and the precise nature of that determination; (b) the relevant legislative, regulatory and technical criteria on which the assessment has been based; (c) the relevant data and facts on which the assessment has been based, the source of that material, and the efforts made to obtain all relevant data and facts; and (d) the reasoning on which the assessment has been based using the relevant data and facts, and the relevant criteria.	Term used by Blueprint Conditions
associated water	Same Definition	**associated water**	means underground water taken or interfered with, if the taking or interference happens during the course of, or results from, the carrying out of another authorised activity under a petroleum authority, such as a petroleum well, and includes waters also known as produced formation water. The term includes all contaminants suspended or dissolved within the water.	No change
associated works	Same Definition	**associated works**	in relation to a dam, means: (a) operations of any kind and all things constructed, erected or installed for that dam; and (b) any land used for those operations	No change
Australian Standard 3580	Same Definition	**Australian Standard 3580**	means any of the following publications: • AS3580.10.1 Methods for sampling and analysis of ambient air—Determination of particulate matter—Deposited matter—Gravimetric method. • AS3580.9.6 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—PM10 high volume sampler with size-selective inlet—Gravimetric method • AS3580.9.9 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter— PM10 low volume sampler—Gravimetric sampler.	No change
Not Defined	Not Defined	**Australian Standard 4323**	means Australian Standard 4323.1:1995 Stationary source emissions method 1: Selection of sampling positions.	Term used by Blueprint Conditions
background noise level	means the sound pressure level, measured in the absence of the noise under investigation, as the L A90,T being the A-weighted sound pressure level exceeded for 90% of the measurement time period T of not less than 15 minutes (or LA 90, adj, 15 mins), using Fast response.	**Not Defined**	N/A	Term not used by Blueprint Conditions

SMC Definitions		Blueprint Definitions		Justification
bankfull	means the channel flow rate that exists when the water is at the elevation of the channel bank above which water begins to spill out onto the floodplain. The term describes the condition of the channel relative to its banks (e.g. overbank, in-bank, bankfull, low banks, high bank).	**Not Defined**	N/A	Term not used by Blueprint Conditions
bed	Same Definition	**bed**	of any waters, has the meaning in Schedule 12 of the Environmental Protection Regulation 2019 and— (a) includes an area covered, permanently or intermittently, by tidal or non-tidal waters; but (b) does not include land adjoining or adjacent to the bed that is from time to time covered by floodwater.	No change
being or intended to be utilised by the landholder or overlapping tenure holder	Same Definition	**being or intended to be utilised by the landholder or overlapping tenure holder**	for significantly disturbed land, means there is a written agreement (e.g. land and compensation agreement) between the landholder or the overlapping tenure holder and the holder of the environmental authority identifying that the landholder or the overlapping tenure holder has a preferred use of the land such that rehabilitation standards for revegetation by the holder of the environmental authority are not required. For dams, means there is a written agreement (e.g. land and compensation agreement) between the landholder or the overlapping tenure holder and the holder of the environmental authority identifying that the landholder or the overlapping tenure holder has a preferred use for the dam such that rehabilitation standards for revegetation by the holder of the environmental authority are not required.	No change
biodiversity values	Same Definition	**biodiversity values**	for the purposes of this environmental authority, means environmentally sensitive areas, prescribed environmental matters and wetlands.	No change
BTEX	means benzene, toluene, ethylbenzene, ortho-xylene, para-xylene, meta-xylene and total xylene.	**Not Defined**	N/A	Term not used by Blueprint Conditions
Not Defined	Not Defined	**bore**	means a water observation bore or a water supply bore that is either subartesian or artesian.	Term used by Blueprint Conditions
Not Defined	Not Defined	**brine**	means saline water with a total dissolved solid concentration greater than 40 000 mg/l.	Term used by Blueprint Conditions
Category A Environmentally Sensitive Area	Same Definition	**Category A Environmentally Sensitive Area**	means any area listed in Schedule 12, Section 1 of the *Environmental Protection Regulation 2019.*	No change
Category B Environmentally Sensitive Area	Same Definition	**Category B Environmentally Sensitive Area**	means any area listed in Schedule 12, Section 2 of the *Environmental Protection Regulation 2019.*	No change
Category C Environmentally Sensitive Area	Same Definition	**Category C Environmentally Sensitive Area**	means any of the following areas: • nature refuges as defined in the conservation agreement for that refuge under the Nature Conservation Act 1992 koala habitat areas as defined under the Nature Conservation (Koala) Conservation Plan 2006 • state forests or timber reserves as defined under the Forestry Act 1959 • regional parks (previously known as resource reserves) under the Nature Conservation Act 1992 • an area validated as 'essential habitat' from ground-truthing surveys in accordance with the Vegetation Management Act 1999 for a species of wildlife listed as endangered or vulnerable under the Nature Conservation Act 1992 • 'of concern regional ecosystems' that are remnant vegetation and identified in the database called 'RE description database' containing regional ecosystem numbers and descriptions.	No change
Not Defined	Not Defined	**certification (in relation to structures which are dams or levees - Schedule D)**	means assessment and approval must be undertaken by a suitably qualified and experienced person in relation to any assessment or documentation required by this Manual, including design plans, 'as constructed' drawings and specifications, construction, operation or an annual report regarding regulated structures, undertaken in accordance with the Board of Professional Engineers of Queensland Policy Certification by RPEQs (ID: 1.4 (2A)).	Term used by Blueprint Conditions

SMC Definitions		Blueprint Definitions		Justification
certified or certification	Same Definition	**certified or certification**	in relation to any matter other than a design plan, 'as constructed' drawings or an annual report regarding dams means, a Statutory Declaration by a suitably qualified person or suitably qualified third party accompanying the written document stating: • the person's qualifications and experience relevant to the function • that the person has not knowingly included false, misleading or incomplete information in the document • that the person has not knowingly failed to reveal any relevant information or document to the administering authority • that the document addresses the relevant matters for the function and is factually • correct; and • that the opinions expressed in the document are honestly and reasonably held.	No change
clearing	has the meaning in the dictionary of the Vegetation Management Act 2000 and for vegetation— (a) means remove, cut down, ringbark, push over, poison or destroy in any way including by burning, flooding or draining; but (b) does not include destroying standing vegetation by stock, or lopping a tree.	**clearing**	for vegetation means removing, cutting down, ringbarking, pushing over, poisoning or destroying in any way including by burning, flooding or draining; but does not include destroying standing vegetation by stock, or lopping a tree.	Similar / Equivalent Definition
closed-loop systems	means using waste on site in a way that does not release waste or contaminants in the waste to the environment.	**Not Defined**	N/A	Term not used by Blueprint Conditions
Not Defined	Not Defined	**consequence**	in relation to a structure as defined, means the potential for environmental harm resulting from the collapse or failure of the structure to perform its primary purpose of containing, diverting or controlling flowable substances.	Term used by Blueprint Conditions
Not Defined	Not Defined	**consequence category**	means a category, either low, significant or high, into which a dam is assessed as a result of the application of tables and other criteria in the Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/193313).	Term used by Blueprint Conditions
Not Defined	Not Defined	**construction or constructed**	in relation to a dam includes building a new dam and modifying or lifting an existing dam, but does not include investigations and testing necessary for the purpose of preparing a design plan.	Term used by Blueprint Conditions
control measure	has the meaning in section 47 of the Environmental Protection Regulation 2008 and means a device, equipment, structure, or management strategy used to prevent or control the release of a contaminant or waste to the environment.	**control measure/s**	has the meaning in section 31 of the *Environmental Protection Regulation 2019* and means a device, equipment, structure, or management strategy used to prevent or control the release of a contaminant or waste to the environment.	Similar / Equivalent Definition Updated definition as per *Environmental Protection Regulation 2019*
critically limited regional ecosystem	means the regional ecosystems defined and listed in Appendix 5 of the Queensland Biodiversity Offset Policy.	**Not Defined**	N/A	Term not used by Blueprint Conditions / critically limited regional ecosystems are not present in PL 1055
coal seam gas water	means underground water brought to the surface of the earth, or moved underground in connection with exploring for, or producing coal seam gas.	**Not Defined**	N/A	Term not used by Blueprint Conditions
daily peak design capacity	Same Definition	**daily peak design capacity**	for sewage treatment works, has the meaning in Schedule 2, section 63(4) of the *Environmental Protection Regulation 2019* as the higher equivalent person (EP) for the works calculated using each of the formulae found in the definition for EP.	No change
dam(s)	Same Definition	**dam(s)**	means a land-based structure or a void that contains, diverts or controls flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based structure or void and associated works.	No change
declared pest species	has the meaning in the Land Protection (Pest and Stock Route Management) Regulation 2003 and is a live animal or plant declared to be a declared pest under section 36 (Declaring Pests by Regulation) or section 37(2) (Declaring Pest under Emergency Pest Notice) of that Act and includes reproductive material of the animal or plant.	**Not Defined**	N/A	Term not used by Blueprint Conditions

SMC Definitions		Blueprint Definitions		Justification
declared plant pest species	has the meaning in the Land Protection (Pest and Stock Route Management) Regulation 2003 and is a plant declared to be a declared pest under section 36 (Declaring Pests by Regulation) or section 37(2) (Declaring Pest under Emergency Pest Notice) of that Act and includes reproductive material of the plant.	**Not Defined**	N/A	Term not used by Blueprint Conditions
designated precinct	has the meaning in Part 5 section 15(3) of the Regional Planning Interests Regulation 2014 and means: • for a strategic environmental area mentioned in section 4(1) – the area identified as a designated precinct on the strategic environmental area map for the strategic environmental are; or • if a strategic environmental area is shown on a map in a regional plan – the area identified on the map as a designated precinct for the strategic environmental area.	**Not Defined**	N/A	Term not used by Blueprint Conditions
development wells	means a petroleum well which produces or stores petroleum. For clarity, a development well does not include an appraisal well.	**Not Defined**	N/A	Term not used by Blueprint Conditions
design storage allowance or DSA	Same Definition	**design storage allowance or DSA**	means an available volume, estimated in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures ESR/2016/19337),* published by the administering authority, as amended from time to time, that must be provided in a dam to an annual exceedance probability specified in that Manual.	No change
document	Same Definition	**document/s**	has the meaning in the *Acts Interpretation Act 1954* and means: • any paper or other material on which there is writing; and • any paper or other material on which there are marks; and • figures, symbols or perforations having a meaning for a person qualified to interpret them; and any disc, tape or other article or any material from which sounds, images, writings or messages are capable of being produced or reproduced (with or without the aid of another article or device).	No change
ecologically dominant layer	has the meaning in the Methodology for Surveying and Mapping of Regional Ecosystems and Vegetation Communities in Queensland (Version 3.2 August 2012) and means the layer making the greatest contribution to the overall biomass of the site and the vegetation community (NLWRA 2001). This is also referred to as the ecologically dominant stratum or the predominant canopy in woody ecosystems.	**Not Defined**	N/A	Term not used by Blueprint Conditions
ecosystem function	means the interactions between and within living and nonliving components of an ecosystem and generally correlates with the size, shape and location of the vegetation community.	**Not Defined**	N/A	Term not used by Blueprint Conditions
enclosed flare	Same Definition	**enclosed flare**	means a device where the residual gas is burned in a cylindrical or rectilinear enclosure that includes a burning system and a damper where air for the combustion reaction is admitted.	No change
environmental harm	Same Definition	**environmental harm**	has the meaning in section 14 of the *Environmental Protection Act 1994* and means any adverse effect, or potential adverse effect (whether temporary or permanent and of whatever magnitude, duration or frequency) on an environmental value, and includes environmental nuisance. Environmental harm may be caused by an activity— (a) whether the harm is a direct or indirect result of the activity; or (b) whether the harm results from the activity alone or from the combined effects of the activity and other activities or factors.	No change
environmental nuisance	Same Definition	**environmental nuisance**	has the meaning in section 15 of the *Environmental Protection Act 1994* and means unreasonable interference or likely interference with an environmental value caused by— (a) aerosols, fumes, light, noise, odour, particles or smoke; or (b) an unhealthy, offensive or unsightly condition because of contamination; or (c) another way prescribed by regulation.	No change
environmentally sensitive area	Same Definition	**environmentally sensitive area**	means Category A, B or C environmentally sensitive areas (ESAs).	No change

SMC Definitions		Blueprint Definitions		Justification
equivalent person/s or EP	Same Definition	**equivalent person/s or EP**	has the meaning under section 3 of the Planning Guidelines For Water Supply and Sewerage, 2005, published by the Queensland Government. It is calculated in accordance with Schedule 2, Section 63(4) of the *Environmental Protection Regulation 2019* where: (a) EP = V/200 where V is the volume, in litres, of the average dry weather flow of sewage that can be treated at the works in a day; or (b) EP = M/2.5 where M is the mass, in grams, of phosphorus in the influent that the works are designed to treat as the inlet load in a day.	No change
essential petroleum activities	means activities that are essential to bringing the resource to the surface and are only the following: • low impact petroleum activities • geophysical, geotechnical, geological, topographic and cadastral surveys (including seismic, sample /test / geotechnical pits, core holes) • single well sites not exceeding 1 hectare disturbance and multi-well sites not exceeding 1.5 hectare disturbance • well sites with monitoring equipment (including monitoring bores): o for single well sites, not exceeding 1.25 hectares disturbance o for multi-well sites, not exceeding 1.75 hectares disturbance • well sites with monitoring equipment (including monitoring bores) and tanks (minimum 1 ML) for above ground fluid storage: o for single well sites, not exceeding 1.5 hectares disturbance o for multi-well sites, not exceeding 2.0 hectares disturbance • associated infrastructure located on a well site necessary for the construction and operations of wells: o water pumps and generators o flare pits o chemical / fuel storages o sumps for residual drilling material and drilling fluids o tanks, or dams which are not significant or high consequence dams to contain wastewater (e.g. stimulation flow back waters, produced water) o pipe laydown areas o soil and vegetation stockpile areas o a temporary camp associated with a drilling rig that may involve sewage treatment works that are no release works o temporary administration sites and warehouses o dust suppression activities using water that meets the quality and operational standards approved under the environmental authority • communication and power lines that are necessary for the undertaking of petroleum activities and that are located within well sites, well pads and pipeline right of ways without increasing the disturbance area of petroleum activities • supporting access tracks • gathering / flow pipelines from a well head to the initial compression facility • activities necessary to achieve compliance with the conditions of the environmental authority in relation to another essential	**essential petroleum activities**	means activities that are essential to bringing the resource to the surface and are only the following: • low impact petroleum activities • geophysical, geotechnical, geological, topographic and cadastral surveys including seismic, sample /test / geotechnical pits, core holes) • single well sites up to 1.5 ha • For multi-well sites, an additional 0.25 ha per additional well up to a maximum of 3 ha • If well(s) require stimulation: o For single well sites, not exceeding 1.65 ha of disturbance o For multi-well sites, not exceeding 3.8 ha of disturbance • associated infrastructure located on a well site necessary for the construction and operations of wells: o water pumps and generators o flare pits o chemical / fuel storages o sumps for residual drilling material and drilling fluids o tanks, or dams which are not significant or high consequence dams to contain wastewater (e.g. stimulation flow back waters, produced water) o pipe laydown areas o soil and vegetation stockpile areas o a temporary camp associated with a drilling rig that may involve sewage treatment works that are no release works o temporary administration sites and warehouses o dust suppression activities using water that meets the quality and operational standards approved under the environmental authority • communication and power lines that are necessary for the undertaking of petroleum activities and that are located within well sites, well pads and pipeline right of ways without increasing the disturbance area of petroleum activities • supporting access tracks • gas gathering / flow pipelines from a well head to the initial compression facility. • oil gathering / flow pipelines from a well head to the initial processing facility. • activities necessary to achieve compliance with the conditions of the environmental authority in relation to another essential petroleum activity (e.g. sediment and erosion control measures, rehabilitation).	Similar / Equivalent Definition: Changes to well lease sizes - the drilling rigs used for conventional activities are different to those used in CSG operations. The petroleum reservoirs are typically at a much greater depth and under pressure, which requires larger / more specialised rigs and more storage for the additional associated equipment and drilling by-products. Santos has optimised the well lease layout to minimise disturbance, whilst not compromising on safety requirements. This process reduced the average well lease size from 1.8 ha down to approximately 1.5 ha for a single well lease (~ 20% reduction). Much of the lease area is restricted due the safety requirements associated with the mast fall zone as well as being utilised for equipment essential to the drilling process. The mast fall radius largely prevents further concentration of equipment, as rig site offices and storage areas must be located outside of this zone for safety reasons. Water tanks are present on the lease, however these are typically only up to 80 cubic metres in capacity. This is far less than the 1 ML requirement to enable a larger well pad size according to the

SMC Definitions		Blueprint Definitions		Justification
	petroleum activity (e.g. sediment and erosion control measures, rehabilitation).			existing EA definition. If conducting stimulation activities, additional tanks will be used, however, may still not be above the 1 ML limit in all instances. The additional water tanks for stimulation require a pad extension of up to 0.15 ha for single wells and a maximum of 0.8 ha for multi-wells (depending on the number of stimulation stages required).
existing authority	Same Definition	**Not Defined**	N/A	Term not used by Blueprint Conditions
Not Defined	Not Defined	**existing structure**	means a structure that prior to <<insert date when EA is issued with new dam manual conditions>> meets any or both of the following, a structure: (a) with a design that is in accordance with the <date and version> *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* and that is considerably in progress; (b) that is under considerable construction or that is constructed.	Term used by Blueprint Conditions
Exploration well	means a petroleum well that is drilled to: • explore for the presence of petroleum or natural underground reservoirs suitable for storing petroleum; or • obtain stratigraphic information for the purpose of exploring for petroleum. For clarity, an exploration well does not include an appraisal or development well.	**Not Defined**	N/A	Term not used by Blueprint Conditions
flare pit	has the meaning in the Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ESR/2016/19338), and means containment area where any hydrocarbon that is discovered in an over-pressured reservoir during a drilling operation is diverted to, and combusted, The flare pit is only used during the drilling and work over process on a petroleum well.	**flare pit**	for the purposes of Schedule D (dam schedule) means containment area where any produced fluid that is discovered in an over-pressured reservoir during a drilling operation is diverted. The flare pit may be used during the drilling, work over process and operation of a petroleum well.	Similar / Equivalent Definition
flare precipitant	means waste fluids which result from the operation of a flare.	**Not Defined**	N/A	Term not used by Blueprint Conditions
floodplains	Same Definition	**floodplains**	has the meaning in the *Water Act 2000* and means an area of reasonably flat land adjacent to a watercourse that— • is covered from time to time by floodwater overflowing from the watercourse; and • does not, other than in an upper valley reach, confine floodwater to generally follow the path of the watercourse; and • has finer sediment deposits than the sediment deposits of any bench, bar or in-stream island of the watercourse.	No change
flowable substance	Same Definition	**flowable substance/s**	means matter or a mixture of materials which can flow under any conditions potentially affecting that substance. Constituents of a flowable substance can include water, other liquids fluids or solids, or a mixture that includes water and any other liquids fluids or solids either in solution or suspension.	No change

SMC Definitions		Blueprint Definitions		Justification
fuel burning or combustion facility	Same Definition	**fuel burning or combustion facility**	means a permanent fuel burning or combustion equipment which in isolation, or combined in operation, or which are interconnected, is, or are capable of burning more than 500 kg of fuel in an hour.	No change
GDA	Same Definition	**GDA**	means Geocentric Datum of Australia.	No change
groundwater dependent ecosystem (GDE)	means ecosystems which require access to groundwater on a permanent or intermittent basis to meet all or some of their water requirements so as to maintain their communities of plants and animals, ecological processes and ecosystem services. For the purposes of the environmental authority, groundwater dependent ecosystems do not include those mapped as "unknown".	**Not Defined**	N/A	Term not used by Blueprint Conditions
green waste	Same Definition	**green waste**	means waste that is grass cuttings, trees, bushes, shrubs, material lopped from trees, untreated timber or other waste that is similar in nature but does not include pest species (restricted matter).	No change
greywater	means wastewater generated from domestic activities such as laundry, dishwashing, and bathing. Greywater does not include sewage.	**Not Defined**	N/A	Term not used by Blueprint Conditions
groundwater dependant ecosystem	means ecosystems which require access to groundwater on a permanent or intermittent basis to meet all or some of their water requirements so as to maintain their communities of plants and animals, ecological processes and ecosystem services. For the purposes of the environmental authority, groundwater dependent ecosystems do not include those mapped as "unknown".	**Not Defined**	N/A	Term not used by Blueprint Conditions
growing	means to increase by natural development, as any living organism or part thereof by assimilation of nutriment; increase in size or substance.	**Not Defined**	N/A	Term not used by Blueprint Conditions
Not Defined	Not Defined	**holder**	means: (a) where this document is an environmental authority, any person who is the holder of, or is acting under, that environmental authority; or (b) where this document is a development approval, any person who is the registered operator for that development approval.	Term used by Blueprint Conditions
hydraulic integrity	Same Definition	**hydraulic integrity**	refers to the capacity of a dam to contain or safely pass flowable substances based on its design.	No change
Not Defined	Not Defined	**incidental activity/ies**	For this environmental authority means an activity that is not a specified relevant activity and is necessary to carry out the activities authorised by this environmental authority.	Term used by Blueprint Conditions
impulsive (for noise)	Same Definition	**impulsive (for noise)**	means sound characterised by brief excursions of sound pressure (acoustic impulses) that significantly exceed the background sound pressure. The duration of a single impulsive sound is usually less than one second.	No change
Not Defined	Not Defined	**inventory**	in relation to existing petroleum activities means: • relevant shapefiles which clearly show the location of infrastructure; and • metadata for the relevant shapefiles which include the infrastructure ID, latitude and longitude, and date of disturbance for the activity.	Term used by Blueprint Conditions
$L_{A\ 90,\ adj,\ 15\ mins}$	means the A-weighted sound pressure level, adjusted for tonal character that is equal to or exceeded for 90% of any 15 minutes sample period equal, using Fast response.	**Not Defined**	N/A	Term not used by Blueprint Conditions
$L_{Aeq,\ adj,\ 15\ mins}$	Same Definition	**$L_{Aeq,\ adj,\ 15\ mins}$**	means the A-weighted sound pressure level of a continuous steady sound, adjusted for tonal character, that within any 15 minute period has the same square sound pressure as a sound level that varies with time.	No change
land degradation	Same Definition	**land degradation**	has the meaning in the *Vegetation Management Act 1999* and means the following: • soil erosion	No change

SMC Definitions		Blueprint Definitions		Justification
			• rising water tables • the expression of salinity • mass movement by gravity of soil or rock • stream bank instability • a process that results in declining water quality	
Not Defined	Not Defined	**land farm**	a bioremediation system to reduce concentrations of petroleum constituents in soil through biodegradation. Land farming usually involves stimulating aerobic microbial activity in soils through aeration and/or the addition of minerals, nutrients and moisture.	Term used by Blueprint Conditions
landholder's active groundwater bore	Same Definition	**landholder's active groundwater bore**	means bores that are able to continue to provide a reasonable yield of water in terms of quantity for the bores authorised purpose or use. This term does not include monitoring bores owned by the administering authority of the *Water Act 2000*.	No change
linear infrastructure	means powerlines, pipelines, flowlines, roads and access tracks.	**linear infrastructure**	means communication and powerlines, pipelines, flowlines, roads and access tracks.	Revised to include reference to communication lines
liquid	Same Definition	**liquid**	means a substance which is flowing and offers no permanent resistance to changes of shape.	No change
long term noise event	means a noise exposure, when perceived at a sensitive receptor, persists for a period of greater than five (5) days, even when there are respite periods when the noise is inaudible within those five (5) days.	**Not Defined**	N/A	Term not used by Blueprint Conditions
low consequence dam	Same Definition	**low consequence dam**	means any dam that is not classified as high or significant as assessed using the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures*, published by the administering authority, as amended from time to time.	No change
low impact petroleum activities	Same Definition	**low impact petroleum activities**	means petroleum activities which do not result in the clearing of native vegetation, cause disruption to soil profiles through earthworks or excavation or result in significant disturbance to land which cannot be rehabilitated immediately using hand tools after the activity is completed. Examples of such activities include but are not necessarily limited to soil surveys (excluding test pits), topographic surveys, cadastral surveys and ecological surveys, may include installation of monitoring equipment provided that it is within the meaning of low impact and traversing land by car or foot via existing access tracks or routes or in such a way that does not result in permanent damage to vegetation.	No change
Not Defined	Not Defined	**manual**	means the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/193314)* published by the administering authority, as amended from time to time.	Term used by Blueprint Conditions
Map of referable wetlands	has the meaning in Schedule 12 of the Environmental Protection Regulation 2008 and means the 'Map of referable wetlands', a document approved by the chief executive on 4 November 2011 and published by the department, as amended from time to time by the chief executive under section 144D.	**Not Defined**	Not Defined	Referable wetlands reference is redundant
Max $L_{pA, 15\ min}$	Same Definition	**Max $L_{pA, 15\ min}$**	means the absolute maximum instantaneous A-weighted sound pressure level, measured over 15 minutes.	No change
Max $L_{pZ, 15\ min}$	Same Definition	**Max $L_{pZ, 15\ min}$**	means the maximum value of the Z-weighted sound pressure level measured over 15 minutes.	No change
maximum extent of impact	means the total, cumulative, residual extent and duration of impact to a prescribed environmental matter that will occur over a project's life after all reasonable avoidance and reasonable on-site mitigation measures have been, or will be, undertaken.	**Not Defined**	N/A	Term not used by Blueprint Conditions

SMC Definitions		Blueprint Definitions		Justification
medium term noise event	Same Definition	**medium term noise event**	is a noise exposure, when perceived at a sensitive receptor, persists for an aggregate period not greater than five (5) days and does not re-occur for a period of at least four (4) weeks. Re-occurrence is deemed to apply where a noise of comparable level is observed at the same receptor location for a period of one hour or more, even if it originates from a difference source or source location.	No change
methodology	Same Definition	**methodology**	means the science of method, especially dealing with the logical principles underlying the organisation of the various special sciences, and the conduct of scientific inquiry.	No change
mix-bury cover method	Same Definition	**mix-bury cover method**	means the stabilisation of residual drilling solids in the bottom of a sump by mixing with subsoil and which occurs in accordance with the following methodology: • the base of the subsoil and residual solid mixture must be separated from the groundwater table by at least one metre of a continuous layer of impermeable subsoil material (kw=10–8m/s) or subsoil with a clay content of greater than 20%; and • the residual solids is mixed with subsoil in the sump and cover; and • the subsoil and residual solids is mixed at least three parts subsoil to one part waste (v/v); and • a minimum of one metre of clean subsoil must be placed over the subsoil and residual solids mixture; and • topsoil is replaced.	No change
month	Same Definition	**month**	has the meaning in the *Acts Interpretation Act 1954* and means a calendar month and is a period starting at the beginning of any day of one (1) of the 12 named months and ending— • immediately before the beginning of the corresponding day of the next named month; or • if there is no such corresponding day—at the end of the next named month.	No change
NATA accreditation	Same Definition	**NATA accreditation**	means accreditation by the National Association of Testing Authorities Australia.	No change
notice of election	has the meaning in section 18(2) Environmental Offsets Act 2014.	**Not Defined**	N/A	Term not used by Blueprint Conditions
Not Defined	Not Defined	**pest species (restricted matter)**	has the same meaning as 'declared pest' in the *Vegetation Management Act 1999* and means a plant or animal, other than a native species of plant or animal, that is— (a) invasive biosecurity matter under the Biosecurity Act 2014; or (b) controlled biosecurity matter or regulated biosecurity matter under the *Biosecurity Act 2014*.	Term used by Blueprint Conditions
prescribed contaminants	Same Definition	**prescribed contaminants**	has the meaning in section 440ZD of the *Environmental Protection Act 1994*.	No change
prescribed environmental matter	Same Definition	**prescribed environmental matter**	has the meaning in section 10 of the *Environmental Offsets Act 2014*, limited to the matters of State environmental significant listed in schedule 2 of the *Environmental Offsets Regulation 2014*.	No change
Not Defined	Not Defined	**prescribed storage gases**	has the meaning in section 12 of the *Petroleum and Gas (Production and Safety) Act 2004*.	Term used by Blueprint Conditions
pipeline waste water	means hydrostatic testing water, flush water or water from low point drains.	**Not Defined**	N/A	Term not used by Blueprint Conditions
pre-disturbed land use	means the function or use of the land as documented prior to significant disturbance occurring at that location.	**Not Defined**	N/A	Term not used by Blueprint Conditions
predominant species	has the meaning in the Methodology for Surveying and Mapping of Regional Ecosystems and Vegetation Communities in Queensland (Version 3.2 August 2012) and means a species that contributes most to the overall above-ground biomass of a particular stratum.	**Not Defined**	N/A	Term not used by Blueprint Conditions
primary protection zone	Same Definition	**primary protection zone**	means an area within 200m from the boundary of any Category A, B or C ESA.	No change
produced water	Same Definition	**Not Defined**	N/A	Term not used by Blueprint Conditions

SMC Definitions		Blueprint Definitions		Justification
protection zone	Same Definition	**protection zone**	means the primary protection zone of any Category A, B or C ESA or the secondary protection zone of any Category A or B ESA.	No change
regional ecosystem	Same Definition	**regional ecosystem**	has the meaning in the Methodology for Surveying and Mapping of Regional Ecosystems and Vegetation Communities in Queensland (Version 3.2 August 2012) and means a vegetation community in a bioregion that is consistently associated with a particular combination of geology, landform and soil. Regional ecosystems of Queensland were originally described in Sattler and Williams (1999). The Regional Ecosystem Description Database (Queensland Herbarium 2013) is maintained by Queensland Herbarium and contains the current descriptions of regional ecosystems.	No change
regulated dam	Same Definition	**regulated dam**	means any dam in the significant or high consequence category as assessed using the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ESR/2016/19339),* published by the administering authority, as amended from time to time.	No change
Not Defined	Not Defined	**regulated structure**	means any structure in the significant or high consequence category as assessed using the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/193315)* published by the administering authority. A regulated structure does not include: • a fabricated or manufactured tank or container, designed and constructed to an Australian Standard that deals with strength and structural integrity of that tank or container; • a sump or earthen pit used to store residual drilling material and drilling fluid only for the duration of drilling and well completion activities; • a flare pit.	Term used by Blueprint Conditions
rehabilitation or rehabilitated	Same Definition	**rehabilitation or rehabilitated**	means the process of reshaping and revegetating land to restore it to a stable landform and in accordance with acceptance criteria and, where relevant, includes remediation of contaminated land. For the purposes of pipeline rehabilitation, rehabilitation includes reinstatement, revegetation and restoration.	No change
reinstate or reinstatement	Same Definition	**reinstate or reinstatement**	for pipelines, means the process of bulk earth works and structural replacement of pre-existing conditions of a site (i.e. soil surface typography, watercourses, culverts, fences and gates and other landscape(d) features) and is detailed in the *Australian Pipeline Industry Association (APIA) Code of Environmental Practice: Onshore Pipelines (2013)*.	No change
reporting limit	Same Definition	**reporting limit**	means the lowest concentration that can be reliably measured within specified limits of precision and accuracy during routine laboratory operating conditions. For many analytes, the reporting limit is selected as the lowest non-zero standard in the calibration curve. Results that fall below the reporting limit will be reported as “less than” the value of the reporting limit. The reporting limit is also referred to as the practical quantitation limit or the limit of quantitation. For polycyclic aromatic hydrocarbons, the reporting limit must be based on super-ultra trace methods and, depending on the specific polycyclic aromatic hydrocarbon, will range between 0.005 ug/L–0.02 ug/L.	No change
residual drilling material	Same Definition	**residual drilling material**	means waste drilling materials including workover solids and fluids, muds and cuttings or cement returns from well holes and which have been left behind after the drilling fluids are pumped out.	No change
restoration	means the replacement of structural habitat complexity, ecosystem processes, services and function from a disturbed or degraded site to that of a pre-determined or analogue site. For the purposes of pipelines, restoration applies to final rehabilitation after pipeline decommissioning.	**Not Defined**	Not Defined	Term not used by Blueprint Conditions. Restoration is included in the definition of rehabilitation or rehabilitated above.
restricted stimulation fluids	has the meaning in section 206 of the Environmental Protection Act 1994 and means fluids used for the purpose of stimulation, including fracturing, that contain the following chemicals in more than the maximum amount prescribed under a regulation— (a) petroleum hydrocarbons containing benzene, ethylbenzene, toluene or xylene	**restricted stimulation fluids**	has the meaning in section 206 of the *Environmental Protection Act 1994* and means fluids used for the purpose of stimulation, including fracturing, that contain the following chemicals in more than the maximum amount prescribed under a regulation— (a) petroleum hydrocarbons containing benzene, ethylbenzene, toluene or xylene (b) chemicals that produce, or are likely to produce, benzene, ethylbenzene, toluene or xylene as the chemical breaks down in the environment.	Minor change to clarify that the restriction relates only to the chemical additives and not the water used in the fluid.

SMC Definitions		Blueprint Definitions		Justification
	(b) chemicals that produce, or are likely to produce, benzene, ethylbenzene, toluene or xylene as the chemical breaks down in the environment.		For clarity, the term restricted stimulation fluid only applies to fluid injected down well post-perforation. The amount of any chemical is not measured in relation to water included in the restricted stimulation fluid.	
revegetation or revegetating or revegetate	means to actively re-establish vegetation through seeding or planting techniques in accordance with site specific management plans.	**Not Defined**	Not Defined	Term not used by Blueprint Conditions
secondary protection zone	Same Definition	**secondary protection zone**	in relation to a Category A or Category B ESA means an area within 100 metres from the boundary of the primary protection zone.	No change
secondary treated class A standards	means treated sewage effluent or greywater which meets the following standards: • total phosphorous as P, maximum 20mg/L • total nitrogen as N, maximum 30mg/L • 5-day biochemical oxygen demand (inhibited) (e.g. release pipe from sewage treatment plant), maximum 20mg/L • suspended solids, maximum 30mg/L • pH, range 6.0 to 8.5 • e-coli, 80th percentile based on at least 5 samples with not less than 30 minutes between samples, 100cfu per 100mL, maximum 1000cfu per 100mL.	**Not Defined**	N/A	Term not used by Blueprint Conditions
secondary treated class B standards	means treated sewage effluent or greywater which meets the following standards: • total phosphorous as P, maximum 20mg/L • total nitrogen as N, maximum 30mg/L • 5-day biochemical oxygen demand (inhibited) (e.g. release pipe from sewage treatment plant), maximum 20mg/L • suspended solids, maximum 30mg/L • pH, range 6.0 to 8.5 • e-coli, 80th percentile based on at least 5 samples with not less than 30 minutes between samples, 1000cfu per 100mL, maximum 10 000cfu per 100mL.	**Not Defined**	N/A	Term not used by Blueprint Conditions
secondary treated class C standards	means treated sewage effluent or greywater which meets the following standards: • total phosphorous as P, maximum 20mg/L • total nitrogen as N, maximum 30mg/L • 5-day biochemical oxygen demand (inhibited) (e.g. Release pipe from sewage treatment plant), maximum 20mg/L • suspended solids, maximum 30mg/L • pH, range 6.0 to 8.5 • e-Coli, 80th percentile based on at least 5 samples with not less than 30 minutes between samples, 10 000cfu per 100mL, maximum 100 000cfu per 100mL.	**Not Defined**	N/A	Term not used by Blueprint Conditions
sensitive place	Same Definition	**sensitive place**	means: • a dwelling (including residential allotment, mobile home or caravan park, residential marina or other residential premises, motel, hotel or hostel) • a library, childcare centre, kindergarten, school, university or other educational institution • a medical centre, surgery or hospital • a protected area	No change

SMC Definitions		Blueprint Definitions		Justification
			• a public park or garden that is open to the public (whether or not on payment of money) for use other than for sport or organised entertainment • a work place used as an office or for business or commercial purposes, which is not part of the petroleum activity(ies) and does not include employees accommodation or public roads • for noise, a place defined as a sensitive receptor for the purposes of the *Environmental Protection (Noise) Policy 2019*.	
sensitive receptor	Same Definition	**sensitive receptor**	is defined in Schedule 2 of the *Environmental Protection (Noise) Policy 2019*, and means an area or place where noise is measured.	No change
short term noise event	is a noise exposure, when perceived at a sensitive receptor, persists for an aggregate period not greater than eight hours and does not re-occur for a period of at least seven (7) days. Re-occurrence is deemed to apply where a noise of comparable level is observed at the same receptor location for a period of one hour or more, even if it originates from a different source or source location.	**Not Defined**	N/A	Term not used by Blueprint Conditions
significantly disturbed or significant disturbance or significant disturbance to land or areas	has the meaning in Schedule 12, section 4 of the Environmental Protection Regulation 2008. Land is significantly disturbed if— (i) to a condition required under the relevant environmental authority; or (ii) if the environmental authority does not require the land to be rehabilitated to a particular condition—to the condition it was in immediately before the disturbance.	**significantly disturbed or significant disturbance or significant disturbance to land**	Land is significantly disturbed if— (a) it is contaminated land; or (b) it has been disturbed and human intervention is needed to rehabilitate it – (i) to a condition required under the relevant environmental authority; or (ii) if the environmental authority does not require the land to be rehabilitated to a particular condition—to the condition it was in immediately before the disturbance. However, for the purpose of this authority the following areas are not significantly disturbed: (a) areas off the petroleum authority (e.g. roads or tracks which provide access to the petroleum authority); (b) areas previously significantly disturbed which have been rehabilitated to the final acceptance criteria as identified in 'Schedule J – Rehabilitation' and that continue to meet the final acceptance criteria; (c) areas under permanent infrastructure (e.g. roads, bridges, buildings) as agreed in writing by the landholder, (d) areas that were significantly disturbed prior to the grant of the petroleum authority, unless: a. those areas are re-disturbed by the petroleum authority holder during the course of carrying out the petroleum activities' b. those areas and activities were conducted on a petroleum tenure that was replaced by the current tenure (e.g. through conditional surrender or the transition from an authority to prospect to a petroleum lease).	Similar / Equivalent Definition: Term refined to clearly articulate what is or isn't significant disturbance. This is particularly relevant information at the time of EA surrender.
significant residual impact	Same Definition	**significant residual impact**	has the meaning in section 8 *Environmental Offsets Act 2014*.	No change
species richness	means the number of different species in a given area.	**Not Defined**	N/A	Term not used by Blueprint Conditions
Not Defined	Not Defined	**specified relevant activities**	for this environmental activity means an activity that but for being carried out as a resource activity, would otherwise be an activity prescribed under section 19 of the Environmental Protection Act 1994 as an environmentally relevant activity and is identified in the cover pages of this environmental authority	Term not used by Blueprint Conditions
stable	Same Definition	**stable**	has the meaning in Schedule 5 of the *Environmental Protection Regulation 2019* and, for a site, means the rehabilitation and restoration of the site is enduring or permanent so that the site is unlikely to collapse, erode or subside.	No change
statement of compliance	for a condition in an environmental authority has the meaning in section 208 of the *Environmental Protection Act 1994* and is a condition that requires the holder to give the administering authority a statement of compliance about a document or work relating to a relevant activity. The condition must also state—	**Not Defined**	N/A	Term not used by Blueprint Conditions

SMC Definitions		Blueprint Definitions		Justification
	(a) the criteria (the compliance criteria) the document or work must comply with; and (b) that the statement of compliance must state whether the document or work complies with the compliance criteria; and (c) the information (the supporting information) that must be provided to the administering authority to demonstrate compliance with the compliance criteria; and (d) when the statement of compliance and supporting information must be given to the administering authority.			
stimulation	means a technique used to increase the permeability of natural underground reservoir that is undertaken above the formation pressure and involves the addition of chemicals. It includes hydraulic fracturing / hydrofraccing, fracture acidizing and the use of proppant treatments. Explanatory note: This definition is restricted from that in the Petroleum and Gas (Production and Safety) Act 2004 in order to only capture the types of stimulation activities that pose a risk to environmental values of water quality in aquifers.	**stimulation**	means a technique used to increase the permeability of natural underground reservoir that is undertaken above the formation pressure and involves the addition of chemicals. It includes hydraulic fracturing / hydrofraccing, fracture acidizing and the use of proppant treatments.	Definition is the same apart from explanatory note.
stimulation fluid	means the fluid injected underground to increase permeability. For clarity, the term stimulation fluid only applies to fluid injected down well post-perforation.	**stimulation fluid**	means the fluid injected underground to increase permeability. For clarity, the term stimulation fluid only applies to fluid injected down well post-perforation. The amount of any chemical is not measured in relation to water included in the stimulation fluid.	Minor change to clarify that the restriction relates only to the chemical additives and not the water used in the fluid.
stimulation impact zone	Same Definition	**stimulation impact zone**	means a 100m maximum radial distance from the stimulation target location within a gas producing formation.	No change
strategic environmental area	has the meaning in section 11(1) of the Regional Planning Interest Act 2014.	**Not Defined**	N/A	Term not used by Blueprint Conditions
structure	Same Definition	**structure**	means a dam or levee.	No change
subterranean cave GDE	• means an area identified as a subterranean cave in the mapping produced by the Queensland Government and identified in the Queensland Government Information System, as amended from time to time; and • means a cave ecosystem which requires access to groundwater on a permanent or intermittent basis to meet all or some of their water requirements so as to maintain its communities of plants and animals, ecological processes and ecosystem services. Subterranean cave GDEs are caves dependent on the subterranean presence of groundwater. Subterranean cave GDEs have some degree of groundwater connectivity and are indicated by either high moisture levels or the presence of stygofauna, or both, referred to in the Queensland Government WetlandsInfo mapping program, as amended from time to time. Note: the Subterranean GDE (caves) dataset can be displayed through the Queensland Government WetlandInfo mapping program. Note: the Subterranean GDE (caves) dataset can be obtained from the Queensland Government Information System.	**Not Defined**	N/A	Term not used by Blueprint Conditions
Not Defined	Not Defined	**suitably qualified and experienced person**	in relation to regulated structures means a person who is a Registered Professional Engineer of Queensland (RPEQ) under the provisions of the *Professional Engineers Act 2002*, and has demonstrated competency and relevant experience: • for regulated dams, an RPEQ who is a civil engineer with the required qualifications in dam safety and dam design • for regulated levees, an RPEQ who is a civil engineer with the required qualifications in the design of flood protection embankments.	Term used by Blueprint Conditions

SMC Definitions		Blueprint Definitions		Justification
			Note: It is permissible that a suitably qualified and experienced person obtain subsidiary certification from an RPEQ who has demonstrated competence and relevant experience in either geomechanics, hydraulic design or engineering hydrology.	
suitably qualified person	Same Definition	**suitably qualified person**	means a person who has professional qualifications, training or skills or experience relevant to the nominated subject matters and can give authoritative assessment, advice and analysis about performance relevant to the subject matters using relevant protocols, standards, methods or literature.	No change
suitably qualified third party	Same Definition	**suitably qualified third party**	means a person who: (a) has qualifications and experience relevant to performing the function including but not limited to: (i) a bachelor's degree in science or engineering; and (ii) 3 years' experience in undertaking soil contamination assessments; and (b) is a member of at least one organisation prescribed in Schedule 8 of the *Environmental Protection Regulation 2019*; and (c) not be an employee of, nor have a financial interest or any involvement which would lead to a conflict of interest with the holder(s) of the environmental authority.	No change
sump	means a pit in which waste residual drilling material or drilling fluids are stored only for the duration of drilling activities.	**sump**	For the purposes of Schedule D means a pit in which waste residual drilling material or drilling fluids are stored for the duration of drilling activities.	Similar / Equivalent Definition
synthetic based drilling mud	Same Definition	**synthetic based drilling mud**	means a mud where the base fluid is a synthetic oil, consisting of chemical compounds which are artificially made or synthesised by chemically modifying petroleum components or other raw materials rather than the whole crude oil.	No change
transmissivity	Same Definition	**transmissivity**	means the rate of flow of water through a vertical strip of aquifer which is one unit wide and which extends the full saturated depth of the aquifer.	No change
valid complaint	Same Definition	**valid complaint**	means all complaints unless considered by the administering authority to be frivolous, vexatious or based on mistaken belief.	No change
void	means any constructed, open excavation in the ground.	**void**	means any man-made, open excavation in the ground (includes borrow pits, drill sumps, frac pits, flare pits, cavitation pits and trenches).	Term revised to specify examples of voids
waste and resource management hierarchy	Same Definition	**waste and resource management hierarchy**	has the meaning provided in section 9 of the *Waste Reduction and Recycling Act 2011* and is the following precepts, listed in the preferred order in which waste and resource management options should be considered— (a) AVOID unnecessary resource consumption (b) REDUCE waste generation and disposal (c) RE-USE waste resources without further manufacturing (d) RECYCLE waste resources to make the same or different products (e) RECOVER waste resources, including the recovery of energy (f) TREAT waste before disposal, including reducing the hazardous nature of waste (g) DISPOSE of waste only if there is no viable alternative.	No change
waste and resource management principles	Same Definition	**waste and resource management principles**	has the meaning provided in section 4(2)(b) of the *Waste Reduction and Recycling Act 2011* and means the: (a) polluter pays principle (b) user pays principle (c) proximity principle (d) product stewardship principle.	No change
waste fluids	has the meaning in section 13 of the *Environmental Protection Act 1994* in conjunction with the common meaning of "fluid" which is "a substance which is capable of flowing and offers no permanent resistance to changes of shape". Accordingly, to be a waste fluid, the waste must be a substance which is capable of flowing and offers no permanent resistance to changes of shape.	**Not Defined**	N/A	Term not used by Blueprint Conditions

SMC Definitions		Blueprint Definitions		Justification
watercourse	has the meaning in Schedule 4 of the *Environmental Protection Act 1994* and means: 1) a river, creek or stream in which water flows permanently or intermittently— (a) in a natural channel, whether artificially improved or not; or (b) in an artificial channel that has changed the course of the watercourse. 2) Watercourse includes the bed and banks and any other element of a river, creek or stream confining or containing water.	**Not Defined**	N/A	Defined under 'waters' below
waters	Same Definition	**waters**	includes all or any part of a creek, river, stream, lake, lagoon, swamp, wetland, spring, unconfined surface water, unconfined water in natural or artificial watercourses, bed and bank of any waters, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and underground water	No change
well integrity	Same Definition	**well integrity**	the ability of a well to contain the substances flowing through it.	No change
wetland	for the purpose of this environmental authority, wetland means: • areas shown on the Map of Queensland wetlands environmental values which is a document approved by the chief executive on 4 November 2011 and published by the department, as amended from time to time by the chief executive under section 19 of the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019*; and • areas defined under the Queensland Wetlands Program as permanent or periodic / intermittent inundation, with water that is static or flowing fresh, brackish or salt, including areas of marine water, the depth of which at low tide does not exceed six (6) metres, and possess one or more of the following attributes: ○ at least periodically, the land supports plants or animals that are adapted to and dependent on living in wet conditions for at least part of their life cycle, or ○ the substratum is predominantly undrained soils that are saturated, flooded or ponded long enough to develop anaerobic conditions in the upper layers, or ○ the substratum is not soil and is saturated with water, or covered by water at some time. The term wetland includes riverine, lacustrine, estuarine, marine and palustrine wetlands; and it does not include a Great Artesian Basin Spring or a subterranean wetland that is a cave or aquifer.	**wetland**	for the purpose of this environmental authority, wetland means: • areas shown on the 'Map of Queensland wetland environmental values' which is a document approved by the chief executive and published by the department, as amended from time to time. • areas defined under the Queensland Wetlands Program as permanent or periodic / intermittent inundation, with water that is static or flowing fresh, brackish or salt, including areas of marine water, the depth of which at low tide does not exceed six (6) metres, and possess one or more of the following attributes: ○ at least periodically, the land supports plants or animals that are adapted to and dependent on living in wet conditions for at least part of their life cycle, or ○ the substratum is predominantly undrained soils that are saturated, flooded or ponded long enough to develop anaerobic conditions in the upper layers, or ○ the substratum is not soil and is saturated with water, or covered by water at some time. The term wetland includes riverine, lacustrine, estuarine, marine and palustrine wetlands; and it does not include a Great Artesian Basin Spring or a subterranean wetland that is a cave or aquifer.	Term revised to exclude details regarding EPP (*Water and Wetland Biodiversity)* 2019
wetland of high ecological significance	means a wetland that meets the definition of a wetland and that is shown as a wetland of 'high ecological significance' or wetland of 'high ecological value' on the Map of referable wetlands.	**wetland of high ecological significance**	means a wetland that meets the definition of a wetland and that is shown as a wetland of 'high ecological significance' or wetland of 'high ecological value' on the Map of Queensland wetland environmental values	Revised definition - (referable wetlands reference is redundant). Refer to definition: Map of Queensland wetland environmental values.
Not Defined	Not Defined	**wetland of general ecological significance / general ecologically significant wetland**	means a wetland that meets the definition of a wetland and that is shown as a wetland of 'general environmental significance' or wetland of 'other environmental value' on the Map of Queensland wetland environmental values.	Revised definition - (referable wetlands reference is redundant).
wetland of other environmental value	means a wetland that meets the definition of a wetland and that is shown as a wetland of 'general environmental significance' or wetland of 'other environmental value' on the Map of referable wetlands.	**Not Defined**	N/A	Defined above under 'wetland of general ecological significance / general ecologically significant wetland'

Appendix B – Proposed EA Conditions

<table>
<tr><th>Blueprint Condition Reference</th><th>Blueprint Condition</th></tr>
<tr><td colspan="2">SCHEDULE A - General</td></tr>
<tr><td>A1</td><td>This environmental authority authorises the carrying out of the following resource activities:
(a) the petroleum activities listed in Schedule A, Table 1 – Scale of Activities to the extent they are carried out in accordance with the activity's corresponding scale and intensity;
(b) petroleum activities, including but not limited to:
(i) linear infrastructure;
(ii) borrow pits / extracting, other than by dredging; and
(iii) compressor stations; and
(iv) sewage treatment – operating sewage treatment works, other than no release works; and
(v) seismic surveys
(c) the specified relevant activities prescribed by this Environmental Authority at the locations specified on the cover pages of this environmental authority;
(d) incidental activities that are not otherwise specified relevant activities.

Schedule A, Table 1 – Scale of Activities
<table><tr><th>Petroleum Activities and Infrastructure</th><th>Scale (number of activities)</th></tr><tr><td>Wells</td><td>12</td></tr><tr><td>Stimulation</td><td>12 wells</td></tr></table></td></tr>
<tr><td>A2</td><td>The activities in condition (A1) are authorised subject to the conditions of this environmental authority.</td></tr>
<tr><td>A3</td><td>This environmental authority does not authorise a relevant act[1] to occur in carrying out an authorised resource activity unless a condition of this environmental authority expressly authorises the relevant act to occur[2]. Where there is no condition, the lack of a condition must not be construed as authorising the relevant act.
[1] See section 493A of the Act.
[2] Section 493A(2) of the Act provides that a relevant act is unlawful unless it is authorised to be done under, among other things, an environmental authority.</td></tr>
<tr><td>A4</td><td>By [insert date 6 months from date of issue of this EA] an inventory of all existing petroleum activities which commenced prior to [insert date of grant of EA] must be developed and maintained.</td></tr>
<tr><td>A5</td><td>The inventory required under condition (A4) must be provided to the administering authority upon written request and within the requested timeframe.</td></tr>
<tr><td>A6</td><td>At the request of the administering authority, a third-party auditor must audit compliance with the conditions of this environmental authority.</td></tr>
<tr><td>A7</td><td>Notwithstanding condition (A6), and prior to undertaking the third-party audit, the timing[1], scope and content of the third-party audit may be negotiated with the administering authority.
[1] The intent of allowing the timing to be negotiated is to allow the EA holder to plan and commission third party audits in such a way that does not result in unnecessary administrative</td></tr>
</table>

Blueprint Condition Reference	Blueprint Condition
	burden on the EA holder (e.g. no more than four (4) audits in a given year across the EA holders other resource EAs in south-west QLD).
A8	An audit report must be prepared and certified by the third-party auditor presenting the findings of each audit carried out.
A9	Any recommendations arising from the audit report must be acted upon by: (a) investigating any non-compliance issues identified; and (b) as soon as reasonably practicable, implementing measures or taking necessary action to ensure compliance with the requirements of this environmental authority.
A10	A written response must be attached to the audit report detailing the actions taken or to be taken on stated dates: (a) to ensure compliance with this environmental authority; and (b) to prevent a recurrence of any non-compliance issues identified.
A11	All monitoring must be undertaken by a suitably qualified person.
A12	If requested by the administering authority in relation to investigating a complaint, monitoring must be commenced within 10 business days.
A13	All laboratory analyses and tests must be undertaken by a laboratory that has NATA accreditation for such analyses and tests unless NATA accredited tests are not available in Australia.
A14	Monitoring and sampling must be carried out in accordance with the requirements of the following documents (as relevant to the sampling being undertaken), as amended from time to time: (a) for waters and aquatic environments, the Queensland Government's Monitoring and Sampling Manual 2009 – *Environmental Protection (Water) Policy 2019*; (b) for groundwater, *Groundwater Sampling and Analysis – A Field Guide* (2009:27 GeoCat #6890.1); (c) for noise, the *Environmental Protection Regulation 2019*; (d) for air, the *Queensland Air Quality Sampling Manual* and/or Australian Standard 4323.1:1995 Stationary source emissions method 1: Selection of sampling positions, as appropriate for the relevant measurement; (e) for soil, the *Guidelines for Surveying Soil and Land Resources*, 2nd edition (McKenzie et al. 2008), and/or the Australian Soil and Land Survey Handbook, 3rd edition (National Committee on Soil and Terrain, 2009); and (f) for dust, Australian Standard 3580.
A15	**Notification** In addition to the requirements under Chapter 7, Part 1, Division 2 of the Environmental Protection Act 1994, the administering authority must be notified through the Pollution Hotline and in writing, as soon as possible, but within 48 hours of becoming aware of any of the following events: (a) any unauthorised significant disturbance to land (b) potential or actual loss of structural or hydraulic integrity of a dam (c) when the level of the contents of any regulated dam reaches the mandatory reporting level (d) when a regulated dam (or network of linked containment systems) will not have available storage to meet the design storage allowance on 1 November of any year (e) potential or actual loss of well integrity

Blueprint Condition Reference	Blueprint Condition
	(f) when the seepage trigger action response procedure required under condition (C3) (g)) is or should be implemented (g) unauthorised releases of any volume of prescribed contaminants to waters (h) unauthorised releases of volumes of contaminants, in any mixture, to land greater than: viii. 200 L of hydrocarbons; or ix. 200 L of stimulation additives; or x. 500 L of stimulation fluids; or xi. 1 000 L of brine; or xii. 5 000 L of associated water; or xiii. 5 000 L of raw sewage; or xiv. 10 000 L of treated sewage effluent. (i) The use of restricted stimulation fluids (j) groundwater monitoring results from a landholder's active groundwater bore monitored under the stimulation impact monitoring program which is a 10% or greater increase from a previous baseline value for that bore and which renders the water unfit for its intended use (k) monitoring results where two out of any five consecutive samples do not comply with the relevant limits in the environmental authority.
A16	From [insert date 6 months from grant date of EA] petroleum activities involving significant disturbance to land cannot commence until the development of written contingency procedures for emergency environmental incidents which include, but are not necessarily limited to: (a) a clear definition of what constitutes an environmental emergency incident or near miss for the petroleum activity; (b) consideration of the risks caused by the petroleum activity including the impact of flooding and other natural events on the petroleum activity; (c) response procedures to be implemented to prevent or minimise the risks of environmental harm occurring; (d) the practices and procedures to be employed to restore the environment or mitigate any environmental harm caused; (e) procedures to investigate causes and impacts including impact monitoring programs for releases to waters and/or land; (f) training of staff to enable them to effectively respond; and (g) procedures to notify the administering authority, local government and any potentially impacted landholder.
A17	All plant and equipment must be maintained and operated in their proper and effective condition.
A18	For activities commenced [after grant date of EA] measures to minimise fauna being harmed from entrapment must be implemented during the construction and operation of well infrastructure, dams and pipeline trenches.
A19	For activities involving significant disturbance to land, control measures that are commensurate to the site-specific risk of erosion, and risk of sediment release to waters must be implemented to: (a) allow stormwater to be diverted around or pass through the site in a controlled manner (b) minimise soil erosion resulting from wind, rain, and flowing water (c) minimise the duration that disturbed soils are exposed to the erosive forces of wind, rain, and flowing water (d) minimise work-related soil erosion and sediment runoff; and (e) minimise negative impacts to land or properties adjacent to the activities (including roads).
A20	Petroleum activities must not cause environmental nuisance at a sensitive place, other than where an alternative arrangement is in place.

Blueprint Condition Reference	Blueprint Condition
A21	A certification must be prepared by a suitably qualified person within 30 business days of completing every plan, procedure, program and report required to be developed under this environmental authority, which demonstrates that: (a) relevant material, including current published guidelines (where available) have been considered in the written document (b) the content of the written document is accurate and true; and (c) the document meets the requirements of the relevant conditions of the environmental authority.
A22	All plans, procedures, programs, reports and methodologies required under this environmental authority must be written and implemented.
A23	All documents required to be developed under this environmental authority must be kept for five years.
A24	All documents required to be prepared, held or kept under this environmental authority must be provided to the administering authority upon written request within the requested timeframe.
A25	A record of all complaints must be kept including the date, complainant's details, source, reason for the complaint, description of investigations and actions undertaken in resolving the complaint.
SCHEDULE B - Water	
B1	Contaminants must not be directly or indirectly released to any waters except as permitted under this environmental authority.
B2	Conditions (B3), (B4), (B6), and (B7) in Schedule B - Water do not apply to petroleum activity(ies) which commenced prior to [insert date of amended EA].
B3	Only linear infrastructure is permitted in a watercourse.[1] [1] For the purposes of condition B3, a watercourse does not include a floodplain.
B4	Prior to the construction of any linear infrastructure that will result in significant disturbance in or on the bed and banks of a watercourse, it must be demonstrated that: (a) no reasonable or practicable alternative exists; and (b) the activity is preferentially located in pre-existing areas of clearing or significant disturbance.
B5	The construction or maintenance of linear infrastructure activities in a watercourse must be conducted in the following preferential order: (a) firstly, in times where there is no water present; (b) secondly, in times of no flow; and (c) thirdly in times of flow, but in a way that does not impede low flow.
B6	Only essential petroleum activities (excluding temporary campsites / workforce accommodation) and borrow pits are permitted within a wetland of high ecological significance.
B7	Only essential petroleum activities and borrow pits are permitted within a wetland of general ecological significance.
B8	Prior to carrying out essential petroleum activities within a general ecologically significant wetland or wetland of high ecological significance it must be demonstrated, in the following order of preference that: (a) no reasonable or practicable alternative exists for carrying out the essential petroleum activities within the general ecologically significant wetland or wetland of high ecological significance;

<table>
<tr><th>Blueprint Condition Reference</th><th>Blueprint Condition</th></tr>
<tr><td></td><td>(b) the essential petroleum activities are preferentially located in pre-existing areas of clearing or significant disturbance.</td></tr>
<tr><td>B9</td><td>Prior to the establishment of a borrow pit within a wetland of high ecological significance or a general ecologically significant wetland it must be demonstrated, in the following order of preference that:

(a) no reasonable or practicable alternative exists for establishing a borrow pit within the wetland of high ecological significance or general ecologically significant wetland;
(b) the borrow pit is preferentially located in pre-existing areas of clearing or significant disturbance.</td></tr>
<tr><td>B10</td><td>Petroleum activities other than construction and maintenance activities carried out within any general ecologically significant wetland or wetland of high ecological significance must not:

(a) change the existing surface water hydrological regime; or
(b) impact bank stability.</td></tr>
<tr><td>B11</td><td>Construction or maintenance of petroleum activities in a general ecologically significant wetland or a wetland of high ecological significance must not:

(a) prohibit the flow of surface water in or out of the wetland;
(b) impact surface water quality in the wetland unless specifically authorised by this environmental authority;
(c) drain or fill the wetland;
(d) impact bank stability; or
(e) result in the clearing of riparian vegetation outside of the minimum area practicable to carry out the works.</td></tr>
<tr><td>B11</td><td>Construction or maintenance of linear infrastructure that will result in significant disturbance in or on the bed and banks of a watercourse must not release from the site any contaminants to any waters that exceed the water quality limits specified in Schedule B, Table 1 – Release Limits to Waters.</td></tr>
<tr><td>B12</td><td>Construction or maintenance activities within a general ecologically significant wetland or wetland of high ecological significance must not release from the site any contaminants to any waters that exceed the water quality limits specified in Schedule B, Table 1 – Release Limits to Waters.

Schedule B, Table 1 – Release Limits to Waters
<table>
<tr><th>Water Quality Parameters</th><th>Units</th><th>Water Quality Limits</th></tr>
<tr><td>Turbidity</td><td>Nephelometric Turbidity Units (NTU)</td><td>For a general ecologically significant wetland or wetland of high ecological significance, if background water turbidity is above 45 NTU, no greater than 25% above background water turbidity measured within a 50 m radius of the construction or maintenance activity.

For a watercourse, if background water turbidity is above 45 NTU, no greater than 25% above background water turbidity measured</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Blueprint Condition Reference</th><th colspan="4">Blueprint Condition</th></tr>
<tr><td></td><td></td><td></td><td></td><td>within 50 m downstream of the construction or maintenance activity.</td></tr>
<tr><td></td><td></td><td></td><td></td><td>For a general ecologically significant wetland or wetland of high ecological significance, if background water turbidity is equal to, or below 45 NTU, a turbidity limit of no greater than 55 NTU applies, measured within a 50 m radius of the construction or maintenance activity.

For a watercourse, if background water turbidity is equal to, or below 45 NTU, a turbidity limit of no greater than 55 NTU applies, measured within 50 m downstream of the construction or maintenance activity.</td></tr>
<tr><td></td><td></td><td>Hydrocarbons</td><td>-</td><td>For a general ecologically significant wetland, wetland of high ecological significance, or watercourse, no visible sheen or slick.</td></tr>
<tr><td>B14</td><td colspan="4">Monitoring must be undertaken at a frequency that is appropriate to demonstrate compliance with conditions (B12) and (B13).</td></tr>
<tr><td>B15</td><td colspan="4">After the construction or maintenance works for petroleum activities in a general ecologically significant wetland or a wetland of high ecological significance are completed, the petroleum infrastructure must not:

(a) drain or fill the wetland;
(b) prohibit the flow of surface water in or out of the wetland;
(c) lower or raise the water table and hydrostatic pressure outside the bounds of natural variability that existed before the activities commenced;
(d) result in ongoing negative impacts to water quality;
(e) result in bank instability; or
(f) result in fauna ceasing to use adjacent areas for habitat, feeding, roosting or nesting.</td></tr>
<tr><td>B16</td><td colspan="4">From [insert date of amended EA], records must be kept of all significant construction and maintenance activities causing disturbance and conducted in a general ecologically significant wetland, a wetland of high ecological significance or a watercourse during times of flow, which must include:

(a) location of the activity (e.g. GPS coordinates (GDA94)); and
(b) duration of works.</td></tr>
<tr><td>B17</td><td colspan="4">Where the petroleum activity(ies) is carried out on floodplains the petroleum activity(ies) must be carried out in a way that does not:

(a) concentrate flood flows in a way that will or may cause environmental harm; or
(b) divert or impede flood flows from natural drainage paths and alter flow distribution; or
(c) increase the local duration of floods; or
(d) increase the risk of detaining flood flows.</td></tr>
<tr><td colspan="5">Schedule C - Groundwater</td></tr>
</table>

Blueprint Condition Reference	Blueprint Condition
C1	The extraction of groundwater as part of the petroleum activity(ies) from underground aquifers must not directly or indirectly cause environmental harm to any watercourse, lake, wetland or spring.
C2	A Seepage Monitoring Program must be developed by a suitably qualified person that is commensurate with the site-specific risk of contaminant seepage from containment facilities and able to determine if seepage of contaminants to groundwater is occurring as a result of storing contaminants in containment facilities by [Insert date 12 months after the grant of the EA here].
C3	The Seepage Monitoring Program required by Condition (C2), must include, but not necessarily be limited to: (a) identification of the containment facilities for which seepage will be monitored; (b) identification of the trigger parameters that are associated with the potential or actual contaminants stored in the containment facility; (c) identification of trigger concentration levels that are suitable for early detection of contaminant releases at the containment facilities; (d) Installation of background seepage monitoring bores where groundwater quality will not have been affected by the petroleum activities authorised under this environmental authority to use as reference sites for determining impacts (e) Installation of seepage monitoring bores that: (i) are within the upper-most aquifer potentially affected by the containment facilities authorised under this environmental authority (i.e. within the potential area of impact) (ii) provide for the early detection of negative impacts prior to reaching sensitive receptors (i.e. groundwater dependent ecosystems, water supply bores) (iii) provide for the early detection of negative impacts prior to reaching migration pathways to other aquifers and formations (i.e. faults, areas of unconformities known to connect two or more formations) (f) monitoring of groundwater at each background and seepage monitoring bore at a sufficient frequency that will allow for early detection of contaminants for the trigger parameters identified in Condition (C3(b)); (g) seepage trigger action response procedures for when trigger parameters and trigger levels identified in conditions (C3(b)) and (C3(c)) trigger the early detection of seepage, or upon becoming aware of any monitoring results that indicate potential groundwater contamination; (h) a rationale detailing the program conceptualisation including assumptions, determinations, monitoring equipment, sampling methods and data analysis; and (i) provides for annual updates to the program for new containment facilities constructed in each annual return period.
C4	A drill bore log must be completed for each seepage monitoring bore in condition (C3), which must include: (a) bore identification reference and geographical coordinate location (b) specific construction information including but not limited to depth of bore, depth and length of casing, depth and length of screening and bore sealing details (c) standing groundwater level and water quality parameters including physical parameter and results of laboratory analysis for the possible trigger parameters (d) lithological data, preferably a stratigraphic interpretation to identify the important features including the identification of any aquifers; and (e) target formation of the bore.
SCHEDULE D - DAMS	

Blueprint Condition Reference	Blueprint Condition
D1	The consequence category of any structure, other than flare pits and sumps, must be assessed by a suitably qualified and experienced person in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (ESR/2016/1933) at the following times: (a) following the design and prior to construction of the structure, if it is not an existing structure; or (b) if it is an existing structure, [insert date 12 months from date of EA grant]; or (c) prior to any change in its purpose or the nature of its stored contents.
D2	A consequence assessment report and certification must be prepared for each structure assessed and the report may include a consequence assessment for more than one structure.
D3	Certification must be provided by the suitably qualified and experienced person who undertook the assessment, in the form set out in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (ESR/2016/1933).
D4	Regulated Structures are not authorised by this environmental authority.
SCHEDULE E - LAND	
E1	Contaminants must not be directly or indirectly released to land except for those releases authorised by conditions <<insert relevant waste to land conditions>>.
E2	Top soil must be managed in a manner that preserves its biological and chemical properties.
E3	Chemicals and fuels stored, must be effectively contained and where relevant, meet Australian Standards, where such a standard is applicable.
SCHEDULE F – BIODIVERSITY	
F1	Conditions (F2) to (F9) inclusive in Schedule F – Biodiversity do not apply to the petroleum activity(ies) which commenced prior to [insert date of amended EA grant].
F2	Prior to undertaking activities that result in significant disturbance to land in areas of native vegetation, confirmation of on-the-ground biodiversity values of the native vegetation communities at that location must be undertaken by a suitably qualified person.
F3	A suitably qualified person must develop and certify a methodology so that condition (F2) can be complied with and which is appropriate to confirm on-the-ground biodiversity values by [Insert date 6 months after the grant of the EA].
F4	Where mapped biodiversity values differ from those confirmed under conditions (F2) and (F3), petroleum activities may proceed in accordance with the conditions of the environmental authority based on the confirmed on-the-ground biodiversity value.
F5	The location of the petroleum activity(ies) must be selected in accordance with the following site planning principles: (a) maximise the use of areas of pre-existing disturbance; (b) in order of preference, avoid, minimise or mitigate any impacts, including cumulative impacts, on areas of native vegetation or other areas of ecological value; (c) minimise disturbance to land that may result in land degradation; (d) in order of preference, avoid then minimise isolation, fragmentation, edge effects or dissection of tracts of native vegetation; and (e) in order of preference, avoid then minimise clearing of native mature trees.

<table>
<tr><th>Blueprint Condition Reference</th><th>Blueprint Condition</th></tr>
<tr><td>F6</td><td>Linear infrastructure construction corridors must:

(a) maximise co-location
(b) be minimised in width to the greatest practicable extent; and
(c) for linear infrastructure that is an essential petroleum activity authorised in an environmentally sensitive area or its protection zone, be no greater than 40m in total width.</td></tr>
<tr><td>F7</td><td>Where petroleum activities are to be carried out in environmentally sensitive areas or their protection zones, the petroleum activities must be carried out in accordance with Schedule F, Table 1 - Authorised petroleum activities in environmentally sensitive areas and their protection zones.

Note: Approvals may be required under the Forestry Act 1959 where the petroleum activity(ies) is proposed to be carried out in ESAs that are State Forests or Timber Reserves.

Schedule F, Table 1 – Authorised petroleum activities in environmentally sensitive areas and their protection zones
<table>
<tr><th>Environmentally sensitive areas</th><th>Within the environmentally sensitive area</th><th>Primary protection zone of the environmentally sensitive area</th><th>Secondary protection zone of the environmentally sensitive area</th></tr>
<tr><td>Category A environmentally sensitive area</td><td>No Petroleum activities permitted</td><td>Only low impact petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td></tr>
<tr><td>Category B environmentally sensitive areas that are other than ‘endangered’ regional ecosystems</td><td>Only low impact petroleum activities permitted.</td><td>Only low impact petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td></tr>
<tr><td>Category B environmentally sensitive areas that are ‘endangered’ regional ecosystems</td><td>Only low impact petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td></tr>
<tr><td>Category C environmentally sensitive areas that are ‘nature refuges’ or ‘koala habitat’</td><td>Only low impact petroleum activities permitted.</td><td>Only low impact petroleum activities permitted.</td><td></td></tr>
<tr><td>Category C environmentally sensitive areas that are ‘essential habitat’, ‘essential regrowth habitat’, or ‘of concern’ regional ecosystems</td><td>Only low impact petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td><td></td></tr>
</table>
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<table>
<tr><th>Blueprint Condition Reference</th><th colspan="4">Blueprint Condition</th></tr>
<tr><td></td><td colspan="3"><table>
<tr><td>Category C environmentally sensitive areas that are ‘regional parks’ (previously known as resources reserves’)</td><td>Only essential petroleum activities permitted.</td><td>Only essential petroleum activities permitted.</td></tr>
<tr><td>Category C environmentally sensitive areas that are ‘state forests’ or ‘timber reserves’</td><td>Only essential petroleum activities permitted.</td><td>Petroleum activities permitted.</td></tr>
</table></td></tr>
<tr><td>F8</td><td colspan="4">If essential petroleum activity(ies) are located within a primary protection zone or secondary protection zone of an environmentally sensitive area, the activity(ies) must not negatively affect the adjacent environmentally sensitive area.</td></tr>
<tr><td>F9</td><td colspan="4">Prior to carrying out essential petroleum activities within environmentally sensitive areas in accordance with Schedule F, Table 1 – Authorised petroleum activities in environmentally sensitive areas and their protection zones, it must be demonstrated, in the following order of preference that:
(a) No reasonable or practicable alternative exists for carrying out the essential petroleum activities within the environmentally sensitive area; and
(b) The essential petroleum activities are preferentially located in pre-existing areas of clearing or significant disturbance.</td></tr>
<tr><td>F10</td><td colspan="4">Significant residual impacts to prescribed environmental matters are not authorised under this environmental authority or the Environmental Offsets Act 2014.</td></tr>
<tr><td>F11</td><td colspan="4">Records demonstrating that each impact to a prescribed environmental matter did not, or is not likely to, result in a significant residual impact to that matter must be:
(a) Completed by an appropriately qualified person; and
(b) Kept for the life of the administering authority.</td></tr>
<tr><td colspan="5">SCHEDULE G - ACOUSTIC</td></tr>
<tr><td>G1</td><td colspan="4">Notwithstanding condition (A23), emission of noise from the petroleum activity(ies) at levels less than those specified in Schedule G, Table 1—Noise Nuisance Limits are not considered to be environmental nuisance.
Schedule G, Table 1 – Noise Nuisance Limits
<table>
<tr><th>Time period</th><th>Metric</th><th>Short term noise event</th><th>Medium term noise event</th><th>Long term noise event</th></tr>
<tr><td>7:00am—6:00pm</td><td>LAeq,adj,15 min</td><td>45 dBA</td><td>43 dBA</td><td>40 dBA</td></tr>
<tr><td>6:00pm—10:00pm</td><td>LAeq,adj,15 min</td><td>40 dBA</td><td>38 dBA</td><td>35 dBA</td></tr>
<tr><td>10:00pm—6:00am</td><td>LAeq,adj,15 min</td><td>28 dBA</td><td>28 dBA</td><td>28 dBA</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Blueprint Condition Reference</th><th>Blueprint Condition</th></tr>
<tr><td></td><td>
<table>
<tr><td></td><td>Max LpA, 15 mins</td><td>55 dBA</td><td>55 dBA</td><td>55 dBA</td></tr>
<tr><td>6:00am—7:00am</td><td>LAeq,adj,15 min</td><td>40 dBA</td><td>38 dBA</td><td>35 dBA</td></tr>
</table>
The noise limits in Table 1 have been set based on the following deemed background noise levels (L_{ABG}):
7:00am—6:00 pm: 35 dBA
6:00pm—10:00 pm: 30 dBA
10:00pm—6:00 am: 25 dBA
6:00am—7:00 am: 30 dBA
</td></tr>
<tr><td>G2</td><td>If the noise subject to a valid complaint is tonal or impulsive, the adjustments detailed in Schedule G, Table 2 - Adjustments to be added to noise levels at sensitive receptors are to be added to the measured noise level(s) to derive $LA_{eq,\ adj,\ 15\ min}$.
Schedule G, Table 2 – Adjustments to be added to noise levels at sensitive receptors
<table>
<tr><th>Noise characteristic</th><th>Adjustment to noise</th></tr>
<tr><td>Tonal characteristic is just audible</td><td>+ 2 dBA</td></tr>
<tr><td>Tonal characteristic is clearly audible</td><td>+ 5 dBA</td></tr>
<tr><td>Impulsive characteristic is detectable</td><td>+ 2 to + 5 dBA</td></tr>
</table>
</td></tr>
<tr><td>G3</td><td>Notwithstanding condition (G1), emission of any low frequency noise must not exceed either (G3)(a) and (G3)(b), or (G3)(c) and (G3)(d) in the event of a valid complaint about low frequency noise being made to the administering authority:
(a) 60 dB(C) measured outside the sensitive receptor; and
(b) the difference between the external A-weighted and C-weighted noise levels is no greater than 20 dB; or
(c) 50 dB(Z) measured inside the sensitive receptor; and
(d) the difference between the internal A-weighted and Z-weighted (Max LpZ, 15 min) noise levels is no greater than 15dB. </td></tr>
<tr><td>G4</td><td>A Blast Management Plan must be developed for each blasting activity in accordance with Australian Standard 2187.</td></tr>
<tr><td>G5</td><td>Blasting operations must be designed to not exceed an airblast overpressure level of 120 dB (linear peak) at any time, when measured at or extrapolated to any sensitive place.</td></tr>
<tr><td>G6</td><td>Blasting operations must be designed to not exceed a ground-borne vibration peak particle velocity of 10mm/s at any time, when measured at or extrapolated to any sensitive place.</td></tr>
<tr><td colspan="2">SCHEDULE H - AIR</td></tr>
<tr><td>H1</td><td>Unless venting is authorised under the Petroleum and Gas (Production and Safety) Act 2004 or the Petroleum Act 1923, waste gas must be flared in a manner that complies with all of (H1)(a) and (H1)(b) and (H1)(c), or with (H1)(d):</td></tr>
</table>

Blueprint Condition Reference	Blueprint Condition
	(a) an automatic ignition system is used, and (b) a flame is visible at all times while the waste gas is being flared, and (c) there are no visible smoke emissions other than for a total period of no more than 5 minutes in any 2 hours, or (d) it uses an enclosed flare.
SCHEDULE I - WASTE	
I1	All waste generated in carrying out the activity must be lawfully reused, recycled or removed to a facility that can lawfully accept the waste, except as permitted under another condition of this environmental authority.
I2	Measures must be implemented so that waste is managed in accordance with the waste and resource management hierarchy and the waste and resource management principles.
I3	Sumps not required for the management of residual drilling material in accordance with condition (I4), must only be used to store residual drilling material during drilling activities and work over processes.
I4	From [insert date of amended EA], residual drilling material can only be disposed of on-site: (a) by mix-bury cover method if the residual drilling material meets the approved quality criteria; or (b) if it is certified by a suitably qualified third party as being of acceptable quality for disposal to land by the proposed method and that environmental harm will not result from the proposed disposal.
I5	In accordance with condition B1, the disposal of residual drilling material must not result in a direct or indirect release of contaminants to any waters
I6	Records must be kept to demonstrate compliance with conditions (I3) and (I4).
I7	Green waste may be used on-site for either rehabilitation or sediment and erosion control, or both.
I8	The release of contaminants to land must be carried out in a manner such that: a) vegetation is not damaged; b) soil quality is not adversely impacted; c) there is no surface ponding or runoff to waters; d) there is no aerosols or odours; e) deep drainage below the root zone of any vegetation is minimised; f) the quality of shallow aquifers is not adversely affected
I9	Associated water produced from the authorised petroleum activity(ies) may be used for the following in accordance with condition (I8): (a) for dust suppression on roads; (b) for construction and operational purposes, including drilling, well hole activities and stimulation, for the petroleum activity(ies) authorised by this environmental authority; (c) domestic and stock purposes.

Blueprint Condition Reference	Blueprint Condition
I10	Associated water produced from the authorised petroleum activity(ies) may be transferred to a third party to be used for the following purposes subject to compliance with conditions (I11) and (I12): (a) dust suppression; (b) construction and operational purposes; (c) livestock watering purposes.
I11	From [insert date 6 months from grant of EA], any associated water supplied to a third party for livestock watering purposes in accordance with condition (I10)(c) must meet the ANZECC and ARMCANZ Water Quality Guidelines 2000 for livestock watering purposes, as amended from time to time.
I12	If the responsibility of associated water is given or transferred to a third party in accordance with condition (I10), the holder of environmental authority must ensure that: (a) the responsibility of the associated water is given or transferred in accordance with a written agreement (the third party agreement); and (b) the third party is made aware of the General Environmental Duty under section 319 of the *Environmental Protection Act 1994*.
I13	A record of all written agreements as required by section (I12)(a) must be kept for the life of the authority and be made available to the administering authority upon request within the stated time period
I14	Hydrostatic test water from pipelines may be released to land in accordance with condition (I8).
I15	Treated sewage effluent or greywater from a treatment system with a daily peak design capacity of less than 21 equivalent persons (EP) may be released to land provided it: (a) be to a signed contaminant release area(s); (b) does not contain any properties nor contain any organisms or other contaminants in concentrations that are capable of causing environmental harm; (c) does not result in pooling or run-off or aerosols or spray drift or vegetation die-off; (d) minimises deep drainage below the root zone of any vegetation; and (e) does not adversely affect the quality of shallow aquifers.
SCHEDULE J - REHABILITATION	
J1	Rehabilitation of disturbed areas must take place progressively as works are staged.
J2	**Remaining dams** Where there is a dam (including a low consequence dam) that is being or intended to be utilised by the landholder or overlapping tenure holder, the dam must be decommissioned to no longer accept inflow from the petroleum activity(ies) and the contained water must be of a quality suitable for the intended on-going uses(s) by the landholder or overlapping tenure holder at the time of handover.
J3	Significantly disturbed areas, other than those being or intended to be utilised by the landholder or overlapping tenure holder must be rehabilitated in accordance with conditions (J5) to (J8).
J4	Rehabilitation of significantly disturbed areas in accordance with condition (J5) that are no longer required for on-going petroleum activities must commence within 12 months (unless an exceptional circumstance in the area to be rehabilitated (e.g. a flood event) prevents this timeframe being met).

Blueprint Condition Reference	Blueprint Condition
J5	Rehabilitation of significantly disturbed areas must meet the following acceptance criteria: (a) contaminated land resulting from petroleum activities is remediated (b) the areas are: (i) non-polluting (ii) a stable landform (iii) re-profiled to contours consistent with the surrounding landform (c) surface drainage lines are re-established; (d) top soil where present, is reinstated; and (e) plant pest species (restricted matter) are not present, or are consistent with the surrounding areas.
J6	**Decommissioning of pipelines** Pipeline decommissioning must meet Australian Standards where such a standard is applicable.
J7	**Progressive rehabilitation** Pipelines trenches must be backfilled in accordance with Condition (J8) after pipe laying and rehabilitated as soon as practicable but not longer than three (3) months after completion.
J8	For the life of the operational pipeline, backfilled pipeline trenches must: (a) be a stable landform, exhibiting no subsidence or erosion gullies for the life of the operational pipeline; and (b) be re-profiled to a level consistent with surrounding soils; and (c) be re-profiled to original contours and established drainage lines; and (d) plant pest species (restricted matter) are not present, or are consistent with the surrounding areas.
SCHEDULE K – WELL CONSTRUCTION, MAINTENACE AND STIMULATION	
K1	Oil based or synthetic based drilling muds must not be used in the carrying out of the petroleum activity(ies).
K2	Drilling activities and stimulation activities must not cause the connection of the target formation and another aquifer.
K3	Practices and procedures must be in place to detect, as soon as practicable, any fractures that have or may result in the connection of a target formation and another aquifer as a result of drilling activities.
K4	The holder of this environmental authority must ensure internal and external mechanical integrity of the well system prior to and during stimulation such that there is: (a) no significant leakage in the casing, tubing, or packer; and (b) there is no significant fluid movement into another aquifer through vertical channels adjacent to the well bore hole.
K5	Practices and procedures must be in place to detect, as soon as practicable, any fractures that cause the connection of a target formation and another aquifer if an aquifer is present within 200 metres above or below the target formation(s) and is spatially located with a two (2) kilometre radius from the location of the stimulation initiation point.
K6	Prior to undertaking stimulation activities, a risk assessment must be developed to ensure that stimulation activities are managed to prevent environmental harm.

Blueprint Condition Reference	Blueprint Condition
K7	The stimulation risk assessment must address issues at a relevant geospatial scale such that changes to features and attributes are adequately described and must include, but not necessarily be limited to: (a) a process description of the stimulation activity to be applied, including equipment; (b) provide details of where, when and how often stimulation is to be undertaken on the tenures covered by this environmental authority; (c) a geological model of the field to be stimulated including geological names, descriptions and depths of the target producing formation(s); (d) naturally occurring geological faults; (e) seismic history of the region (e.g. earth tremors, earthquakes); (f) proximity of overlying and underlying aquifers; (g) description of the depths that aquifers with environmental values occur, both above and below the target formation. (h) identification and proximity of landholders' active groundwater bores in the area where stimulation activities are to be carried out; (i) the environmental values of groundwater in the area; (j) an assessment of the appropriate limits of reporting for all water quality indicators relevant to stimulation monitoring in order to accurately assess the risks to environmental values of groundwater; (k) description of overlying and underlying formations in respect of porosity, permeability, hydraulic conductivity, faulting and fracture propensity; (l) consideration of barriers or known direct connections between the target formation and the overlying and underlying aquifers; (m) a description of the well mechanical integrity testing program; (n) process control and assessment techniques to be applied for determining extent of stimulation activities (e.g. microseismic measurements, modelling etc); (o) practices and procedures to ensure that the stimulation activities are designed to be contained within the target formation; (p) groundwater transmissivity, flow rate, hydraulic conductivity and direction(s) of flow; (q) a description of the chemicals used in stimulation activities (including estimated total mass, estimated composition, chemical abstract service numbers and properties), their mixtures and the resultant compounds that are formed after stimulation; (r) a mass balance estimating the concentrations and absolute masses of chemicals that will be reacted, returned to the surface or left in the target formation subsequent to stimulation; (s) An environmental hazard assessment of the chemicals used including their mixtures and the resultant chemicals that are formed after stimulation including: (i) toxicological and ecotoxicological information of chemical compounds used; (ii) information on the persistence and bioaccumulation potential of the chemical compounds used; (iii) identification of the chemicals of potential concern in stimulation fluids derived from the risk assessment; (t) an environmental hazard assessment of the chemicals used including mixtures and the resultant chemicals that are formed after stimulation; (u) identification and an environmental hazard assessment of using radioactive tracer beads in stimulation activities where such beads have been used or are proposed to be used; (v) an environmental hazard assessment of leaving chemical compounds in stimulation fluids in the target formation for extended periods subsequent to stimulation; (w) human health exposure pathways to operators and the regional population (x) risk characterisation of environmental impacts based on the environmental hazard assessment; (y) potential impacts to landholder bores as a result of stimulation activities;

Blueprint Condition Reference	Blueprint Condition
	(z) an assessment of cumulative underground impacts, spatially and temporally of the stimulation activities to be carried out on the tenures covered by this environmental authority; and (aa) potential environmental or health impacts which may result from stimulation activities including but not limited to water quality, air quality (including suppression of dust and other airborne contaminants), noise and vibration.
K8	**Water Quality Baseline Monitoring** Prior to undertaking any stimulation activity, a baseline bore assessment must be undertaken of the water quality of: (a) landholders' active groundwater bores (subject to access being permitted by the landholder) that are within a two (2) kilometre radius from the location of the stimulation initiation point within the target formation; and (b) any other bore that could potentially be adversely impacted by the stimulation activity(ies) in accordance with the findings of the risk assessment required by conditions (K6) and (K7).
K9	Baseline bore assessments required in condition (K8) must include the minimum water quality analytes and physico-chemical parameters identified in the Baseline Assessment Guideline and any restricted stimulation fluids as defined in the *Environmental Protection Act 1994*, as amended from time to time, in order to establish baseline water quality.
K10	**Stimulation Impact Monitoring Program** A Stimulation Impact Monitoring Program must be developed prior to the carrying out stimulation activities which must be able to detect adverse impacts to quality from stimulation activities and must consider the findings of the risk assessment required by conditions (K6) and (K7) that relate to stimulation activities and must include, as a minimum, monitoring of: (a) the stimulation fluids to be used in stimulation activities at sufficient frequency and which sufficiently represents the quantity and quality of the fluids used; and (b) flow back waters from stimulation activities at sufficient frequency and which sufficiently represents the quality of that flow back water; and (c) all bores in accordance with condition (K8).
K11	The Stimulation Impact Monitoring Program must provide for monitoring of: (a) analytes and physico-chemical parameters relevant to stimulation baseline bore assessments required by conditions (K8) and (K9); and (b) any other analyte or physico-chemical parameters that will enable detection of adverse water quality impacts and the inter-connection with a non-target aquifer as a result of stimulation activities if an aquifer is present within 200 metres above or below the target formation(s) and is spatially located with a two (2) kilometre radius from the location of the stimulation initiation point.
K12	The Stimulation Impact Monitoring Program must provide for monitoring of the bores in condition (K10)(c) at the following minimum frequency: (a) monthly for the first six (6) months subsequent to stimulation activities being undertaken; then (b) annually for the first five (5) years subsequent to stimulation activities being undertaken or until analytes and physico-chemical parameters listed in condition (K6) are not detected in concentrations above baseline bore monitoring data on two (2) consecutive monitoring occasions.
K13	The results of the Stimulation Impact Monitoring Program must be made available to any potentially affected landholder upon request by that landholder.

Blueprint Condition Reference	Blueprint Condition
K14	Polycyclic aromatic hydrocarbons or products that contain polycyclic aromatic hydrocarbons must not be used in stimulation fluids in concentrations above the reporting limit.
K15	Stimulation activities must not negatively affect water quality, other than that within the stimulation impact zone of the target formation.

SCHEDULE L - DEFINITIONS	
administering authority	means: (a) for a matter, the administration and enforcement of which has been devolved to a local government under section 514 of the *Environmental Protection Act 1994*—the local government; or (b) for all other matters—the Chief Executive of the Department of Environment and Science; or (c) another State Government Department, Authority, Storage Operator, Board or Trust, whose role is to administer provisions under other enacted legislation.
alternative arrangement	means a written agreement about the way in which a particular environmental nuisance impact will be dealt with at a sensitive place, and may include an agreed period of time for which the arrangement is in place. An alternative arrangement may include, but is not limited to, a range of nuisance abatement measures to be installed at the sensitive place, or provision of alternative accommodation for the duration of the relevant nuisance impact.
annual return period	means the most current 12-month period between two anniversary dates.
appropriately qualified person / suitably qualified person	means a person who has professional qualifications, training or skills or experience relevant to the nominated subject matters and can give authoritative assessment, advice and analysis about performance relevant to the subject matters using relevant protocols, standards, methods or literature.
approved quality criteria	for the purposes of residual drilling materials, means the residual drilling material meet the following quality standards: Part A In all cases:

Parameter	**Maximum concentration**
pH	6-10.5 (range)
Electrical Conductivity	20d/Sm (20,000µS/cm)
Chloride*	8000mg/L

*Chloride analysis is only required if an additive containing chloride was used in the drilling process

The limits in Part A must be measured in the clarified filtrate of oversaturated solids prior to mixing.

Part B If any of the following metals are a component of the drilling fluids, then for that metal:

Parameter	Maximum concentration
Arsenic	20mg/kg
Selenium	5mg/kg
Boron	100mg/kg
Cadmium	3mg/kg
Chromium (total)	400mg/kg
Copper	100mg/kg
Lead	600mg/kg

The limits in Part B and Part C refer to the post soil/by-product mix.

Part C If a hydrocarbon sheen is visible, the following hydrocarbon fractions:

TPH	Maximum concentration
C6-C10	170mg/kg
C10-C16	150mg/kg
C16-C34	1300mg/kg
C34-C40	5600mg/kg
Total Polycyclic Aromatic Hydrocarbons (PAH's)	20mg/kg
Phenols (halogenated)	1mg/kg
Phenols (non-halogenated)	60mg/kg
Monocyclic aromatic hydrocarbons *(Total sum of benzene, toluene, ethyl, benzene, xylenes (including ortho, para and meta xylenes) and styrene)*	7mg/kg

	Benzene	1mg/kg
areas of pre-existing disturbance	means areas where environmental values have been negatively impacted as a result of anthropogenic activity and these impacts are still evident. Areas of pre-disturbance may include areas where legal clearing, logging, timber harvesting, or grazing activities have previously occurred, where high densities of weed or pest species are present which have inhibited re-colonisation of native regrowth, or where there is existing infrastructure (regardless of whether the infrastructure is associated with the authorised petroleum activities). The term 'areas of pre-disturbance' does not include areas that have been impacted by wildfire/s, controlled burning, flood or natural vegetation die-back.	
assessed or assessment	by a suitably qualified and experienced person in relation to a consequence assessment of a dam, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit of the assessment: (a) exactly what has been assessed and the precise nature of that determination; (b) the relevant legislative, regulatory and technical criteria on which the assessment has been based; (c) the relevant data and facts on which the assessment has been based, the source of that material, and the efforts made to obtain all relevant data and facts; and (d) the reasoning on which the assessment has been based using the relevant data and facts, and the relevant criteria.	
associated water	means underground water taken or interfered with, if the taking or interference happens during the course of, or results from, the carrying out of another authorised activity under a petroleum authority, such as a petroleum well, and includes waters also known as produced formation water. The term includes all contaminants suspended or dissolved within the water.	
associated works	in relation to a dam, means: (a) operations of any kind and all things constructed, erected or installed for that dam; and (b) any land used for those operations	
Australian Standard 3580	means any of the following publications: • AS3580.10.1 Methods for sampling and analysis of ambient air—Determination of particulate matter—Deposited matter—Gravimetric method. • AS3580.9.6 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—PM10 high volume sampler with size-selective inlet— Gravimetric method	

	• AS3580.9.9 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter— PM10 low volume sampler—Gravimetric ampler.
Australian Standard 4323	means Australian Standard 4323.1:1995 *Stationary source emissions method 1: Selection of sampling positions*.
bed	of any waters, has the meaning in Schedule 19 of the Environmental Protection Regulation 2019 and— (a) includes an area covered, permanently or intermittently, by tidal or non-tidal waters; but (b) does not include land adjoining or adjacent to the bed that is from time to time covered by floodwater.
being or intended to be utilised by the landholder or overlapping tenure holder	for significantly disturbed land, means there is a written agreement (e.g. land and compensation agreement) between the landholder or the overlapping tenure holder and the holder of the environmental authority identifying that the landholder or the overlapping tenure holder has a preferred use of the land such that rehabilitation standards for revegetation by the holder of the environmental authority are not required. For dams, means there is a written agreement (e.g. land and compensation agreement) between the landholder or the overlapping tenure holder and the holder of the environmental authority identifying that the landholder or the overlapping tenure holder has a preferred use for the dam such that rehabilitation standards for revegetation by the holder of the environmental authority are not required.
biodiversity values	for the purposes of this environmental authority, means environmentally sensitive areas, prescribed environmental matters and wetlands.
bore	means a water observation bore or a water supply bore that is either sub-artesian or artesian.
brine	means saline water with a total dissolved solid concentration greater than 40 000 mg/l.
Category A Environmentally Sensitive Area	means any area listed in Schedule 19, Part 1 of the Environmental Protection Regulation 2019.
Category B Environmentally Sensitive Area	means any area listed in Schedule 10, Part 2 of the Environmental Protection Regulation 2019.
Category C Environmentally Sensitive Area	means any of the following areas: • nature refuges as defined in the conservation agreement for that refuge under the *Nature Conservation Act 1992* koala habitat areas as defined under the Nature Conservation (Koala) Conservation Plan 2006 • state forests or timber reserves as defined under the *Forestry Act 1959* • regional parks (previously known as resource reserves) under the Nature *Conservation Act 1992* • an area validated as 'essential habitat' from ground-truthing surveys in accordance with the Vegetation Management Act 1999 for a

	species of wildlife listed as endangered or vulnerable under the *Nature Conservation Act 1992* • 'of concern regional ecosystems' that are remnant vegetation and identified in the database called 'RE description database' containing regional ecosystem numbers and descriptions.
certification (in relation to structures which are dams or levees - Schedule D)	means assessment and approval must be undertaken by a suitably qualified and experienced person in relation to any assessment or documentation required by this Manual, including design plans, 'as constructed' drawings and specifications, construction, operation or an annual report regarding regulated structures, undertaken in accordance with the Board of Professional Engineers of Queensland Policy Certification by RPEQs (ID: 1.4 (2A)).
certified or certification	in relation to any matter other than a design plan, 'as constructed' drawings or an annual report regarding dams means, a Statutory Declaration by a suitably qualified person or suitably qualified third party accompanying the written document stating: • the person's qualifications and experience relevant to the function • that the person has not knowingly included false, misleading or incomplete information in the document • that the person has not knowingly failed to reveal any relevant information or document to the administering authority • that the document addresses the relevant matters for the function and is factually • correct; and • that the opinions expressed in the document are honestly and reasonably held.
clearing	for vegetation means removing, cutting down, ringbarking, pushing over, poisoning or destroying in any way including by burning, flooding or draining; but does not include destroying standing vegetation by stock, or lopping a tree.
consequence	in relation to a structure as defined, means the potential for environmental harm resulting from the collapse or failure of the structure to perform its primary purpose of containing, diverting or controlling flowable substances.
consequence category	means a category, either low, significant or high, into which a dam is assessed as a result of the application of tables and other criteria in the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/193313).*
construction or constructed	in relation to a dam includes building a new dam and modifying or lifting an existing dam, but does not include investigations and testing necessary for the purpose of preparing a design plan.
control measure/s	has the meaning in section 31 of the Environmental Protection Regulation 2019 and means a device, equipment, structure, or management strategy used to prevent or control the release of a contaminant or waste to the environment.

daily peak design capacity	for sewage treatment works, has the meaning in Schedule 2, section 63(4) of the Environmental Protection Regulation 2019 as the higher equivalent person (EP) for the works calculated using each of the formulae found in the definition for EP.
dam(s)	means a land-based structure or a void that contains, diverts or controls flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based structure or void and associated works.
design storage allowance or DSA	means an available volume, estimated in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures ESR/2016/19337),* published by the administering authority, as amended from time to time, that must be provided in a dam to an annual exceedance probability specified in that Manual.
document/s	has the meaning in the *Acts Interpretation Act 1954* and means: • any paper or other material on which there is writing; and • any paper or other material on which there are marks; and • figures, symbols or perforations having a meaning for a person qualified to interpret them; and • any disc, tape or other article or any material from which sounds, images, writings or messages are capable of being produced or reproduced (with or without the aid of another article or device).
enclosed flare	means a device where the residual gas is burned in a cylindrical or rectilinear enclosure that includes a burning system and a damper where air for the combustion reaction is admitted.
environmental harm	has the meaning in section 14 of the *Environmental Protection Act 1994* and means any adverse effect, or potential adverse effect (whether temporary or permanent and of whatever magnitude, duration or frequency) on an environmental value, and includes environmental nuisance. Environmental harm may be caused by an activity— (a) whether the harm is a direct or indirect result of the activity; or (b) whether the harm results from the activity alone or from the combined effects of the activity and other activities or factors.
environmental nuisance	has the meaning in section 15 of the *Environmental Protection Act 1994* and means unreasonable interference or likely interference with an environmental value caused by— (a) aerosols, fumes, light, noise, odour, particles or smoke; or (b) an unhealthy, offensive or unsightly condition because of contamination; or (c) another way prescribed by regulation
environmentally sensitive area	means Category A, B or C environmentally sensitive areas (ESAs).
equivalent person/s or EP	has the meaning under section 3 of the Planning Guidelines For Water Supply and Sewerage, 2005, published by the Queensland Government.

	It is calculated in accordance with Schedule 2, Section 63(4) of the Environmental Protection Regulation 2019 where: • EP = V/200 where V is the volume, in litres, of the average dry weather flow of sewage that can be treated at the works in a day; or • EP = M/2.5 where M is the mass, in grams, of phosphorus in the influent that the works are designed to treat as the inlet load in a day.

essential petroleum activities	means activities that are essential to bringing the resource to the surface and are only the following:
	• low impact petroleum activities
	• geophysical, geotechnical, geological, topographic and cadastral surveys including seismic, sample /test / geotechnical pits, core holes)
	• single well sites up to 1.5 ha
	• For multi-well sites, an additional 0.25 ha per additional well up to a maximum of 3 ha
	• If well(s) require stimulation:
	  ○ For single well sites, not exceeding 1.65 ha of disturbance
	  ○ For multi-well sites, not exceeding 3.8 ha of disturbance
	• associated infrastructure located on a well site necessary for the construction and operations of wells:
	  ○ water pumps and generators
	  ○ flare pits
	  ○ chemical / fuel storages
	  ○ sumps for residual drilling material and drilling fluids
	  ○ tanks, or dams which are not significant or high consequence dams to contain wastewater (e.g. stimulation flow back waters, produced water)
	  ○ pipe laydown areas
	  ○ soil and vegetation stockpile areas
	  ○ a temporary camp associated with a drilling rig that may involve sewage treatment works that are no release works
	  ○ temporary administration sites and warehouses
	  ○ dust suppression activities using water that meets the quality and operational standards approved under the environmental authority
	• communication and power lines that are necessary for the undertaking of petroleum activities and that are located within well sites, well pads and pipeline right of ways without increasing the disturbance area of petroleum activities
	• supporting access tracks
	• gas gathering / flow pipelines from a well head to the initial compression facility.

	• oil gathering / flow pipelines from a well head to the initial processing facility. • activities necessary to achieve compliance with the conditions of the environmental authority in relation to another essential petroleum activity (e.g. sediment and erosion control measures, rehabilitation).
existing structure	means a structure that prior to 22 November 2020 meets any or both of the following, a structure: (a) with a design that is in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (ESR/2016/1933, Version 5.02 or more recent) and that is considerably in progress; (b) that is under considerable construction or that is constructed.
flare pit	for the purposes of Schedule D (dam schedule), means containment area where any produced fluid that is discovered in an over-pressured reservoir during a drilling operation is diverted. The flare pit may be used during the drilling, work over process and operation of a petroleum well.
floodplains	has the meaning in the *Water Act 2000* and means an area of reasonably flat land adjacent to a watercourse that— • is covered from time to time by floodwater overflowing from the watercourse; and • does not, other than in an upper valley reach, confine floodwater to generally follow the path of the watercourse; and • has finer sediment deposits than the sediment deposits of any bench, bar or in-stream island of the watercourse.
flowable substance/s	means matter or a mixture of materials which can flow under any conditions potentially affecting that substance. Constituents of a flowable substance can include water, other liquids fluids or solids, or a mixture that includes water and any other liquids fluids or solids either in solution or suspension.
fuel burning or combustion facility	means a permanent fuel burning or combustion equipment which in isolation, or combined in operation, or which are interconnected, is, or are capable of burning more than 500 kg of fuel in an hour.
GDA	means Geocentric Datum of Australia.
green waste	means waste that is grass cuttings, trees, bushes, shrubs, material lopped from trees, untreated timber or other waste that is similar in nature but does not include pest species (restricted matter).
holder	means: (a) where this document is an environmental authority, any person who is the holder of, or is acting under, that environmental authority; or (b) where this document is a development approval, any person who is the registered operator for that development approval.
hydraulic integrity	refers to the capacity of a dam to contain or safely pass flowable substances based on its design.

incidental activity/ies	For this environmental authority means an activity that is not a specified relevant activity and is necessary to carry out the activities authorised by this environmental authority.
impulsive (for noise)	means sound characterised by brief excursions of sound pressure (acoustic impulses) that significantly exceed the background sound pressure. The duration of a single impulsive sound is usually less than one second.
inventory	in relation to existing petroleum activities means: • relevant shapefiles which clearly show the location and type of infrastructure; and • metadata for the relevant shapefiles which include the infrastructure ID, latitude and longitude, and date of disturbance for the activity.
LAeq, adj, 15 mins	means the A-weighted sound pressure level of a continuous steady sound, adjusted for tonal character, that within any 15 minute period has the same square sound pressure as a sound level that varies with time.
land degradation	has the meaning in the Vegetation Management Act 1999 and means the following: • soil erosion • rising water tables • the expression of salinity • mass movement by gravity of soil or rock • stream bank instability • a process that results in declining water quality
land farm	a bioremediation system to reduce concentrations of petroleum constituents in soil through biodegradation. Land farming usually involves stimulating aerobic microbial activity in soils through aeration and/or the addition of minerals, nutrients and moisture.
landholder's active groundwater bore	means bores that are able to continue to provide a reasonable yield of water in terms of quantity for the bores authorised purpose or use. This term does not include monitoring bores owned by the administering authority of the Water Act 2000.
linear infrastructure	means communication and powerlines, pipelines, flowlines, roads and access tracks.
liquid	means a substance which is flowing and offers no permanent resistance to changes of shape.
low consequence dam	means any dam that is not classified as high or significant as assessed using the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/193314)*, published by the administering authority, as amended from time to time.
low impact petroleum activities	means petroleum activities which do not result in the clearing of native vegetation, cause disruption to soil profiles through earthworks or excavation or result in significant disturbance to land which cannot be rehabilitated immediately using hand tools after the activity is completed.

	Examples of such activities include but are not necessarily limited to soil surveys (excluding test pits), topographic surveys, cadastral surveys and ecological surveys, may include installation of monitoring equipment provided that it is within the meaning of low impact and traversing land by car or foot via existing access tracks or routes or in such a way that does not result in permanent damage to vegetation.
manual	means the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/193314)* published by the administering authority, as amended from time to time.
Max LpA, 15 min	means the absolute maximum instantaneous A-weighted sound pressure level, measured over 15 minutes.
Max LpZ, 15 min	means the maximum value of the Z-weighted sound pressure level measured over 15 minutes.
medium term noise event	is a noise exposure, when perceived at a sensitive receptor, persists for an aggregate period not greater than five (5) days and does not re-occur for a period of at least four (4) weeks. Re-occurrence is deemed to apply where a noise of comparable level is observed at the same receptor location for a period of one hour or more, even if it originates from a difference source or source location.
methodology	means the science of method, especially dealing with the logical principles underlying the organisation of the various special sciences, and the conduct of scientific inquiry.
mix-bury cover method	means the stabilisation of residual drilling solids in the bottom of a sump by mixing with subsoil and which occurs in accordance with the following methodology: • the base of the subsoil and residual solid mixture must be separated from the groundwater table by at least one metre of a continuous layer of impermeable subsoil material (kw=10–8m/s) or subsoil with a clay content of greater than 20%; and • the residual solids is mixed with subsoil in the sump and cover; and • the subsoil and residual solids is mixed at least three parts subsoil to one part waste (v/v); and • a minimum of one metre of clean subsoil must be placed over the subsoil and residual solids mixture; and • topsoil is replaced
month	has the meaning in the *Acts Interpretation Act 1954* and means a calendar month and is a period starting at the beginning of any day of one (1) of the 12 named months and ending— • immediately before the beginning of the corresponding day of the next named month; or • if there is no such corresponding day—at the end of the next named month.
NATA accreditation	means accreditation by the National Association of Testing Authorities Australia.
operational plan	includes:

	(a) normal operating procedures and rules (including clear documentation and definition of process inputs in the DSA);contingency and emergency action plans including operating procedures designed to avoid and/or minimise environmental impacts including threats to human life resulting from any overtopping or loss of structural integrity of the regulated structure.
pest species (restricted matter)	has the same meaning as 'declared pest' in the *Vegetation Management Act 1999* and means a plant or animal, other than a native species of plant or animal, that is— (a) invasive biosecurity matter under the *Biosecurity Act 2014;* or (b) controlled biosecurity matter or regulated biosecurity matter under the *Biosecurity Act 2014*.
prescribed contaminants	has the meaning in section 440ZD of the *Environmental Protection Act 1994.*
prescribed environmental matter	has the meaning in section 10 of the *Environmental Offsets Act 2014*, limited to the matters of State environmental significance listed in schedule 2 of the Environmental Offsets Regulation 2014.
prescribed storage gases	has the meaning in section 12 of the *Petroleum and Gas (Production and Safety) Act 2004*.
primary protection zone	means an area within 200m from the boundary of any Category A, B or C ESA.
protection zone	means the primary protection zone of any Category A, B or C ESA or the secondary protection zone of any Category A or B ESA.
regional ecosystem	has the meaning in the Methodology for Surveying and Mapping of Regional Ecosystems and Vegetation Communities in Queensland (Version 3.2 August 2012) and means a vegetation community in a bioregion that is consistently associated with a particular combination of geology, landform and soil. Regional ecosystems of Queensland were originally described in Sattler and Williams (1999). The Regional Ecosystem Description Database (Queensland Herbarium 2013) is maintained by Queensland Herbarium and contains the current descriptions of regional ecosystems.
regulated dam	means any dam in the significant or high consequence category as assessed using the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ESR/2016/19339),* published by the administering authority , as amended from time to time.
regulated structure	means any structure in the significant or high consequence category as assessed using the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/193315)* published by the administering authority and amended from time to time. A regulated structure does not include: • a fabricated or manufactured tank or container, designed and constructed to an Australian Standard that deals with strength and structural integrity of that tank or container; • a sump or earthen pit used to store residual drilling material and drilling fluid only for the duration of drilling and well completion activities;

	• a flare pit.
rehabilitation or rehabilitated	means the process of reshaping and revegetating land to restore it to a stable landform and in accordance with acceptance criteria and, where relevant, includes remediation of contaminated land. For the purposes of pipeline rehabilitation, rehabilitation includes reinstatement, revegetation and restoration.
reinstate or reinstatement	for pipelines, means the process of bulk earth works and structural replacement of pre-existing conditions of a site (i.e. soil surface typography, watercourses, culverts, fences and gates and other landscape(d) features) and is detailed in the Australian Pipeline Industry Association (APIA) Code of Environmental Practice: Onshore Pipelines (2013).
reporting limit	means the lowest concentration that can be reliably measured within specified limits of precision and accuracy during routine laboratory operating conditions. For many analytes, the reporting limit is selected as the lowest non-zero standard in the calibration curve. Results that fall below the reporting limit will be reported as "less than" the value of the reporting limit. The reporting limit is also referred to as the practical quantitation limit or the limit of quantitation. For polycyclic aromatic hydrocarbons, the reporting limit must be based on super-ultra trace methods and, depending on the specific polycyclic aromatic hydrocarbon, will range between 0.005 ug/L–0.02 ug/L.
residual drilling material	means waste drilling materials including workover solids and fluids, muds and cuttings or cement returns from well holes and which have been left behind after the drilling fluids are pumped out.
restricted stimulation fluids	has the meaning in section 206 of the *Environmental Protection Act 1994* and means fluids used for the purpose of stimulation, including fracturing, that contain the following chemicals in more than the maximum amount prescribed under a regulation— (a) petroleum hydrocarbons containing benzene, ethylbenzene, toluene or xylene (b) chemicals that produce, or are likely to produce, benzene, ethylbenzene, toluene or xylene as the chemical breaks down in the environment. For clarity, the term restricted stimulation fluid only applies to fluid injected down well post-perforation. The amount of any chemical component of the stimulation fluid is not to be measured in relation to the amount of water included in the stimulation fluid.
secondary protection zone	in relation to a Category A or Category B ESA means an area within 100 metres from the boundary of the primary protection zone.
sensitive place	means: • a dwelling (including residential allotment, mobile home or caravan park, residential marina or other residential premises, motel, hotel or hostel) • a library, childcare centre, kindergarten, school, university or other educational institution • a medical centre, surgery or hospital

	• a protected area • a public park or garden that is open to the public (whether or not on payment of money) for use other than for sport or organised entertainment • a work place used as an office or for business or commercial purposes, which is not part of the petroleum activity(ies) and does not include employees accommodation or public roads • for noise, a place defined as a sensitive receptor for the purposes of the Environmental Protection (Noise) Policy 2019.
sensitive receptor	is defined in Schedule 2 of the Environmental Protection (Noise) Policy 2019, and means an area or place where noise is measured.
significantly disturbed or significant disturbance or significant disturbance to land	Land is significantly disturbed if— (a) it is contaminated land; or (b) it has been disturbed and human intervention is needed to rehabilitate it – (i) to a condition required under the relevant environmental authority; or (ii) if the environmental authority does not require the land to be rehabilitated to a particular condition—to the condition it was in immediately before the disturbance. However, for the purpose of this authority the following areas are not significantly disturbed: (c) areas off the petroleum authority (e.g. roads or tracks which provide access to the petroleum authority); (d) areas previously significantly disturbed which have been rehabilitated to the final acceptance criteria as identified in 'Schedule J – Rehabilitation' and that continue to meet the final acceptance criteria; (e) areas under permanent infrastructure (e.g. roads, bridges, buildings) as agreed in writing by the landholder, (f) areas that were significantly disturbed prior to the grant of the petroleum authority, unless: a. those areas are re-disturbed by the petroleum authority holder during the course of carrying out the petroleum activities' b. those areas and activities were conducted on a petroleum tenure that was replaced by the current tenure (e.g. through conditional surrender or the transition from an authority to prospect to a petroleum lease).
significant residual impact	has the meaning in section 8 of the *Environmental Offsets Act 2014*.
specified relevant activities	for this environmental activity means an activity that but for being carried out as a resource activity, would otherwise be an activity prescribed under section 19 of the Environmental Protection Act 1994 as an

	environmentally relevant activity and is identified in the cover pages of this environmental authority
stable	has the meaning in Schedule 8, Part 1 of the Environmental Protection Regulation 2019 and, for a site, means the rehabilitation and restoration of the site is enduring or permanent so that the site is unlikely to collapse, erode or subside.
stimulation	means a technique used to increase the permeability of natural underground reservoir that is undertaken above the formation pressure and involves the addition of chemicals. It includes hydraulic fracturing / hydrofraccing, fracture acidizing and the use of proppant treatments.
stimulation fluid	means the fluid injected underground to increase permeability. For clarity, the term stimulation fluid only applies to fluid injected down well post-perforation. The amount of any chemical component of the stimulation fluid is not to be measured in relation to the amount of water included in the stimulation fluid.
stimulation impact zone	means a 100m maximum radial distance from the stimulation target location within a gas producing formation.
structure	means a dam or levee.
suitably qualified and experienced person	in relation to regulated structures means a person who is a Registered Professional Engineer of Queensland (RPEQ) under the provisions of the *Professional Engineers Act 2002*, and has demonstrated competency and relevant experience: • for regulated dams, an RPEQ who is a civil engineer with the required qualifications in dam safety and dam design • for regulated levees, an RPEQ who is a civil engineer with the required qualifications in the design of flood protection embankments. Note: It is permissible that a suitably qualified and experienced person obtain subsidiary certification from an RPEQ who has demonstrated competence and relevant experience in either geomechanics, hydraulic design or engineering hydrology.
suitably qualified person	means a person who has professional qualifications, training or skills or experience relevant to the nominated subject matters and can give authoritative assessment, advice and analysis about performance relevant to the subject matters using relevant protocols, standards, methods or literature.
suitably qualified third party	means a person who: (a) has qualifications and experience relevant to performing the function including but not limited to: i. a bachelor's degree in science or engineering; and ii. 3 years' experience in undertaking soil contamination assessments; and (b) is a member of at least one organisation prescribed in Schedule 14 of the Environmental Protection Regulation 2019; and

	(c) not be an employee of, nor have a financial interest or any involvement which would lead to a conflict of interest with the holder(s) of the environmental authority.
sump	For the purposes of Schedule D (dam schedule), means a pit in which waste residual drilling material or drilling fluids are stored for the duration of drilling activities.
synthetic based drilling mud	means mud were the base fluid is a synthetic oil, consisting of chemical compounds which are artificially made or synthesised by chemically modifying petroleum components or other raw materials rather than the whole crude oil.
transmissivity	means the rate of flow of water through a vertical strip of aquifer which is one unit wide and which extends the full saturated depth of the aquifer.
valid complaint	means all complaints unless considered by the administering authority to be frivolous, vexatious or based on mistaken belief
void	means any man-made, open excavation in the ground (includes borrow pits, drill sumps, frac pits, flare pits, cavitation pits and trenches).
waste and resource management hierarchy	has the meaning provided in section 9 of the Waste Reduction and Recycling Act 2011 and is the following precepts, listed in the preferred order in which waste and resource management options should be considered— (a) AVOID unnecessary resource consumption (b) REDUCE waste generation and disposal (c) RE-USE waste resources without further manufacturing (d) RECYCLE waste resources to make the same or different products (e) RECOVER waste resources, including the recovery of energy (f) TREAT waste before disposal, including reducing the hazardous nature of waste (g) DISPOSE of waste only if there is no viable alternative.
waste and resource management principles	has the meaning provided in section 4(2)(b) of the *Waste Reduction and Recycling Act 2011* and means the: (a) polluter pays principle (b) user pays principle (c) proximity principle (d) product stewardship principle.
waters	includes all or any part of a creek, river, stream, lake, lagoon, swamp, wetland, spring, unconfined surface water, unconfined water in natural or artificial watercourses, bed and bank of any waters, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and underground water
well integrity	the ability of a well to contain the substances flowing through it.

wetland	for the purpose of this environmental authority, wetland means:
	• areas shown on the 'Map of Queensland wetland environmental values' which is a document approved by the chief executive and published by the department, as amended from time to time.
	• areas defined under the Queensland Wetlands Program as permanent or periodic / intermittent inundation, with water that is static or flowing fresh, brackish or salt, including areas of marine water, the depth of which at low tide does not exceed six (6) metres, and possess one or more of the following attributes:
	  ○ at least periodically, the land supports plants or animals that are adapted to and dependent on living in wet conditions for at least part of their life cycle, or
	  ○ the substratum is predominantly undrained soils that are saturated, flooded or ponded long enough to develop anaerobic conditions in the upper layers, or
	  ○ the substratum is not soil and is saturated with water, or covered by water at some time.
	The term wetland includes riverine, lacustrine, estuarine, marine and palustrine wetlands; and it does not include a Great Artesian Basin Spring or a subterranean wetland that is a cave or aquifer.

wetland of high ecological significance	means a wetland that meets the definition of a wetland and that is shown as a wetland of 'high ecological significance' or wetland of 'high ecological value' on the Map of Queensland wetland environmental values
wetland of general ecological significance / general ecologically significant wetland	means a wetland that meets the definition of a wetland and that is shown as a wetland of 'general environmental significance' or wetland of 'other environmental value' on the Map of Queensland wetland environmental values.

Appendix C – Ecological Assessment for PL 1055 (E2M, 2021)

Ecological Assessment

Santos
Petroleum Lease 1055 (Bantam)

[redacted]

Issue Date: 15 March 2021

[redacted]

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Document management

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2	15/03/2021	Issued for use	J. van Osta J. Gamack	B. Dreis	

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Definitions

Term	Definition
Disturbance footprint	The area that is proposed to be impacted by the project.
The project	Bantam (PL 1055) petroleum activities.
Regional Ecosystem	A vegetation community in a bioregion that is consistently associated with a particular combination of geology, landform and soil. Regional Ecosystems are described in the Regional Ecosystem Description Database, produced by the Queensland Herbarium.
Regulated vegetation	Vegetation that is mapped within the Regulated Vegetation Management Map produced by DNRME.
The PL	Petroleum Lease (PL) 1055 (Bantam).
Suitable habitat	A species preferred environment required to sustain a viable population. Suitable habitat may include breeding, foraging and shelter resources for fauna or preferred environmental conditions of flora.
Threatened species	Extinct (EX), extinct in the wild (XW), critically endangered (CE), endangered (E), vulnerable (V) or conservation dependent (CD) under the *Environment Protection and Biodiversity Conservation Act 1999* or extinct in the wild (PE), Endangered, Vulnerable or Near Threatened (EVNT) under the *Nature Conservation Act 1992*.

Abbreviations

Abbreviation	Description
DAWE	Commonwealth Government Department of Agriculture, Water and the Environment (formerly Department of Environment and Energy (DEE))
DES	Queensland Department of Environment and Science
DNRME	Queensland Department of Natural Resources, Mines and Energy (now Department of Resources)
E2M	E2M Pty Ltd
EO Act	*Environmental Offsets Act 2014*
EO Regulation	*Environmental Offsets Regulation 2014*
EP Act	*Environmental Protection Act 1994*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
NC Act	*Nature Conservation Act 1992*
RE	Regional Ecosystem
SEA	Strategic Environmental Area, defined under the EO Regulation
SRI	Significant Residual Impact

1 Introduction

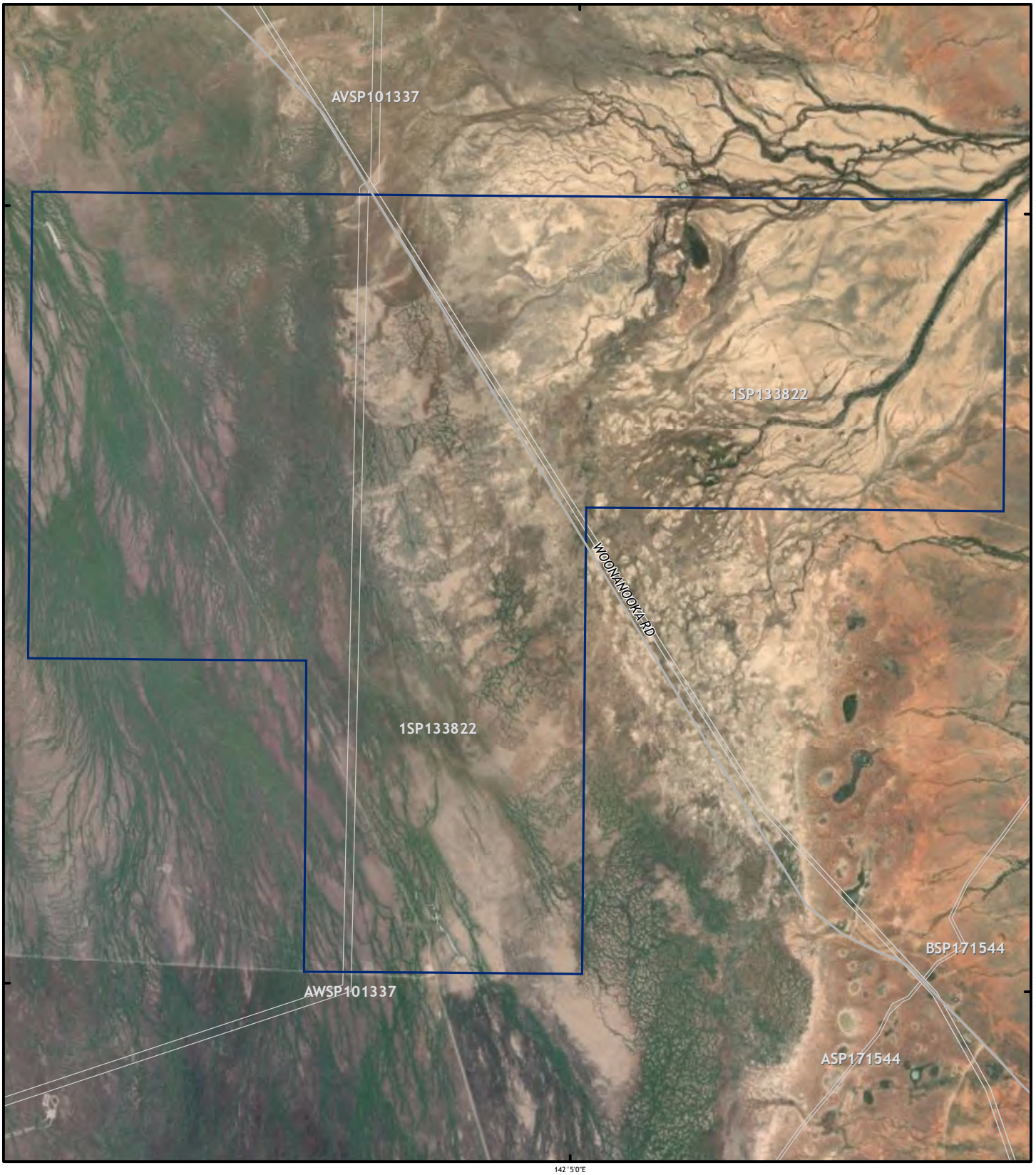
1.1 Project background and scope

Santos is proposing new petroleum activities within Petroleum Lease (PL) 1055 (Bantam), herein referred to as 'the PL', and has engaged E2M to undertake an ecological assessment for the PL. The scope of this assessment is to:

- Conduct a review of Commonwealth and State Government environmental mapping, databases and legislative considerations
- Undertake a field assessment to ground-truth vegetation communities and habitat for species listed as Matters of National Environmental Significance (MNES) and/or Matters of State Environmental Significance (MSES) within the PL
- Provide a preliminary assessment of potential impacts of the proposed development on identified MNES and MSES
- Detail management strategies to avoid, minimise or mitigate potential impacts to MNES and MSES within the PL; and
- Undertake preliminary significant residual impact (SRI) assessments to determine potential offset requirements for identified MNES and MSES.

1.2 Site description

The PL is located within the Cooper Creek floodplain, approximately 30 km north-east of the Ballera gas plant. The PL is approximately 6,706 ha and is entirely contained within Lot 1 on SP133822. Land within the PL is predominately used for cattle grazing. The PL and surrounding environs are depicted in Figure 1.



Legend

- Road
- Petroleum Lease
- Cadastre

N

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Kilometres

Coordinate System: GDA 1994 MGA Zone 54
Projection: Transverse Mercator

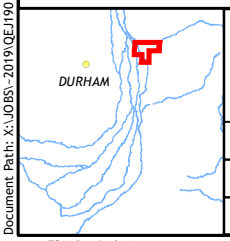

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FIGURE 1: SITE LOCATION - PL 1055

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1 of 1	QEJ19010	2

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2 Methods

2.1 Desktop assessment

A desktop assessment was undertaken to review Commonwealth and State Government environmental mapping and databases to identify potential MNES and MSES within the PL. The following legislation, associated triggers and databases were reviewed:

- Commonwealth Department of Agriculture, Water and the Environment (DAWE) Protected Matters Report, for a search radius of 100 km from the approximate centre of the PL (-27.20274, 142.07645)
- Department of Environment and Science (DES) MSES mapping for the PL
- Department of Natural Resources, Mines and Energy (DNRME) Regulated Vegetation Management Map, Vegetation Management Supporting Map (Regional Ecosystem mapping) and Essential Habitat Map for the PL
- DES Protected Plants Flora Survey Trigger mapping for the PL
- DES WildNet Database, for a 100 km buffer around the boundaries of the PL
- DES Map of Environmentally Sensitive Areas for the PL
- Queensland Globe environmental mapping layers for the PL
- Atlas of Living Australia species records; and
- The latest available aerial photography.

2.2 Field assessment

A field assessment of the PL was conducted by two E2M ecologists (Brad Dreis and John van Osta) from 1 to 4 April 2019 and from 24 to 29 August 2019. Brad Dreis and John van Osta are suitably qualified persons for the purposes of undertaking ecological field surveys. The field assessment was undertaken in conjunction with field assessments of PL 1047 (Okotoko), PL 1058 (Bearcat), PL 1060 (Jarrar) and Potential Commercial Area 251 (Greater Okotoko).

The following data were collected during the survey:

- Delineation of the ground-truthed extents of RE polygons, with a particular focus on delineating homogenous polygons of wetland REs. Ground-truthed Regional Ecosystems (GTREs) were delineated in accordance with Nelder *et al* (2019).
- Assessment of potential habitat for MNES and MSES fauna
- Targeted searches for grey grasswren (*Amytornis barbatus*) within areas of suitable habitat; and
- Opportunistic observations of fauna encountered throughout the PL.

Trimble TDC100 Global Positioning System (GPS) devices were used to delineate the extent of vegetation communities within the PL and record species and habitat data. Captured data was validated, mapped and assessed using a geographical information system, whereby the development footprint and observed features and extents were overlaid on the relevant regulatory mapping (GDA94/MGA zone 54).

2.3 Regional Ecosystem verification

To verify the extent of the vegetation communities in the field, a combination of Secondary, Tertiary and Quaternary type surveys using the CORVEG Methodology (outlined within *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland* (Neldner *et al*. 2019)) were used. Secondary surveys were conducted to collect detailed floristic and structural information, while Tertiary surveys were conducted in REs that had not been flooded and a detailed floristic composition could not be recorded. Quaternary surveys were conducted as a rapid assessment method to characterise the vegetation community.

Where possible, vegetation communities were verified to single homogenous RE polygons in accordance with the Regional Ecosystem Description Database (REDD) (Queensland Herbarium 2019a). However, in areas where multiple REs occurred on a fine scale over extensive areas, such as the floodplain matrix, heterogenous RE polygons were assigned, which included an estimate of the proportion of each RE within each polygon (Neldner *et al*. 2019).

Ground-truthed vegetation communities are used to determine:

- The presence of EPBC Act listed Threatened Ecological Communities (TEC), none of which occur within the PL; and
- Habitat for threatened species.

2.4 Likelihood of occurrence assessment

Threatened flora and fauna species identified in the desktop review were assessed for their likelihood of occurrence within the PL. This assessment considered the species distribution, habitat requirements and historical records in proximity to the PL as well as observations and evidence of occurrence, habitat suitability, threats and on-site conditions identified during the field survey.

The likelihood of occurrence of threatened, migratory and marine species were based on the following criteria:

- **Likely to occur**: suitable habitat to support the species is present and the species has previously been recorded within 100 km of the PL (the desktop search extent)
- **Possible occurrence**: The PL is within the species known distribution and suitable habitat to support the species is present; however
  - the species has not previously been recorded within the desktop search extent; and/or
  - suitable habitat is degraded or of limited extent, thereby reducing the likelihood of the species occurrence.
- **Unlikely to occur**: the PL does not comprise suitable habitat for the species, or is outside of the species known distribution.

2.5 Assumptions and limitations

Ecological surveys have a range of inherent limitations associated with seasonal timing of the survey, variable climate conditions and species behaviour. As such, the survey conducted only represents a "snapshot" in time and may not provide a true indication of presence or absence of flora and fauna species within the PL. In light of the identified limitations, precautionary principles were applied to assume presence where necessary for impact assessment purposes.

Preliminary impact assessments were based on design information that includes the disturbance assumptions identified within Section 5.1. The actual impact arising from the proposed works may differ to the preliminary assessment. The self-assessment has only considered impacts resulting from the proposed works and has not considered cumulative impacts.

3 Results

3.1 Desktop assessment

3.1.1 Commonwealth matters

A Protected Matters Report, generated by the DAWE, was generated to identify MNES that are predicted to occur within the PL (the search results have been included in Appendix A). Matters identified as potentially occurring within 100 km of the PL include:

- One wetland of International Importance (Coongie lakes)
- Eight threatened fauna species
- Three threatened flora species
- Nine migratory (marine, terrestrial, wetland) species
- 14 marine species.

A likelihood of occurrence assessment has been conducted for MNES flora and fauna species (Appendix C).

3.1.2 State matters

3.1.2.1 Vegetation Management Act 1999

The PL was mapped as entirely containing Category B (remnant) regulated vegetation. All Regional Ecosystems (REs) mapped within the PL by DNRME have a 'least concern' vegetation management class and 'no concern at present' biodiversity status (Queensland Herbarium 2019a).

3.1.2.2 Nature Conservation Act 1992

The Queensland Government WildNet database was searched within a 100 km buffer of the PL boundaries to identify the confirmed recorded presence of threatened flora and fauna species. The extract listed four bird, three mammal and four plant species (Appendix A). To determine potential presence within the PL, a likelihood of occurrence assessment has been conducted for these species (Appendix C).

3.1.2.2.1 NC Act Protected Plants

The *Nature Conservation Wildlife Regulation 2006* (NC Regulation) lists flora and fauna species considered to be extinct in the wild, Endangered, Vulnerable or Near Threatened (EVNT) or least concern in Queensland. Clearing of protected plants (i.e. EVNT species) is regulated by the NC Regulation. Furthermore, the State Government has produced a mapping layer which triggers a flora survey requirement if disturbance is proposed within a mapped high risk area. The PL does not contain mapped high risk areas.

3.1.3 Environmental Offsets Act 2014

The EO Act outlines the framework for environmental offsets within Queensland and how they should be provided. As defined within Section 7 of the EO Act, an environmental offset is an *activity undertaken to counterbalance a significant residual impact of a prescribed activity on a prescribed environmental matter*, such as matters of Commonwealth, State or local significance.

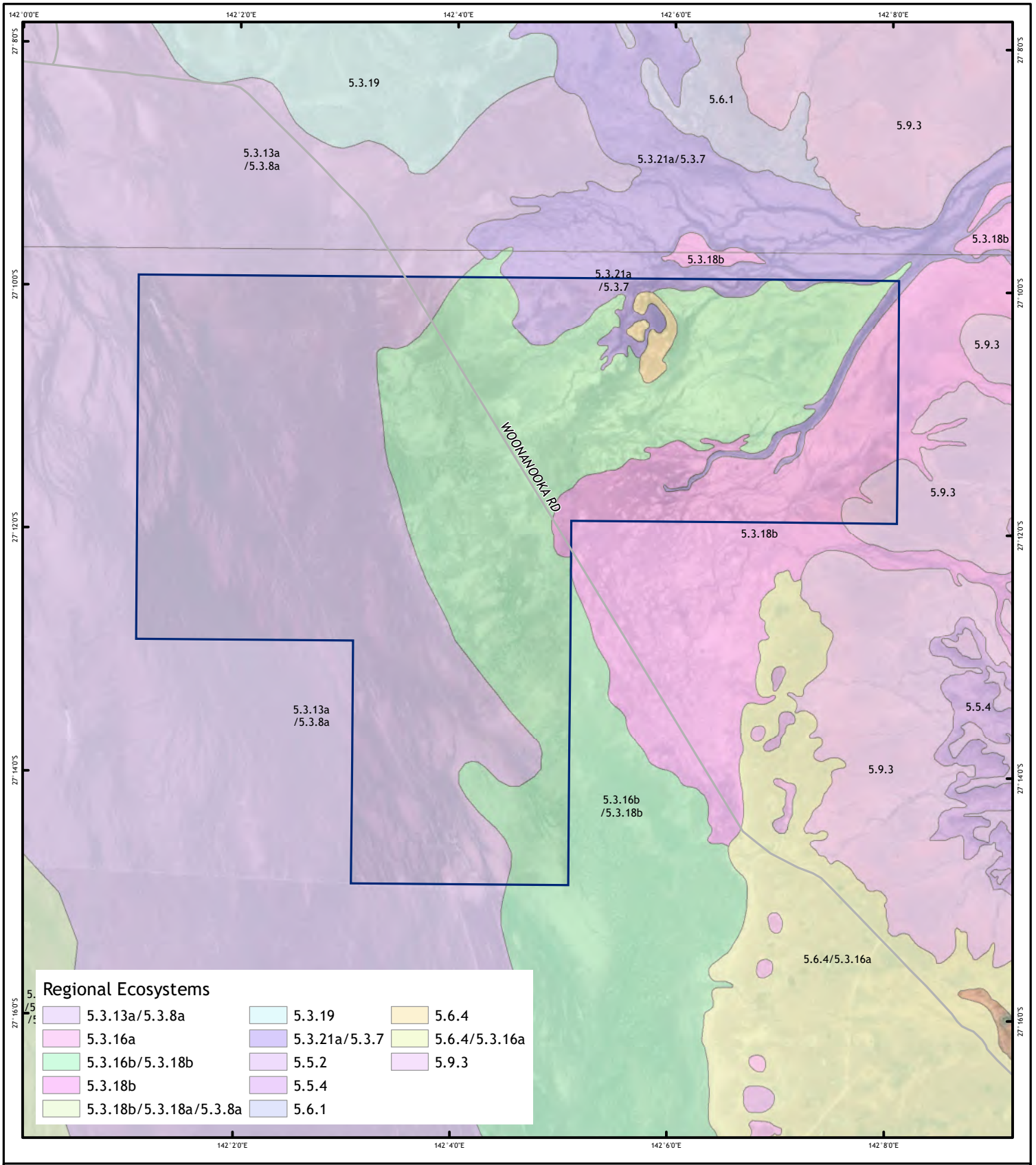
Environmental offsets are not an assessment trigger, but are imposed as a condition for a proposed activity. If a SRI on the prescribed environmental matter remains after the application of impact avoidance, minimisation and mitigation measures, an environmental offset may be required. MSES identified within the PL in the desktop assessment include:

- Threatened species listed under the NC Act
- Special least concern species listed under the NC Act
- Regulated vegetation - intersecting a watercourse
- Regulated vegetation - within 100 m of a Vegetation Management wetland
- Connectivity areas; and
- Channel Country Strategic Environmental Area (SEA).

3.1.4 Environmental Protection Act 1994

No Category A, B or C ESAs are mapped to occur within the PL on the Map of Environmentally Sensitive Areas produced by the DES. Other matters mapped as occurring within the PL include:

- Rivers
- Referable wetlands; and
- Dominant wetlands (51-100%).



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- Road
- Petroleum Lease

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Kilometres

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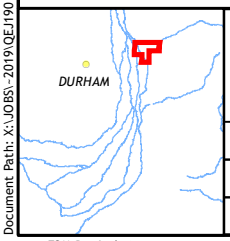
Projection: Transverse Mercator



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2	Issued for Use	DL	JVO	26/02/2021
1	Issued for Use	DL	JVO	19/02/2021

FIGURE 2: DNRME MAPPED REGIONAL ECOSYSTEMS - PL 1055

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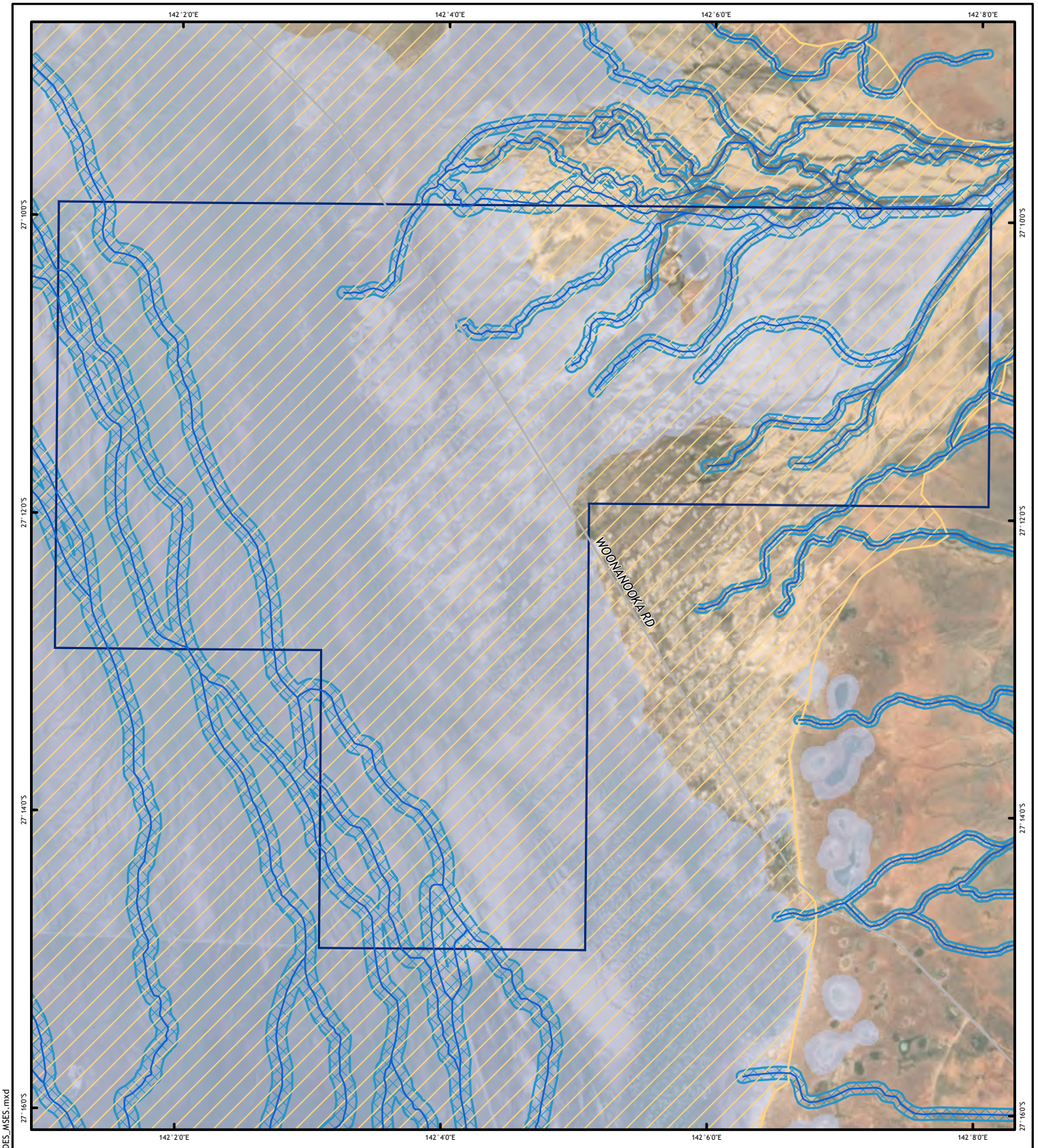

Legend

- Road
- MSES - Watercourse
- MSES Regulated Vegetation – Intersecting a Watercourse
- MSES Regulated Vegetation – within 100m of a Vegetation Management Wetland
- Channel Country Stategic Environmental Area

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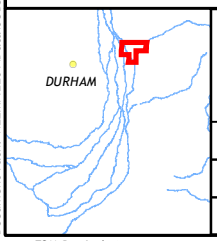
Kilometres

Coordinate System: GDA 1994 MGA Zone 54
Projection: Transverse Mercator



Notes:
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MSES Watercourses: © DES 2020
MSES Wetlands: © DES 2020
SEA: © DILGP 2019

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2	Issued for Use	DL	JVO	26/02/2021
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FIGURE 3: QUEENSLAND GOVERNMENT MAPPED MSES - PL 1055

Ecological Assessment Report
Santos

Map Number	Job Number	Rev
1 of 1	QEJ19010	2

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4 Field assessment results

4.1 Matters of National Environmental Significance

Five MNES have been identified as likely to occur within the PL. These MNES comprise one species listed as endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), grey grasswren (Section 4.1.1), and a further four species listed as migratory under the EPBC Act (Sections 4.1.2). In addition, 15 bird species listed as marine were identified as known or likely to occur (Section 4.1.3). Marine species, while not a MNES are protected under the EPBC Act through their relationship with the Commonwealth marine environment. Habitat associations for MNES species likely to occur within the PL are summarised in Table 1.

Table 1 MNES species likely to occur within the PL

Species	EPBC Act status	Regional Ecosystem (RE) associations	Area within the PL (ha)
Fork-tailed swift (*Apus pacificus*)	Marine and migratory	All REs	6,705.9
Glossy ibis (*Plegadis falcinellus*)	Marine and migratory	REs associated with riverine and palustrine wetlands, including: 5.3.7, 5.3.8a, 5.3.13a, 5.3.17 and 5.3.18a	876.8
Grey grasswren (*Amytornis barbatus*)	Endangered	REs containing lignum (*Duma florulenta*) and swamp canegrass (*Eragrostis australasica*) thickets, including 5.3.7, 5.3.8a and 5.3.13a	406
Gull-billed tern (*Gelochelidon nilotica*)	Marine and migratory	REs associated with riverine and palustrine wetlands, including: 5.3.7, 5.3.8a, 5.3.13a, 5.3.17 and 5.3.18a	876.8
Sharp-tailed sandpiper (*Calidris acuminata*)	Marine and migratory	REs associated with riverine and palustrine wetlands, including: 5.3.7, 5.3.8a, 5.3.13a, 5.3.17 and 5.3.18a	876.8

4.1.1 Threatened species

While no EPBC Act listed threatened species were identified within the PL during the field assessment, the likelihood of occurrence assessment (Appendix C) identified that the PL is likely to provide habitat for one threatened species listed under the NC Act, namely grey grasswren. The Cooper Creek floodplain is known to support grey grasswren; however, the subspecies status of this population is uncertain (Black *et al.* 2011; DEE 2019). The Cooper Creek population may comprise either the Bulloo subspecies (*Amytornis barbatus barbatus*), listed as endangered under the EPBC Act; or the Diamantina subspecies (*Amytornis barbatus diamantina*), not listed under the EPBC Act. In light of this uncertainty, for the purposes of this report, the grey grasswren population has been assumed to comprise the endangered Bulloo subspecies. Habitat for grey grasswren within the PL is mapped within Figure 5.

A further six threatened species listed under the EPBC Act are considered to have the possibility of occurrence within the PL; however, these species are not considered likely, primarily due to the absence of previous records within 100 km of the PL or the marginal quality of potential habitat for each species within the PL (Appendix C).

Fauna habitat mapping is based on GTRE mapping (Figure 4), which includes mixed RE polygons. Where a species habitat is associated with any of the REs that comprise a mixed polygon, the entire polygon was mapped as habitat. As such, the mapped fauna habitat depicted (Figure 5) may include areas of RE that are not habitat for the species.

4.1.2 Migratory species

While no migratory species were recorded within the PL during the field assessment, the likelihood of occurrence assessment identified that the PL is likely to provide habitat for four migratory species, including:

- fork-tailed swift – marine and migratory
- sharp-tailed sandpiper – marine and migratory
- glossy ibis – marine and migratory; and
- gull-billed tern – marine and migratory.

A project is required to seek approval under the EPBC Act for actions that are likely to have 'significant impact' on listed migratory species. 'Important habitat' for migratory species is a key factor for determining whether an action will result in a significant impact. Important habitat is defined in the significance criteria (DoE 2013) as:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
- habitat that is of critical importance to the species at particular life-cycle stages, and/or
- habitat utilised by a migratory species which is at the limit of the species range, and/or
- habitat within an area where the species is declining.

The PL does not comprise important habitat for any migratory species listed under the EPBC Act and is therefore not likely to have a significant impact on listed migratory species.

4.1.3 Marine species

Five marine bird species, listed under the EPBC Act were identified within the PL during the field assessment. In addition, the likelihood of occurrence assessment identified that the PL is likely to provide habitat for a further seven marine bird species.

A project is required to seek approval under the EPBC Act for actions that are likely to have 'significant impact' on the Commonwealth marine environment, which includes resulting in a '*substantial adverse effect on a population of a marine species or cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution*'.

Impact to listed marine species resulting from the proposed disturbance is likely to be minimal. As such, the project will not have a significant impact on listed marine species.

4.2 State matters

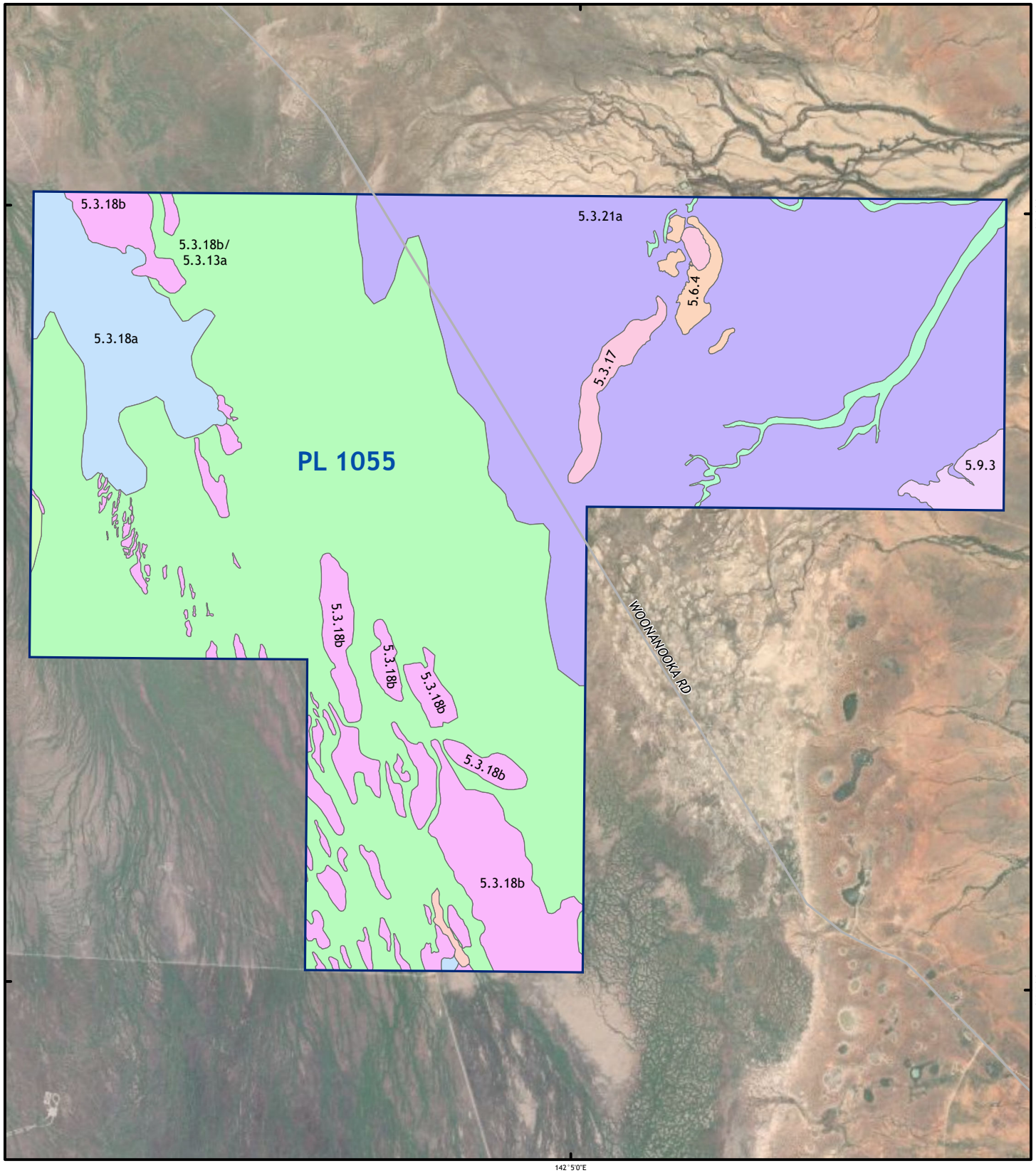
4.2.1 Ground-truthed Regional Ecosystems

GTREs within the PL entirely comprise Category B regulated vegetation under the *Vegetation Management Act 1999* and have a 'least concern' vegetation management class and 'no concern at present' biodiversity status (Queensland Herbarium 2019a). The distribution of all GTREs within the PL is described in Table 2 and is depicted in Figure 4.

Table 2 E2M Ground-truthed Regional Ecosystems (GTREs)

RE Code	Short Description	VM Class/BD Status	Structural category	Area within the PL (ha)[1]
5.3.7	*Eucalyptus coolabah* +/- *Lysiphyllum gilvum* +/- *Acacia stenophylla* +/- *Acacia cambagei* low open woodland on major channels	Least concern / No concern at present	Very sparse	89.1
5.3.8a	*Eucalyptus coolabah* low open woodland +/- *Duma florulenta* on braided channels, drainage lines, flood plain lakes and claypans	Least concern / No concern at present	Very sparse	9.2
5.3.13a	*Duma florulenta* open shrubland in depressions on flood plains, interdune flats, clay pans and clay plains	Least concern / No concern at present	Very sparse	307.7
5.3.17	*Tecticornia* spp. open succulent shrubland fringing playa lakes or clay pans	Least concern / No concern at present	Very sparse	70.5
5.3.18a	*Chenopodium auricomum* open shrubland on braided channel complex of major alluvial plains.	Least concern / No concern at present	Sparse	400.3
5.3.18b	Variable sparse to open-herbland on braided channel complex of major alluvial plains.	Least concern / No concern at present	Sparse	3,401.5
5.3.21a	Variable sparse to open herbland, *Senna* spp. open shrubland and bare scalded areas on infrequently flooded alluvia of major rivers their distributaries, drainage channels and creeks	Least concern / No concern at present	Sparse	2,317.4
5.6.4	*Atalaya hemiglauca* +/- *Acacia aneura* +/- *Acacia* spp. +/- *Corymbia terminalis* low open woodland on reticulate sand dunes	Least concern / No concern at present	Sparse	46.3
5.9.3	*Astrebla* spp. +/- short grasses +/- forbs open herbland on Cretaceous sediments	Least concern / No concern at present	Sparse	63.9

[1] GTRE mapping for the PL includes polygons with multiple REs (heterogenous polygons). Area calculations used the approximate proportion of REs within each heterogenous polygon.



Legend

- Road
- Petroleum Lease

Ground-truthed Regional Ecosystem

5.3.17	5.3.18b	5.3.7
5.3.18a	5.3.18b/5.3.13a	5.3.8a
5.3.18a/5.3.13a	5.3.21a	5.6.4
		5.9.3

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Scale 1:64,000 (A4)

0 1 2 3

Kilometres

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Projection: Transverse Mercator

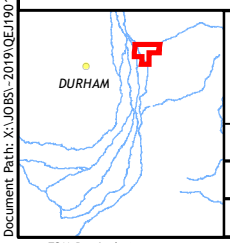

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FIGURE 4: GROUND-TRUTHED REGIONAL ECOSYSTEMS - PL 1055

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4.2.2 Threatened and special least concern species

While no NC Act listed threatened species were identified within the PL during the field assessment, the likelihood of occurrence assessment (Appendix C) identified that the PL is likely to provide habitat for two threatened species listed under the NC Act, namely:

- grey grasswren, listed as endangered/near threatened under the NC Act; and
- Major Mitchell's cockatoo (*Lophochroa leadbeateri*), listed as vulnerable under the NC Act.

As discussed within Section 4.1.1, the subspecies status of grey grasswren within the Cooper Creek floodplain is uncertain (Black *et al.* 2011; DEE 2019). The Cooper Creek population may comprise either the Bulloo subspecies (*Amytornis barbatus barbatus*), listed as endangered under the NC Act; or the Diamantina subspecies (*Amytornis barbatus diamantina*), listed as near threatened under the NC Act. In light of this uncertainty, for the purposes of this report, the grey grasswren population has been assumed to comprise the Bulloo subspecies, listed as endangered under the EPBC Act and NC Act.

The PL contains suitable breeding and foraging habitat for Major Mitchell's cockatoo. The species nests within large hollows, typically in the vertical or nearly vertical trunk or limb of a live or dead tree (Curtis & Dennis 2012). The species prefers trees that are not far from water (Beruldsen 2003). Within the PL, RE 5.3.7, which occurs along major watercourse channels, contain large hollow-bearing coolabah (*Eucalyptus coolabah*) trees provides breeding habitat for the species. RE 5.3.8a within the PL has been mapped to contain foraging habitat only, as the RE contains coolabah trees that are typically smaller, with limited large hollows and away from major water holes.

Habitat for grey grasswren and Major Mitchell's cockatoo within the PL is mapped within Figure 5. As identified in section , fauna habitat mapping is based on GTRE mapping (Figure 4), which includes mixed RE polygons. As such, where a species habitat is associated with any of the REs that comprise a mixed polygon, the entire polygon was mapped as habitat. Consequently, the mapped fauna habitat depicted (Figure 5) may include areas of RE that are not habitat for the species. Associated extent of habitat within the mixed polygon is dependent on the percentage of REs identified as suitable habitat within the polygon.

A further five species listed under the NC Act as special least concern are considered likely to occur (Appendix C), including:

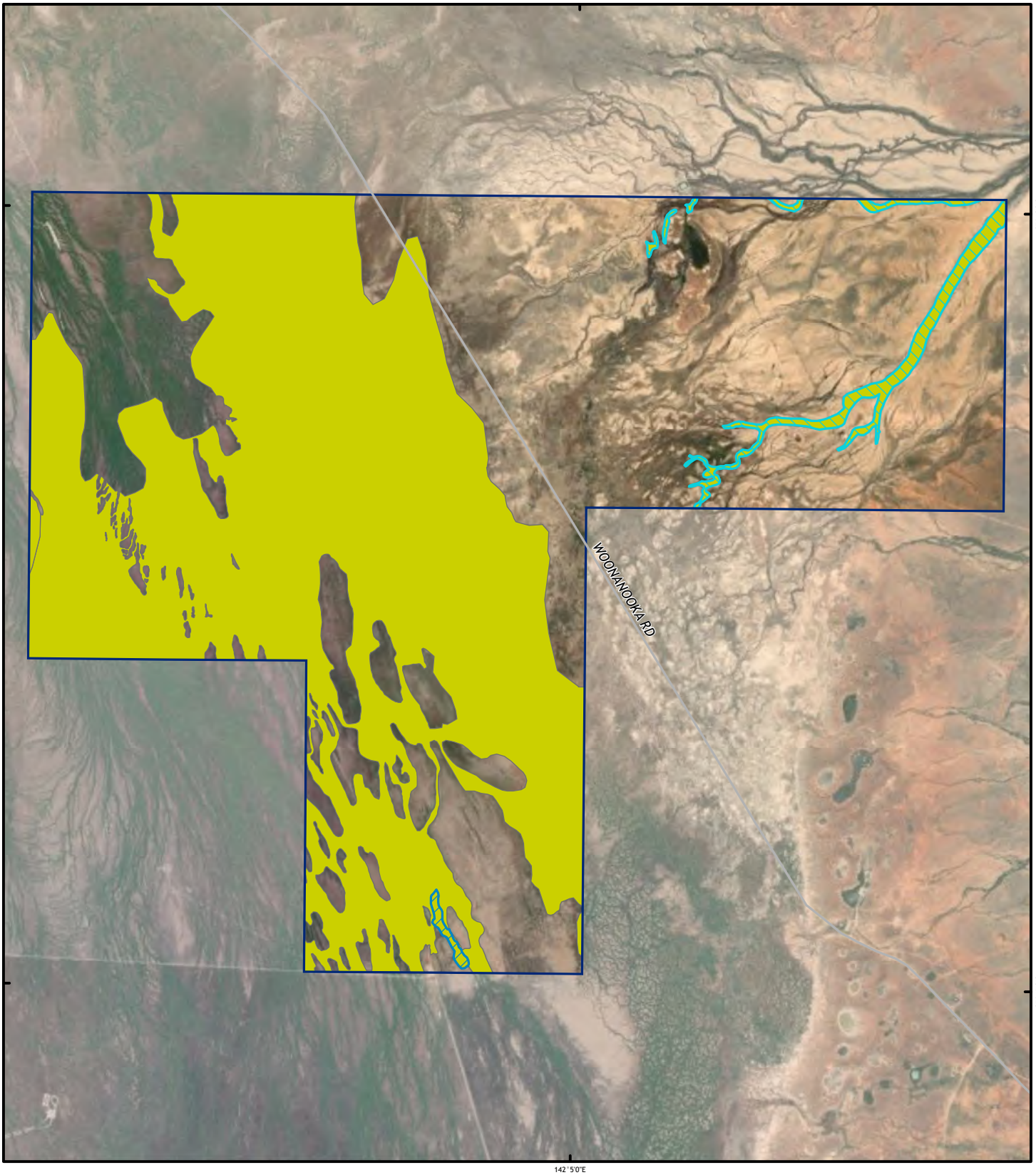
- fork-tailed swift
- sharp-tailed sandpiper
- glossy ibis
- gull-billed tern; and
- short-beaked echidna.

Of these special least concern species, only short-beaked echidna is listed as a MSES under the EO Regulation. Habitat associations for MSES and other special least concern species likely to occur within the PL are summarised in Table 3.

A further nine species listed under the NC Act as threatened or special least concern are considered to have the possibility of occurrence within the PL; however, the likelihood of these species occurring has been reduced primarily due to the absence of previous records within 100 km of the PL or the marginal quality of potential habitat for each species within the PL (Appendix C).

Table 3 Threatened and special least concern species likely to occur within the PL

Species	NC Act status	RE associations	Area within the PL (ha)
Fork-tailed swift (*Apus pacificus*)	Special least concern	All REs	6,705.9
Glossy ibis (*Plegadis falcinellus*)	Special least concern	REs associated with riverine and palustrine wetlands, including: 5.3.7, 5.3.8a, 5.3.13a, 5.3.17 and 5.3.18a	876.8
Grey grasswren (*Amytornis barbatus*)	Endangered or near threatened	REs containing lignum (*Duma florulenta*) and swamp canegrass (*Eragrostis australasica*) thickets, including 5.3.7, 5.3.8a and 5.3.13a	406
Gull-billed tern (*Gelochelidon nilotica*)	Special least concern	REs associated with riverine and palustrine wetlands, including: 5.3.7, 5.3.8a, 5.3.13a, 5.3.17 and 5.3.18a	876.8
Major Mitchell's cockatoo (*Lophochroa leadbeateri*)	Vulnerable	RE 5.3.7 – foraging and breeding habitat RE 5.3.8a – foraging habitat only	89.1 9.2
Sharp-tailed sandpiper (*Calidris acuminata*)	Special least concern	REs associated with riverine and palustrine wetlands, including: 5.3.7, 5.3.8a, 5.3.13a, 5.3.17 and 5.3.18a	876.8
Short-beaked echidna (*Tachyglossus aculeatus*)	Special least concern	All REs	6,705.9



Legend

- Road
- Petroleum Lease

Threatened Species Habitat

- Grey Grasswren (containing REs 5.3.8a, 5.3.13a and 5.3.16a)
- Major Mitchell's Cockatoo Foraging Habitat
- Major Mitchell's Cockatoo Breeding and Foraging Habitat

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Kilometres

Coordinate System: GDA 1994 MGA Zone 54
Projection: Transverse Mercator

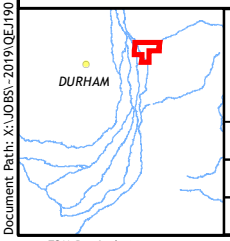

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FIGURE 5: THREATENED SPECIES HABITAT - PL 1055

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4.2.3 Wetlands

The majority of the PL is located on alluvial soils within the Cooper Creek floodplain. Vegetation communities within these alluvial soils may be seasonally inundated, with the frequency of inundation playing a large role in the distribution of REs present (Queensland Herbarium 2019a). Wetland values identified within the PL include REs listed within the REDD (Queensland Herbarium 2019a) to contain:

- palustrine wetland
- riverine wetland or fringing riverine wetland; and
- floodplain (other than floodplain wetlands).

The August 2019 survey was undertaken following a major flooding event. Areas flooded typically corresponded to REs listed as containing palustrine wetland, riverine wetland or fringing riverine wetland in the REDD (Queensland Herbarium 2019a), while areas not flooded occurred on higher ground, or outside of the floodplain (Photograph 1).

Photograph 1 RE 5.3.18a that was recently flooded and listed as a wetland RE (left) and RE 5.3.21a, that had not been recently flooded and is not listed as a wetland RE (right)

4.2.4 Waterways

The *vegetation management watercourse and drainage feature map*, supplied by DNRME, underestimates the density of drainage features present within the PL. Particularly within the western portion of the PL, there is a dense braided network of channels. The field assessment and analysis of high-resolution satellite imagery identified that all watercourse channels and drainage features within the PL are minor, with a size that is reflective of a stream order 1 (Photograph 2).

The *vegetation management watercourse and drainage feature map* identifies 55.8 km of watercourse and drainage features within the PL, comprising stream orders 1, 2, 4, 5, 8 and 9. The location of defining banks for Vegetation Management Watercourses was estimated by buffering the centreline of Vegetation Management Watercourses by 25 m on each side i.e. this assumes a typical watercourse channel width of 50 m. Assessment of the MSES regulated vegetation – intersecting a watercourse is discussed in Section 5.3.2.

No watercourse was considered to comprise the MSES 'waterway providing for fish passage'. The EO Regulation states that '*waterway providing for passage of fish is a matter of State environmental significance only if the construction, installation or modification of waterway barrier works carried out under an authority will limit the passage of fish along the waterway*'. As the proposed development will not limit fish passage within the Cooper Creek floodplain, this MSES does not apply.

Note: ground-truthing of watercourse and drainage feature centrelines and high-banks was not conducted, due to the high density of braided channels making ground-truthing unfeasible.

Photograph 2 Typical drainage feature within the PL (left) and view of braided channel complex (right)

4.2.5 Corridors and connectivity

The PL entirely contains remnant RE, with unimpeded habitat connectivity to adjacent contiguous habitats, particularly the Cooper Creek floodplain surrounding the PL. The PL is entirely located within the Channel Country SEA and three state-wide riparian biodiversity corridors intersect the site. The PL contains environmental attributes characteristic of the Channel Country SEA, as identified within the *Regional Planning Interests Regulation (RPI) 2014*, including:

- natural, unrestricted flows in and along stream channels and the channel network in the area
- overflow from stream channels and the channel network onto the flood plains of the area, or the other way
- natural flow paths of water across flood plains connecting waterholes, lakes and wetlands in the area
- the natural water quality in the stream channels and aquifers and on flood plains in the area; and
- the beneficial flooding of land that supports flood plain grazing and ecological processes in the area.

The MSES 'connectivity areas' includes all remnant vegetation that is required for ecosystem functioning. As the entire PL contains remnant RE and is connected to extensive areas of adjacent remnant vegetation, the entire PL is considered to comprise the MSES connectivity areas.

4.2.6 Introduced/non-native flora

No introduced/non-native flora species listed as Weeds of National Environmental Significance (WONS) or under the Queensland *Biosecurity Act 2014*, were recorded within the PL.

4.2.7 Fauna habitat

Incidental fauna observations recorded during the field survey are provided within Appendix B. Fauna species observed predominantly comprised bird species recorded opportunistically. In addition to habitat for threatened fauna discussed in the 'threatened species' section above, the PL contained a diversity of fauna habitat features for least concern (NC Act) fauna, including:

- hollow limbs of trees and dead stags, which provide potential habitat for arboreal mammals, birds and microchiropteran bats. Hollow-bearing trees were primarily located within coolabah lined watercourses, waterholes and drainage features
- hollow logs that provide habitat for reptiles and small mammals
- extensive alluvial soils forming deep cracks, which provide habitat for cryptic reptiles and small mammals
- decorticating bark, which provide potential habitat for microchiropteran bats and arboreal reptiles
- dense leaf litter for cryptic reptiles and small mammals; and
- bird nests.

4.2.8 Matters of State Environmental Significance

Seven MSES have been identified as known or likely to occur within the PL (Table 4). These MSES are associated with habitat for threatened and special least concern species, regulated vegetation, connectivity areas and the Channel Country SEA.

Table 4 MSES summary

MSES	Report section	Area within the PL (ha)
Regulated vegetation: • within 100 m of a Vegetation Management Wetland	Section 4.2.3	5,863.9
• intersecting a watercourse	Section 4.2.4	55.8 km of DNRME mapped vegetation management watercourses and drainage features. A maximum estimated area of regulated vegetation intersecting a watercourse was 1,125.7 ha (refer to Section 4.2.4)
Connectivity areas	Section 4.2.5	6,705.9
Wetlands and watercourses - High Ecological Significance wetlands	Section 4.2.3	0
Designated precinct in the Channel Country SEA	Section 4.2.5	6,642.4

MSES	Report section	Area within the PL (ha)
Protected wildlife habitat for: • Grey grasswren, listed as endangered • Major Mitchell's cockatoo, listed as vulnerable • Short-beaked echidna, listed as special least concern. A further four special least concern bird species are considered likely to occur within the PL; however, only short-beaked echidna is listed as a MSES under the EO Regulation	Section 4.2.2	 406 89.1 plus 9.2 (foraging only) 6,705.9
Protected areas	N/a	0
Highly protected zones of State marine parks	N/a	0
Fish habitat areas	N/a	0
Waterway providing for fish passage	Section 4.2.4	0
Marine plants	N/a	0
Legally secured offset areas	N/a	0

5 Impacts and mitigation

5.1 Potential impacts

The proposed works are for the construction of ten petroleum well leases and associated infrastructure including borrow pits, pipeline right of ways and access tracks. The location and extent of disturbance footprints are under investigation and are preliminary in nature. The preliminary disturbance footprints for each of the ten wells and associated infrastructure are identified within Table 5.

The preliminary disturbance footprint comprises a total area of 115.5 ha, which includes 39 ha to be rehabilitated post-construction and 76.5 ha to be rehabilitated at the end of the asset's life. Preliminary disturbance footprints are conservative and, for the purposes of impact assessment, a large proportion of the proposed disturbance footprint has been located within 'high constraint' areas, where appropriate (refer to Section 5.2 and 5.3). As such, the assessment of impacts within this report takes a precautionary approach and simulates a conservative disturbance scenario.

Potential impacts arising from the proposed works include:

- removal of native vegetation
- removal of fauna habitat for native species, including potentially suitable habitat for threatened species
- potential injury and death of native fauna associated with vegetation removal and operational activities
- modification of overland flow/hydrology
- sedimentation and erosion, particularly during flood events; and
- introduction and spread of pest species.

Table 5 Proposed disturbance footprint assumptions per well

Infrastructure type	Surface disturbance (ha)	Area rehabilitated post-construction (ha)	Area for final rehabilitation at end of life (ha)
Well pad	1.6	0	1.6
Flowline	4.8 (16 m flowline disturbance width)	3.9	0.9
Access track	3.9 (13 m unsealed access track width)	0	3.9
Borrow pits	1.25	0	1.25
Total per well	**11.55**	**3.9**	**7.65**

5.2 Significant residual impact assessment

5.2.1 Matters of National Environmental Significance

The field assessment identified that the PL contains habitat for the EPBC Act listed endangered grey grasswren. The Australian Government has produced the *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (2013) (MNES Referral Guidelines) to assist in determining if residual impacts associated with a proposed development requires referral. An assessment against the MNES Referral Guidelines is provided in Appendix D. In summary it was determined that the PL is likely to provide habitat for the grey grasswren. The proposed works are considered unlikely to result in a significant impact to the species as:

- The proposed works will require the clearing of approximately 57.8 ha of grey grasswren habitat, which represents 14.2% of the grey grasswren habitat identified within the PL. This disturbance area is based on an assumed five wells and associated infrastructure being located within the species habitat. Given suitable habitat for the species is widely available within the PL and the surrounding Cooper Creek floodplain, the proposed works are unlikely to impact the local population of the species.
- Lignum, which is the key habitat feature for the species, rapidly re-establishes within disturbed areas following flood events (Dawson *et al*. 2017; Higgisson, Briggs & Dyer 2018). Approximately 19.5 ha of the disturbance footprint is proposed for rehabilitation, which includes pipeline right of ways, sump pits and a proportion of the lease areas (assumed five wells and associated infrastructure). These areas are expected to re-establish to suitable habitat for grey grasswren.
- Management measures have been identified to mitigate impacts on the species habitat (Section 5.3.3).

In addition, habitat for four migratory bird species was identified within the PL. Significant impact for these species is unlikely as the PL is not considered to meet the definition of 'important habitat' for these species (Section 4.1.2).

5.2.2 Matters of State Environmental Significance

Assessments against the *Queensland Environmental Offsets Policy Significant Residual Impact Guideline* (SRI Guideline) (DES 2014) were conducted to determine if offsets are likely to be required for impacts to MSES (Appendix E). SRI assessments determined that SRI to all MSES known or likely to occur within with PL is unlikely. In summary it was determined that the proposed works will require the clearing of approximately:

- 57.8 ha of grey grasswren habitat, which represents 14.2% of the species habitat identified within the PL. This disturbance area is based on an assumed five wells and associated infrastructure being located within the species habitat. A SRI to the species is unlikely for the reasons identified within Section 5.2.1.
- 1.8 ha of Major Mitchell's cockatoo foraging and breeding habitat (of which 0.2 ha is foraging habitat only), which represents 1.9% of the species habitat identified within the PL. Due to the location of suitable habitat within the PL, proposed disturbance is considered to be minimal, largely associated within ancillary infrastructure (i.e. flowline and access track). A SRI to the species is unlikely as:
    - The proposed clearing comprises a negligible proportion of the species habitat, which is widely available within and surrounding the PL.
    - Management measures have been identified to mitigate impacts on the species habitat (Section 5.3).

- Infrastructure will be sighted to avoid disturbance to hollow bearing trees (if present) wherever practicable. For example, roads and pipeline alignments will be aligned to avoid the requirement to disturb or clear large mature, or hollow bearing trees (dead or alive).
- The proposed clearing will not increase fragmentation of the species habitat.
- Approximately 0.6 ha of the disturbance footprint is proposed for rehabilitation, which includes pipeline right of ways. These areas are expected to re-establish to suitable habitat for the species following rehabilitation.

- 115.5 ha of echidna habitat, which represents 2% of the species habitat identified within the PL. A SRI to the species is unlikely as:
  - The proposed clearing comprises a negligible proportion of the species habitat, which is widely available within and surrounding the PL.
  - Management measures have been identified to mitigate impacts on the species habitat (Section 5.3).
  - The proposed clearing will not increase fragmentation of the species habitat.
- 108.8 ha of regulated vegetation - within 100 m of a Vegetation Management Wetland, which represents 1.9% of this MSES identified within the PL. The proposed disturbance is less than the residual impact criteria for both linear and non-linear infrastructure. As such, a SRI to this MSES is unlikely.
- 115.5 ha of a 'designated precinct' within the Channel Country Strategic Environmental Area, which represents 1.7% of this MSES identified within the PL. The proposed works are unlikely to have a SRI on any environmental attribute of the Channel Country SEA. Environmental attributes associated with the Channel Country SEA are largely associated with water quality, hydrologic and geomorphic processes and beneficial flooding, which are unlikely to be significantly affected by the proposed works. Furthermore the proposed works will not impact the suitability of land in the area to be used for grazing, which is the primary land use for the PL.
- 115.5 ha of a connectivity area, which represents 1.7% of this MSES identified within the PL. While the Landscape Fragmentation and Connectivity Tool (DES 2018) could not be used as the location of disturbance has not been confirmed, the scale of the disturbance in relation to the extensive areas of remnant regional ecosystem in the surrounding region result in an unlikely SRI on Connectivity.

In addition, areas of regulated vegetation intersecting a watercourse may require clearing. The project will avoid the placement of non-linear infrastructure within the defined distance of the defining bank of regulated vegetation intersecting a watercourse (refer to Section 5.3.2), where practicable. Where disturbance occurs within the defined distance of Vegetation Management Watercourses and Drainage Features and within 5 m of the defining bank, it will comply with SRI clearing limits. As such, a SRI to this MSES is unlikely.

5.3 Mitigation measures

The EPBC Act Environmental Offsets Policy (DSEWPC 2012) and Queensland Environmental Offsets Policy (DES 2019) require proponents to take all reasonable avoidance and mitigation measures to remove or reduce potential impact to MNES and MSES. The following section identifies measures to avoid, minimise and mitigate potential ecological impacts associated with the proposed petroleum infrastructure. Application of these measures is likely to avoid significant residual impact to MNES and MSES.

5.3.1 Impact avoidance

A risk-based approach has been used to identify environmentally constrained areas within the PL (Figure 6). Where possible, avoidance of disturbance to environmentally constrained areas is preferred. The level of environmental constraint has been determined using the following framework.

High constraint

The proposed petroleum activities within high constraint areas have substantial potential to result in a SRI. High constraint areas require targeted management measures to avoid, minimise and mitigate potential impacts to avoid a SRI, which are in addition to the typical ecological management measures employed. Targeted management measures to avoid a SRI are identified within Sections 5.3.1 and 5.3.2. High constraint areas within the PL have been identified as areas that:

- Are located within Queensland Government mapped MSES regulated vegetation – within 100 m of a Vegetation Management Wetland; and
- Provide habitat for threatened species listed under the EPBC Act and/or NC Act. Of relevance to the PL, these species include:
  - grey grasswren, which inhabit REs dominated by lignum (*Duma florulenta*) and swamp canegrass (*Eragrostis australasica*); and
  - Major Mitchell's cockatoo, which inhabit areas of wooded vegetation.

Areas that meet these criteria are shown in Figure 6. High constraint areas also provide habitat for non-threatened MNES and special least concern fauna species, including the sharp-tailed sandpiper, glossy ibis and gull-billed tern.

Moderate constraint

The proposed petroleum activities are unlikely to result in an SRI within moderate constraint areas provided general ecological management measures, typical for the petroleum activities, are employed. Moderate constraint areas within the PL have been identified as areas containing Queensland Government mapped Regulated Vegetation – within 100 m of a Vegetation Management Wetland (Section 4.2.3), which have not already been included in the 'high constraint' areas; or, provide habitat for a threatened MNES/MSES species, which have not already been included in the 'high constraint' areas.

Low constraint

The proposed petroleum activities within low constraint areas have limited potential to result in a SRI. Of relevance to the PL, these areas include all other REs that provide habitat for MNES/MSES species, including fork-tailed swift and short-beaked echidna.

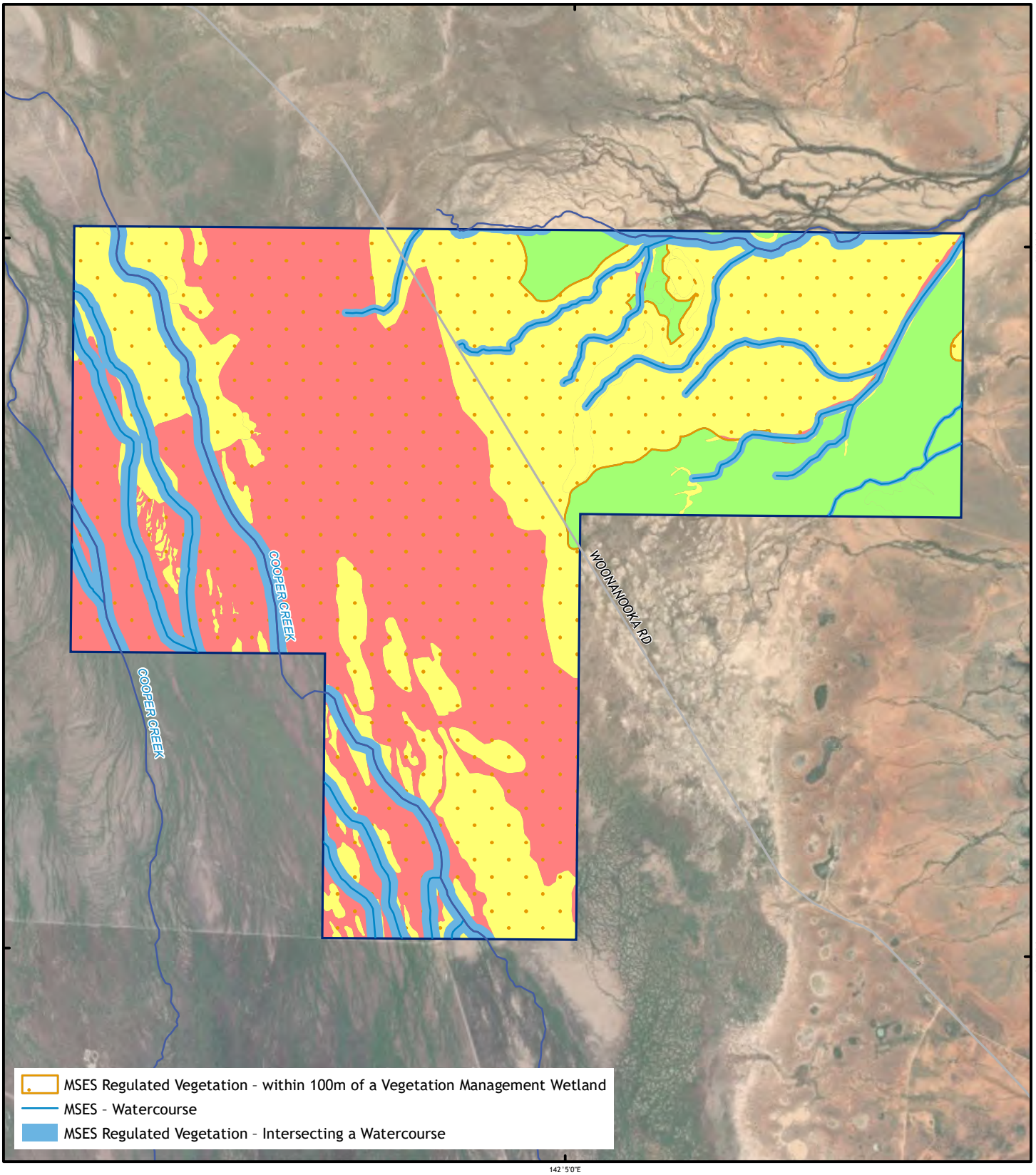
Additional mapped constraints

The high, moderate and low constraint areas discussed above are based on ecological values ground-truthed within the PL. In addition to ground-truthed values, the PL is mapped to contain environmental constraints that represent legislative 'triggers'. Should works be proposed in these mapped legislative trigger areas, additional assessment may be required to demonstrate the mapped environmental values are not present and/or inform an assessment by the relevant regulatory agency. The mapped additional legislative considerations within the PL include:

- MSES High Ecological Significance wetlands; and

- MSES regulated vegetation - intersecting a watercourse, which due to the nature of braided river channels throughout the Cooper Creek floodplain are likely to be inaccurate in their location.

In addition, the majority of the PL is mapped within the Channel Country SEA. A SRI to a SEA may arise where a resource activity impacts a feature, quality, characteristic or other attribute of the area or the land use suitability (i.e. for grazing). Any future resource activity within the SEA will require a regional interest development approval (RIDA) issued under section 53 of the RPI Act. The RIDA application would assess the impacts of the proposed resource activity on the environmental attributes associated with the Channel Country SEA and consider suitable measures to avoid, minimise or mitigate impacts to the SEA such that a SRI does not occur.



Legend

- Road
- Major Watercourse
- Petroleum Lease

Constraint Areas

- High
- Moderate
- Low

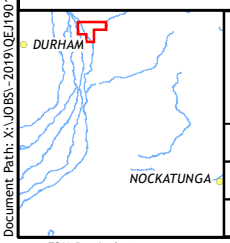
N

Scale 1:70,100 (A4)

0 1 2 3

Kilometres

Coordinate System: GDA 1994 MGA Zone 54
Projection: Transverse Mercator



Notes:
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MSES Regulated Vegetation: DNRME 2017
MSES High Ecological Significance: © DNRME 2017
Watercourse: © Geoscience Australia 2018
MSES Regulated Vegetation wetlands: © DNRME 2019

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FIGURE 6: ENVIRONMENTAL CONSTRAINTS - PL 1055

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5.3.2 Impact minimisation

Significant Residual Impact Guideline Clearing Limits – Regulated Vegetation

The **SRI Guideline** (DEHP 2014) provides criteria for identifying when an impact to a MSES may be deemed to be significant. The SRI guideline contains tests and criteria that provide a trigger for when Environmental Offsets may be required.

The SRI Guideline provides test criteria for two MSES occurring within the PL, namely:

- Regulated vegetation:
  - within 100 m of a Vegetation Management Wetland; and
  - intersecting a watercourse.

Section 2.1 of the SRI Guideline states that for an SRI to occur for these MSES, proposed disturbance must exceed clearing area and width limits (refer to Table 6), and clearing must occur within a specific distance of the 'defining bank' of the wetland or watercourse.

For the purposes of this SRI assessment, the following rules and assumptions have been applied:

<u>For clearing in the portion of a regional ecosystem that lies within a mapped wetland:</u>

1. Vegetation Management Wetlands are as per the Regulated Vegetation Management Map to the extent the regional ecosystem contains remnant vegetation.
2. The 'defining bank' of a VMA wetland is as per the map (i.e. the defining bank is the mapped polygon edge of the wetland).

<u>For clearing in a regional ecosystem that is within the defined distance of a watercourse:</u>

1. Vegetation Management Watercourses are as per the Vegetation Management Watercourse and Drainage Feature Map (as per Section 20AA of the VMA) to the extent the RE contains remnant vegetation.
2. Defined distance from the defining banks of Vegetation Management Watercourses is as per the Queensland Environmental Offsets Policy V1.9 (DES 2020) using stream order as per the Vegetation Management Watercourse and Drainage Feature Map.
3. The location of defining banks for Vegetation Management Watercourses was estimated by buffering the centreline of Vegetation Management Watercourses by 25 m on each side (i.e. this assumes a typical watercourse channel width of 50m).

The maximum area of regulated vegetation - intersecting a watercourse was estimated by buffering the Vegetation Management Watercourse and Drainage Feature Map by the defined distance as per the Queensland Environmental Offsets Policy V1.9 (DES 2020), using stream order as per the Vegetation Management Watercourse and Drainage Feature Map.

Other MNES and MSES do not have prescribed clearing area test criteria within the SRI Guideline (DEHP 2014) or the Commonwealth MNES Significant Impact Guidelines (DotE 2013).

Table 6 Significant Residual Impact test criteria and impact minimisation measures

MSES	Infrastructure type	SRI test criteria (DEHP 2014)	Impact minimisation for the project
Regulated vegetation - within 100 m of a Vegetation Management Wetland	Linear	20 m wide in a sparse or very sparse RE; or 25 m wide in a grassland RE. Clearing must also occur within the wetland or within 50 m of the defining bank to trigger a SRI (as described in Section 5.3.2).	Linear infrastructure will be located outside Vegetation Management Wetlands, and greater than 50 m from the defining bank, where practicable. Where disturbance occurs in Vegetation Management Wetlands and within 50 m of the defining bank, it will comply with SRI clearing limits.
	Non-linear	2 ha within a sparse or very sparse RE; or 5 ha within in a grassland RE. Clearing must also occur within the wetland or within 50 m of the defining bank to trigger a SRI (as described in Section 5.3.2).	Non-linear infrastructure will be located outside Vegetation Management Wetlands, and greater than 50 m from the defining bank, where practicable. Where disturbance occurs in Vegetation Management Wetlands and within 50 m of the defining bank, it will comply with SRI clearing limits.
Regulated vegetation - intersecting a watercourse	Linear	20 m wide in a sparse or very sparse RE; or 25 m wide in a grassland RE. Clearing must also occur within the defined distance or within 5 m of the defining bank to trigger a SRI (as described in Section 5.3.2).	Linear infrastructure will be located outside the defined distance from the defining banks of Vegetation Management Watercourses and Drainage Features, where practicable. Where disturbance occurs within the defined distance of Vegetation Management Watercourses and Drainage Features and within 5 m of the defining bank, it will comply with SRI clearing limits.
	Non-linear	2 ha within a sparse or very sparse RE; or 5 ha within a grassland RE. Clearing must also occur within the defined distance or within 5 m of the defining bank to trigger a SRI (as described in Section 5.3.2).	Non-linear infrastructure will be located outside the defined distance from the defining banks of Vegetation Management Watercourses and Drainage Features, where practicable. Where disturbance occurs within the defined distance of Vegetation Management Watercourses and Drainage Features and within 5 m of the defining bank, it will comply with SRI clearing limits.

Siting and co-location of linear infrastructure

Co-location of linear infrastructure including access tracks and flowlines, potentially reduces the total disturbance footprint and reduces habitat fragmentation. When assessing route optimisation Santos may consider combining access track and flowlines into a single disturbance footprint and/or co-locating linear infrastructure within existing disturbed areas, where possible. The sparse nature of vegetation may also enable areas of woody vegetation to be avoided by linear infrastructure.

5.3.3 Impact mitigation

Management measures to further mitigate ecological impacts and avoid SRI resulting from the proposed development are identified within Table 7.

Table 7 Impact mitigation measures

Impact mitigation measures
During construction
Vegetation to be retained adjacent to proposed disturbance areas will be suitably demarcated where required (e.g. using marker pegs, flagging tape).
Clearing of vegetation is to be undertaken by a suitably qualified contractor.
Disturbance activities will be excluded from areas of retained vegetation.
Erosion and sediment control measures implemented where appropriate.
Hygiene protocols implemented as appropriate to minimise the introduction, spread and persistence of weeds, pest plants, animals and pathogens.
Measures implemented to reduce risks to fauna from entrapment and injury in pipes and excavations, including: • Use of a qualified fauna spotter/catcher where required. • Pipes capped to prevent fauna entrapment during construction or after abandonment. • Facilities (e.g. borrow pits, well cellars) are designed and constructed as far as practicable to minimise impacts to fauna. • Borrow pits are not established in locations which pose an unacceptable hazard to livestock. • Sumps, mud pits and other pits holding fluid are fenced as appropriate to minimise fauna (medium to large) and livestock access. • Minimising the period trenches remain open to as short as reasonably practicable. • Regular inspections of open excavations / trenches and prior to backfilling. • Provision of escape ramps and refuge material for fauna that do enter trenches. • Hollow logs (located on ground) within disturbance areas retained and shifted to adjacent undisturbed areas.

Impact mitigation measures

Post construction

Flowline Right of Ways will be reinstated as soon as practicable following gathering line / pipeline installation. The rehabilitation works are expected to mitigate the majority of impacts resulting from disturbance for flowline construction. Rehabilitation aims to reshape and stabilise disturbed areas to provide appropriate site conditions to facilitate natural revegetation processes, and will include the following activities (where appropriate):

- ripping of areas of compacted soil (except on sensitive soils / environments).
- respreading of stockpiled topsoil, vegetation and seed stock (where available) to facilitate natural revegetation; and
- restoration of natural landform contours.

Final rehabilitation of disturbed areas would be undertaken to achieve the final rehabilitation criteria conditions specified in the relevant Environmental Authority.

Threatened species specific mitigation measures

- Where threatened species nests are identified to be present, disturbance should be avoided.
- If disturbance cannot be avoided, clearing of the nest and a surrounding area should be postponed until after the relevant breeding season and/or incubation period.
- Clearing must not occur while the nest is active, with adults, eggs or nestlings.

Grey grasswren:

- Field and desktop based assessments will be undertaken to preferentially place infrastructure/disturbance outside of areas that are likely to represent grey grasswren habitat (where practicable).
- Disturbance of areas that are likely to represent grey grasswren habitat will be preferentially timed to occur outside of the breeding season for the species where practical (breeding behaviour is poorly known but is thought to occur from late July to August (DEE 2019)).
- Typical characteristics of grey grasswren nests are semi-domed nests that are lined with soft grass, plant down, rootlet and sometimes a few feathers (DEE 2019). The species typically nests in lignum and less commonly swamp canegrass (DotE 2014; DEE 2019).
- The DEE (2019) identifies the likely incubation period of eggs to be about 13 to 15 days and a nestling period to be about 12 to 14 days.

Major Mitchell's cockatoo:

- Major Mitchell's cockatoo nests are a large hollow, typically in the vertical or nearly vertical trunk or limb of a live or dead tree (Curtis & Dennis 2012).
- Where practicable, clearing of mature and hollow bearing trees will be avoided.
- Tree branches will be preferentially lopped rather than removing whole trees or shrubs.
- Infrastructure will be sighted to avoid disturbance to hollow bearing trees wherever practicable. For example, roads and pipeline alignments will be weaved to avoid the requirement to disturb or clear large mature, or hollow bearing trees (dead or alive).
- The species prefers to nest in trees that are not far from water (Beruldsen 2003). While the preferred nesting distance from water is unclear, the adults require water daily and as such typically inhabit areas within 20 km of water (Rowley & Chapman 1991). The species has been recorded breeding from August to December (Beruldsen 2003; Curtis & Dennis 2012). Incubation period of eggs was found to be 28 to 33 days and a nestling period of 53 to 66 days in Western Australia (Rowley & Chapman 1991).

Impact mitigation measures
Wetland specific mitigation measures
Time construction and rehabilitation activities to occur outside of flood periods.
Where possible, areas to be rehabilitated should be immediately rehabilitated post-disturbance. Rehabilitation areas may include pipeline Right of Ways and a portion of disturbance for well leases and sump pits.
Rehabilitation activities will reinstate natural landform contours to ensure natural surface water flows are not impacted.
Topsoil stockpiles separated from subsoil and maintained to preserve the seedbank (where practicable). Compaction of topsoil stockpiles avoided. The topsoil contains an existing seed bank, which will accelerate rehabilitation following a flood event after landform reinstatement. A topsoil stripping depth of up to 200 mm is generally appropriate to retain the seed bank.
Soils should be replaced in order of excavation wherever practicable to restore subsurface soil horizons.
No drilling is proposed in waterway channels. Activities to be located away from watercourses and wetlands (GES/HES) wherever practicable. Where activities are to be undertaken in or near HES/GES wetlands, appropriate review, assessment and mitigation measures are implemented to ensure surface water flows are maintained.
Access tracks, infrastructure and seismic lines located, prepared and constructed to maintain pre-existing surface water flows. Culverts and floodways installed where required.
Fuel, oil and chemical storage and handling undertaken in accordance with Australian standards and guidelines (i.e. in bunded areas) and in small volumes wherever practicable. Spill response equipment and materials kept on site and in operational vehicles (where appropriate). In the event of expected flooding, non-essential items/facilities such as chemicals, fuel and oil storages and waste receptacles removed from areas at risk of inundation (where appropriate / safe to do so).
Where possible, restrict the width of linear infrastructure corridors (access tracks and pipeline Right of Ways) to the minimum width practicable at waterway channel crossings. Preferentially select dry crossing sites for linear infrastructure with minimal earthworks requirements. Pre-existing areas of disturbance used to place infrastructure or seismic lines wherever practicable.

5.4 Cumulative impacts

For the purposes of undertaking a cumulative impact assessment, disturbances within the PL have been defined according to:

1. **Existing disturbance**: comprises a total area of 12.1 ha, which includes existing well leases, access tracks, flowlines, borrow pits and other disturbance footprints for supporting infrastructure[2].

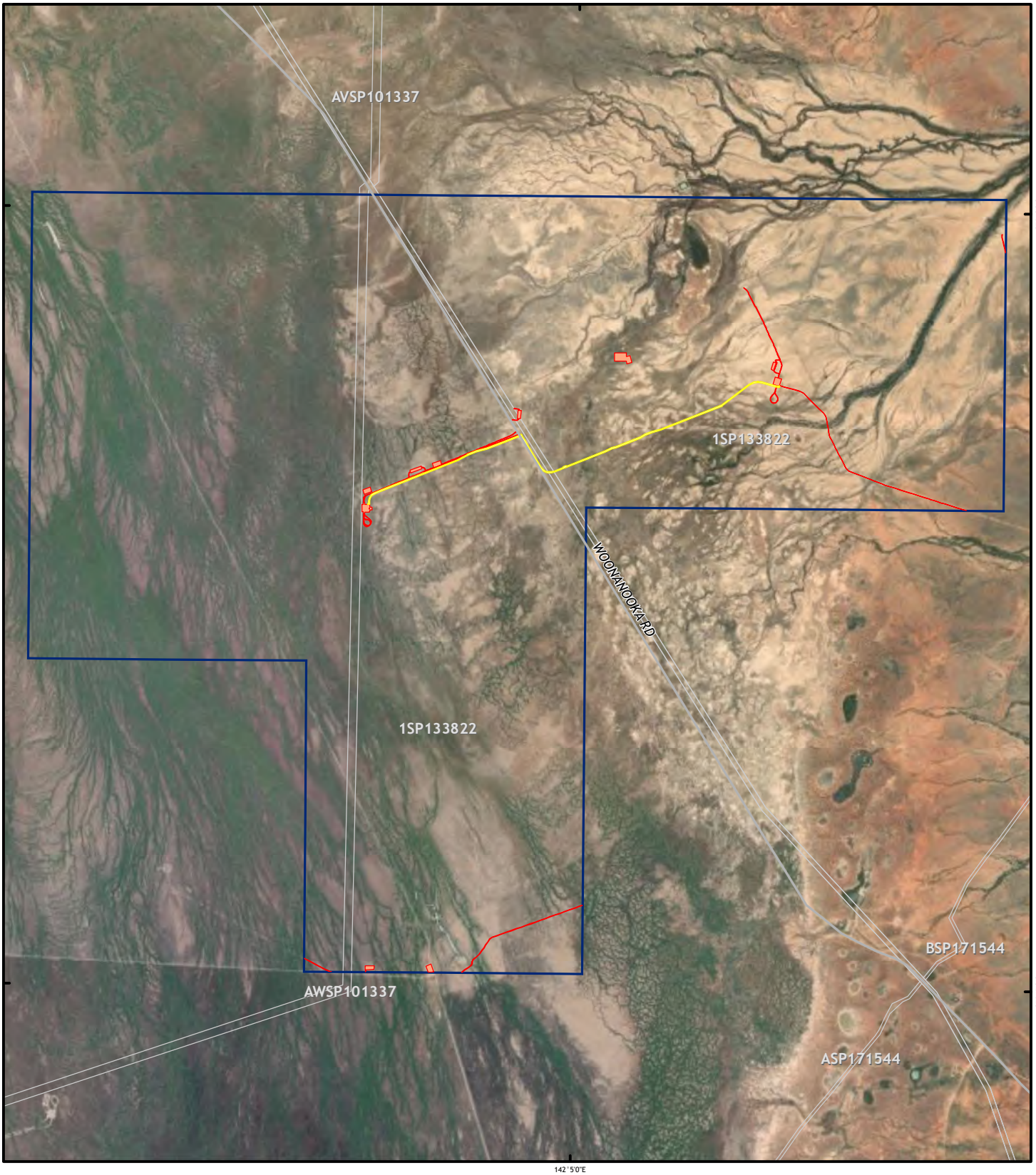
[2] Existing disturbance footprints are based on data supplied by Santos on 28 November 2019. Where supplied disturbance feature data comprised point, or line information, a disturbance polygon was created by assuming a 16 m wide corridor for pipelines, 6 m wide corridor for access tracks and 1.6 ha disturbance area for well leases.

2. **Proposed disturbance**: comprises a total area of 115.5 ha. Approximately 39 ha of this area is proposed to be rehabilitated as soon as practicable post-construction and 76.5 ha to be rehabilitated at the end of the asset's life.

The existing disturbance and proposed disturbance areas for each MNES and MSES identified within the PL are summarised within Table 8 and depicted within Figure 7.

Table 8 MNES and MSES cumulative impact disturbance area

MNES/MSES	Existing disturbance (ha)	Proposed disturbance (ha)
MNES		
Grey grasswren habitat, listed as endangered	5	57.8
MSES		
Regulated vegetation: • intersecting a watercourse • within 100 m of a Vegetation Management Wetland	 2.4 10.6	 N/A 108.8
Connectivity areas	12.1	115.5
Wetlands and watercourses - High Ecological Significance wetlands	0	0
Designated precinct in the Channel Country SEA	12.1	115.5
Protected wildlife habitat for: • Grey grasswren, listed as endangered • Major Mitchell's cockatoo, listed as vulnerable (foraging and breeding habitat) • Short-beaked echidna, listed as special least concern. A further four special least concern bird species are considered likely to occur within the PL; however, only short-beaked echidna is listed as a MSES under the EO Regulation.	 5 0.01 12.1	 57.8 1.8 115.5
Protected areas	0	0
Highly protected zones of State marine parks	0	0
Fish habitat areas	0	0
Waterway providing for fish passage	0	0
Marine plants	0	0
Legally secured offset areas	0	0



Legend

- Road
- Petroleum Lease
- Cadastre
- Existing Disturbance
- Proposed Disturbance

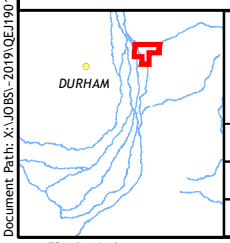
N

Scale 1:64,000 (A4)

0 1 2 3

Kilometres

Coordinate System: GDA 1994 MGA Zone 54
Projection: Transverse Mercator



Notes:
Aerial Imagery: © ESRI 2019
Cadastre: © DNRME 2019
Petroleum Lease: © DNRME 2019
MSES: © DNRME 2017

Rev	Description	Drawn	Approved	Date
2	Issued for Use	DL	JVO	26/02/2021
1	Issued for Use	DL	JVO	19/02/2021

FIGURE 7: CUMULATIVE IMPACT - PL 1055

Ecological Assessment Report
Santos

Map Number	Job Number	Rev
1 of 1	QEJ19010	2

Document Path: X:\JOBS\-2019\QEJ19010\GIS\QEJ19010_EAR_Disturbance.mxd

6 Legislative compliance

6.1 Summary

6.2 Commonwealth legislation

6.2.1 Environment Protection and Biodiversity Conservation Act 1999

Preliminary assessments against the Australian Government MNES Referral Guidelines (DotE 2013) were conducted to assist in determining if residual impacts associated with a proposed development requires referral. In summary, it was determined that the proposed works are unlikely to result in a significant impact to MNES. Based on the findings of the preliminary assessment against the MNES Referral Guidelines, the proposed development is unlikely to require a referral to the DAWE. Significant Impact assessments are summarised within Section 5.2.1 and provided in detail in Appendix D.

6.3 State legislation

6.3.1 Environmental Offsets Act 2014

Assessments against the *Queensland Environmental Offsets Policy Significant Residual Impact Guideline* (DES 2014) were conducted to determine if offsets are likely to be required for impact to MSES. In summary, SRI assessments determined that SRI to all MSES known or likely to occur within with the PL is unlikely. As such, environmental offsets under the EO Act are unlikely to be required for the project. SRI assessments are summarised within Section 5.2.2 and provided in detail in Appendix E.

6.3.2 Environmental Protection Act 1994

No Category A, B or C ESAs were identified within the PL during the desktop and field assessments. Ground-truthing of watercourses as defined under the EP Act was not conducted (Section 4.2.4).

6.3.2.1 NC Act Protected Plants

The PL does not contain mapped 'high risk' areas, and as such the provisions of the *Flora Survey Guidelines - Protected Plants* do not apply. However, any threatened plant occurring 'in the wild' cannot be knowingly cleared or impacted without a clearing permit. If a protected plant is identified within the disturbance footprint and requires removal, a clearing permit will be needed.

7 Conclusion

Santos is proposing new petroleum activities within PL 1055 (Bantam). Desktop and field assessments were conducted to identify environmental values that are known, or are likely, to occur within the PL.

MNES identified within the PL include:

- One species, grey grasswren, listed as endangered under the EPBC Act; and
- Four species listed as migratory under the EPBC Act.

MSES identified within the PL include:

- One species, grey grasswren, listed as endangered under the NC Act
- One species, Major Mitchell's cockatoo, listed as vulnerable under the NC Act
- One species, echidna, listed as special least concern under the NC Act
- Regulated vegetation – within 100 m of a Vegetation Management Wetland
- Regulated vegetation - intersecting a watercourse
- Channel Country SEA; and
- Connectivity areas.

No Category A, B or C ESAs under the EP Act occur within the PL.

Commonwealth and Queensland Government legislative frameworks require proponents to take all reasonable avoidance and mitigation measures to remove or reduce potential impact to MNES and MSES (DSEWPC 2012; DES 2019). The mitigation hierarchy of avoid, minimise, mitigate and offset is to be applied in the design process for the proposed petroleum infrastructure. After the application of avoidance, minimisation and mitigation measures it was determined that the proposed development is unlikely to have a significant residual impact on MNES and MSES occurring within the PL.

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Appendix A Database search results

WildNet Records supplied by the Department of Environment and Science (2019)

Kingdom	Family	Scientific name	Common name	NC Act	EPBC Act	Record Date	Locality	Latitude	Longitude
Animalia	Cacatuidae	Lophochroa leadbeateri	Major Mitchell's cockatoo	V	<Null>	1/05/1994	McGregor Range, 60km W Eromanga	-26.77764	142.66788
Animalia	Cacatuidae	Lophochroa leadbeateri	Major Mitchell's cockatoo	V	<Null>	1/09/1919	Nappa Merrie HS area	-27.59833	141.1025
Animalia	Laridae	Gelochelidon nilotica	gull-billed tern	SL	<Null>	12/06/1976	LAKE PURE; 80 MLS NORTH OF NAPPA MERRIE	-27.02349	141.17623
Animalia	Laridae	Gelochelidon nilotica	gull-billed tern	SL	<Null>	1/06/1976	LAKE PURE-COOPER CREEK-KARMONA MIDDLE	-27.20682	141.66789
Animalia	Macropodidae	Petrogale xanthopus celeris	yellow-footed rock-wallaby	V	V	23/05/1770	PLEVNA DOWNS (MT MARGARET)	-26.56558	142.60621
Animalia	Macropodidae	Petrogale xanthopus celeris	yellow-footed rock-wallaby	V	V	7/12/1974	PLEVNA DOWNS (MT MARGARET)	-26.56558	142.60621
Animalia	Macropodidae	Petrogale xanthopus celeris	yellow-footed rock-wallaby	V	V	23/05/1770	Plevna/Mt Margaret Stns	-26.56515	142.61786
Animalia	Megadermatidae	Macroderma gigas	ghost bat	E	V	23/05/1770	Mt Margaret, Wilson River	-26.89833	142.33444
Animalia	Scolopacidae	Calidris acuminata	sharp-tailed sandpiper	SL	<Null>	25/08/1994	Coothero Waterhole- Nockatunga Station	-27.72628	142.71652
Animalia	Tachyglossidae	Tachyglossus aculeatus	short-beaked echidna	SL	<Null>	3/09/2011	QSN3 Wallumbilla - Ballera	-27.14302	142.50749
Animalia	Tachyglossidae	Tachyglossus aculeatus	short-beaked echidna	SL	<Null>	31/10/2012	Cooper Developmental Road, west of Eromanga, SWQ.	-27.13012	142.78636
Animalia	Threskiornithidae	Plegadis falcinellus	glossy ibis	SL	<Null>	1/06/1976	COOPER CREEK - NAPPA MERRIE - MIDDLE	-27.58182	141.2929
Animalia	Threskiornithidae	Plegadis falcinellus	glossy ibis	SL	<Null>	28/10/2012	Wilson River Campground, Noccundra Waterhole, Noccundra, SWQ.	-27.8214	142.58994
Plantae	Acanthaceae	Xerothamnella parvifolia	<Null>	C	V	27/08/2010	7.3km along Cooneberry Creek road, WSW of Eromanga.	-26.80778	142.95194
Plantae	Acanthaceae	Xerothamnella parvifolia	<Null>	C	V	6/09/2013	3km N of Cunnavale opal mine, Boodook.	-26.47692	142.76985

WildNet Records supplied by the Department of Environment and Science (2019)

Kingdom	Family	Scientific name	Common name	NC Act	EPBC Act	Record Date	Locality	Latitude	Longitude
Plantae	Asteraceae	Rhodanthe rufescens	<Null>	NT	<Null>	11/08/1987	Noccundra about 130km WNW of Thargomindah.	-27.80681	142.59289
Plantae	Asteraceae	Rhodanthe rufescens	<Null>	NT	<Null>	29/08/2010	1km N of 'Plevna Downs' homestead, W of Eromanga.	-26.67472	142.58694
Plantae	Chenopodiaceae	Maireana cheelii	<Null>	C	V	28/06/1936	Nockatunga.	-27.5068	143.00955
Plantae	Fabaceae	Indigofera oxyrachis	<Null>	V	<Null>	3/07/1936	Mt Howitt Station, 80 miles W of Eromanga.	-26.50681	142.25955
Plantae	Fabaceae	Indigofera oxyrachis	<Null>	V	<Null>	30/08/2010	Repeater Tower hill, 1km N of Cooneberry Creek road, W of Eromanga.	-26.76778	142.67056

Queensland Government

Department of Environment and Science

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest
pl: 1055

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or area of interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "central coordinates" option, the resulting assessment area encompasses an area extending for a 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Please direct queries about these reports to: Planning.Support@des.qld.gov.au

Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness, or suitability, for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which the user may incur as a consequence of the information being inaccurate or incomplete in any way and for any reason.

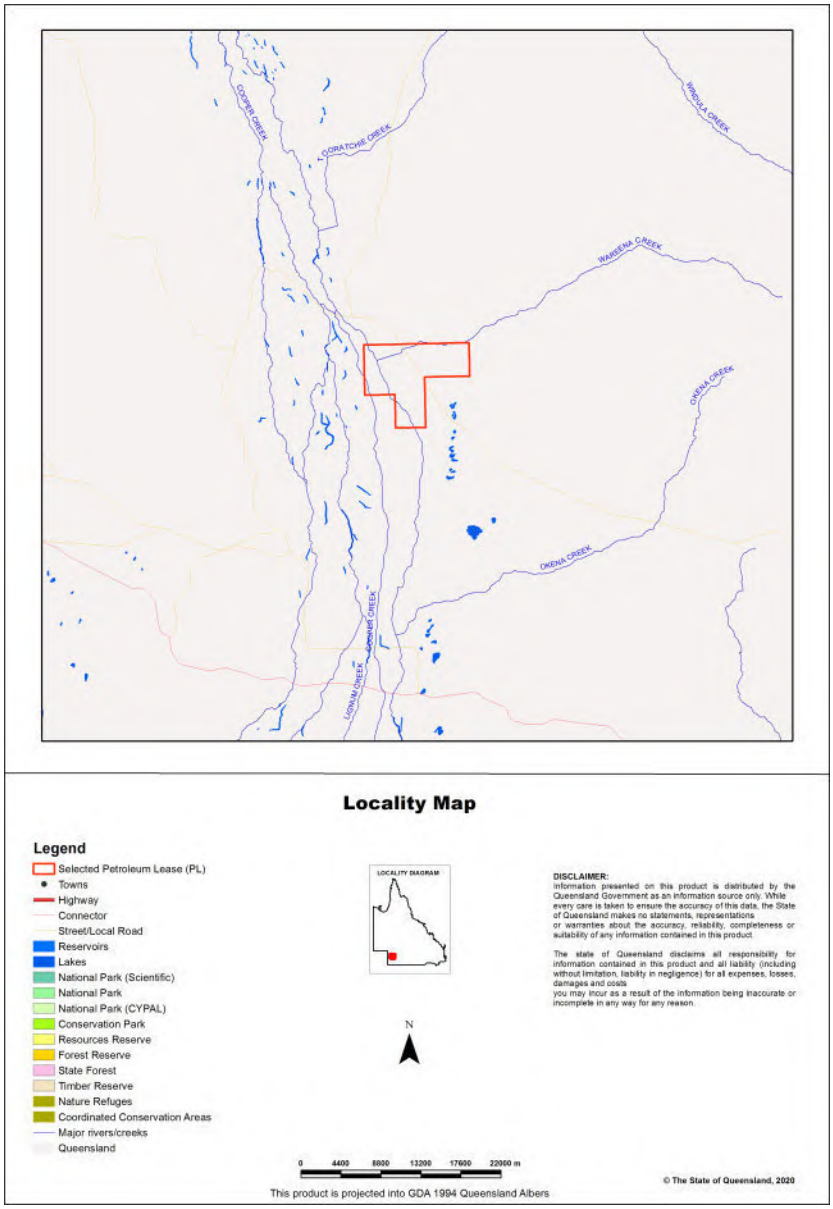
Table of Contents

Assessment Area Details

The following table provides an overview of the area of interest (AOI) with respect to selected topographic and environmental values.

Table 1: Summary table, details for AOI pl: 1055

Size (ha)	6,709.5
Local Government(s)	Bulloo Shire
Bioregion(s)	Channel Country
Subregion(s)	Sturt Stony Desert, Cooper - Diamantina Plains
Catchment(s)	Cooper Creek



Matters of State Environmental Significance (MSES)

MSES Categories

Queensland's State Planning Policy (SPP) includes a biodiversity State interest that states:

'The sustainable, long-term conservation of biodiversity is supported. Significant impacts on matters of national or state environmental significance are avoided, or where this cannot be reasonably achieved; impacts are minimised and residual impacts offset.'

The MSES mapping product is a guide to assist planning and development assessment decision-making. Its primary purpose is to support implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations. Similarly, the SPP biodiversity policy does not override or replace specific requirements of other Acts or regulations.

The SPP defines matters of state environmental significance as:

- Protected areas (including all classes of protected area except coordinated conservation areas) under the *Nature Conservation Act 1992* ;

- Marine parks and land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone under the *Marine Parks Act 2004* ;

- Areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008;

- Threatened wildlife under the *Nature Conservation Act 1992* and special least concern animals under the Nature Conservation (Wildlife) Regulation 2006;

- Regulated vegetation under the *Vegetation Management Act 1999* that is:

    • Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems;

    • Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;

    • Category R areas on the regulated vegetation management map;

    • Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse and drainage feature map;

    • Regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map;

- Strategic Environmental Areas under the *Regional Planning Interests Act 2014* ;

- Wetlands in a wetland protection area of wetlands of high ecological significance shown on the Map of Queensland Wetland Environmental Values under the Environment Protection Regulation 2019;

- Wetlands and watercourses in high ecological value waters defined in the Environmental Protection (Water) Policy 2009, schedule 2;

- Legally secured offset areas.

MSES Values Present

The MSES values that are present in the area of interest are summarised in the table below:

Table 2: Summary of MSES present within the AOI

1a Protected Areas- estates	0.0 ha	0.0 %
1b Protected Areas- nature refuges	0.0 ha	0.0 %
2 State Marine Parks- highly protected zones	0.0 ha	0.0 %
3 Fish habitat areas (A and B areas)	0.0 ha	0.0 %
4 Strategic Environmental Areas (SEA)	6642.45 ha	99.0%
5 High Ecological Significance wetlands on the map of Referable Wetlands	0.0 ha	0.0 %
6a High Ecological Value (HEV) wetlands	0.0 ha	0.0 %
6b High Ecological Value (HEV) waterways **	0.0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	0.0 ha	0.0 %
7b Special least concern animals	0.0 ha	0.0 %
7c i Koala habitat area - core (SEQ)	0.0 ha	0.0 %
7c ii Koala habitat area - locally refined (SEQ)	0.0 ha	0.0 %
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	0.0 ha	0.0 %
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	0.0 ha	0.0 %
8c Regulated Vegetation - Category R (GBR riverine regrowth)	0.0 ha	0.0 %
8d Regulated Vegetation - Essential habitat	0.0 ha	0.0 %
8e Regulated Vegetation - intersecting a watercourse **	55.8 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	5863.88 ha	87.4%
9a Legally secured offset areas- offset register areas	0.0 ha	0.0 %
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0.0 ha	0.0 %

Additional Information with Respect to MSES Values Present

MSES - State Conservation Areas

1a. Protected Areas - estates

(no results)

1b. Protected Areas - nature refuges

(no results)

2. State Marine Parks - highly protected zones

(no results)

3. Fish habitat areas (A and B areas)

(no results)

Refer to **Map 1 - MSES - State Conservation Areas** for an overview of the relevant MSES.

MSES - Wetlands and Waterways

4. Strategic Environmental Areas (SEA)

Regional planning interest type	Region	Status
Strategic Environmental Area - Designated Precinct	Channel Country	Current - June 2014

5. High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values

(no results)

6a. Wetlands in High Ecological Value (HEV) waters

(no results)

6b. Waterways in High Ecological Value (HEV) waters

(no results)

Refer to **Map 2 - MSES - Wetlands and Waterways** for an overview of the relevant MSES.

MSES - Species

7a. Threatened (endangered or vulnerable) wildlife

Not applicable

7b. Special least concern animals

Not applicable

7c i. Koala habitat area - core (SEQ)

Not applicable

7c ii. Koala habitat area - locally refined (SEQ)

Not applicable

Threatened (endangered or vulnerable) wildlife habitat suitability models

Species	Common name	NCA status	Presence
Boronia keysii		V	None
Calyptorhynchus lathami	Glossy black cockatoo	V	None
Casuarius casuarius johnsonii	Sthn population cassowary	E	None
Crinia tinnula	Wallum froglet	V	None
Denisonia maculata	Ornamental snake	V	None
Litoria freycineti	Wallum rocketfrog	V	None
Litoria olongburensis	Wallum sedgefrog	V	None
Melaleuca irbyana		E	None
Petaurus gracilis	Mahogany Glider	E	None
Petrogale persephone	Proserpine rock-wallaby	E	None
Phascolarctos cinereus	Koala - outside SEQ*	V	None
Pezoporus wallicus wallicus	Eastern ground parrot	V	None
Taudactylus pleione	Kroombit tinkerfrog	E	None
Xeromys myoides	Water Mouse	V	None

**For koala model, this includes areas outside SEQ. Check 7c SEQ koala habitat for presence/absence.*

Threatened (endangered or vulnerable) wildlife species records

(no results)

Special least concern animal species records

(no results)

**Nature Conservation Act 1992 (NCA) Status- Endangered (E), Vulnerable (V) or Special Least Concern Animal (SL). Environment Protection and Biodiversity Conservation Act 1999 (EPBC) status: Critically Endangered (CE) Endangered (E), Vulnerable (V)*

Migratory status (M) - China and Australia Migratory Bird Agreement (C), Japan and Australia Migratory Bird Agreement (J), Republic of Korea and Australia Migratory Bird Agreement (R), Bonn Migratory Convention (B), Eastern Flyway (E)

To request a species list for an area, or search for a species profile, access Wildlife Online at:

https://www.qld.gov.au/environment/plants-animals/species-list/

Refer to **Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals** and **Map 3b - MSES - Species - Koala habitat area (SEQ)** for an overview of the relevant MSES.

MSES - Regulated Vegetation

For further information relating to regional ecosystems in general, go to:
https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/
For a more detailed description of a particular regional ecosystem, access the regional ecosystem search page at:
https://environment.ehp.qld.gov.au/regional-ecosystems/

8a. Regulated Vegetation - Endangered/Of concern in Category B (remnant)

Not applicable

8b. Regulated Vegetation - Endangered/Of concern in Category C (regrowth)

Not applicable

8c. Regulated Vegetation - Category R (GBR riverine regrowth)

Not applicable

8d. Regulated Vegetation - Essential habitat

Not applicable

8e. Regulated Vegetation - intersecting a watercourse**

A vegetation management watercourse is mapped as present

8f. Regulated Vegetation - within 100m of a Vegetation Management wetland

Regulated vegetation map category	Map number	RVM rule
B	7343	2

Refer to **Map 4 - MSES - Regulated Vegetation** for an overview of the relevant MSES.

MSES - Offsets

9a. Legally secured offset areas - offset register areas

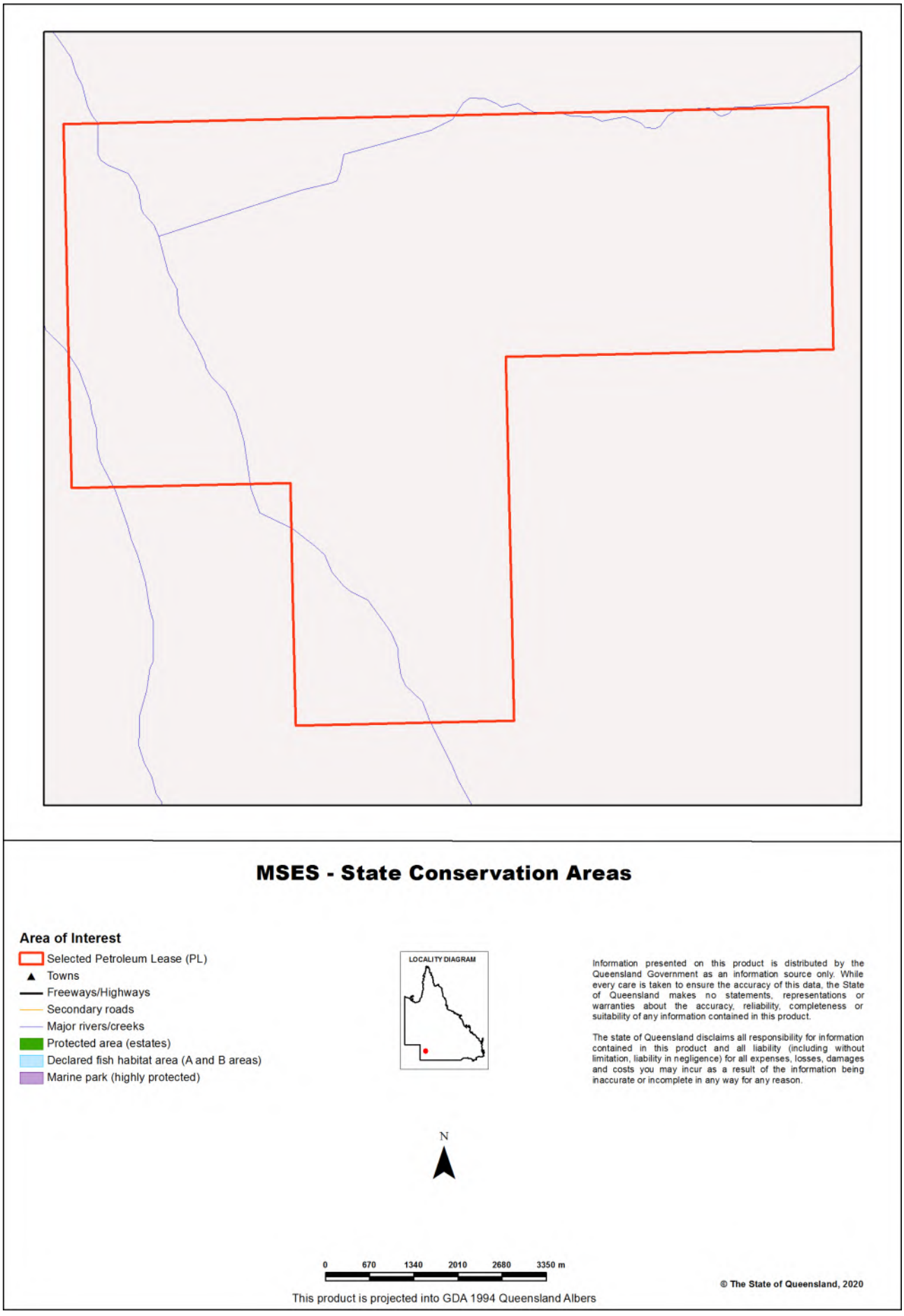
(no results)

9b. Legally secured offset areas - vegetation offsets through a Property Map of Assessable Vegetation

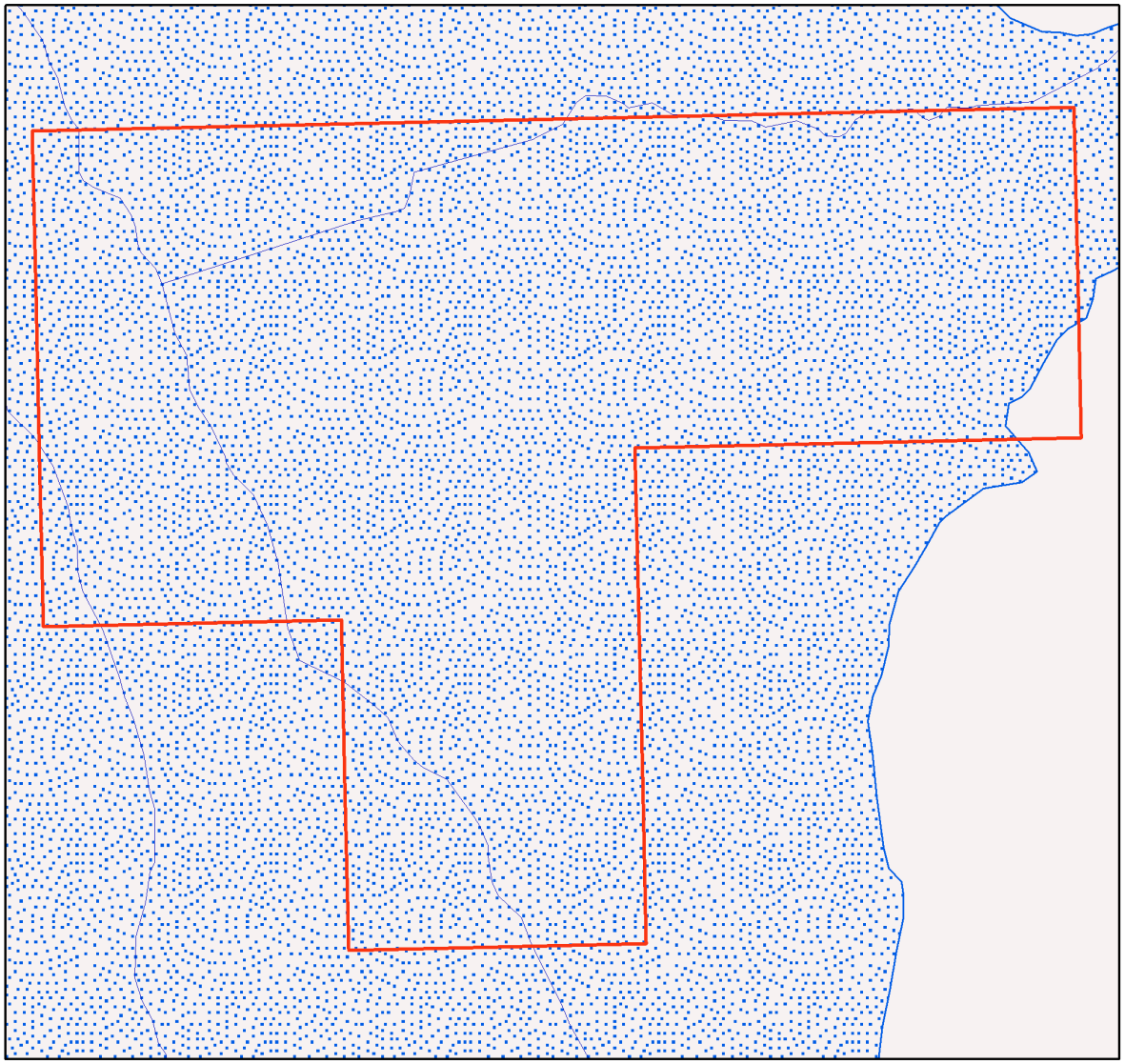
(no results)

Refer to **Map 5 - MSES - Offset Areas** for an overview of the relevant MSES.

Map 1 - MSES - State Conservation Areas



Map 2 - MSES - Wetlands and Waterways

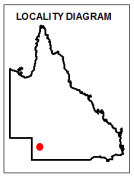


MSES - Wetlands and Waterways

Area of Interest

- Selected Petroleum Lease (PL)
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Declared high ecological value waters (watercourse)
- Strategic environmental area (designated precinct)
- Declared high ecological value waters (wetland)
- High ecological significance wetlands

LOCALITY DIAGRAM

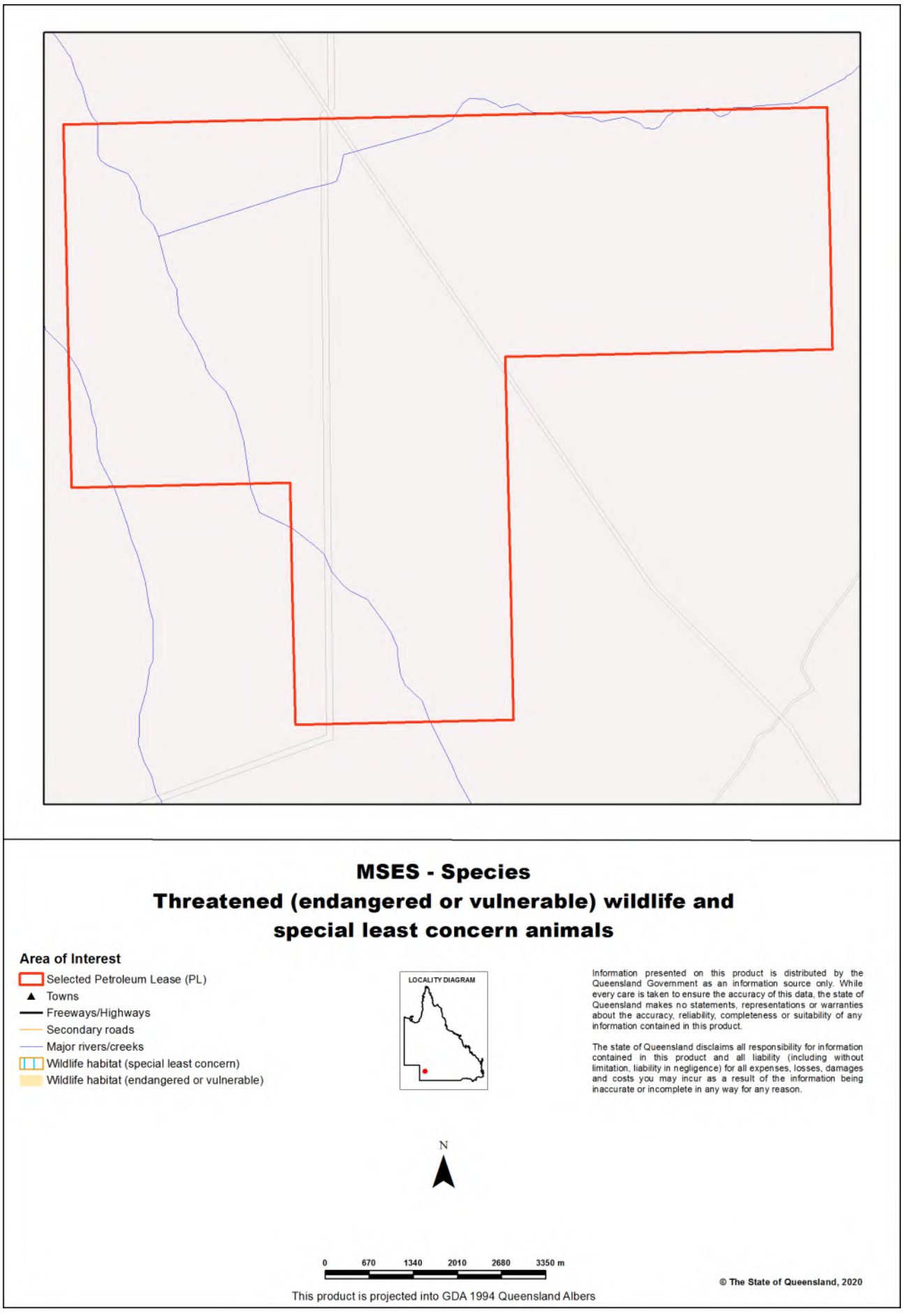


N

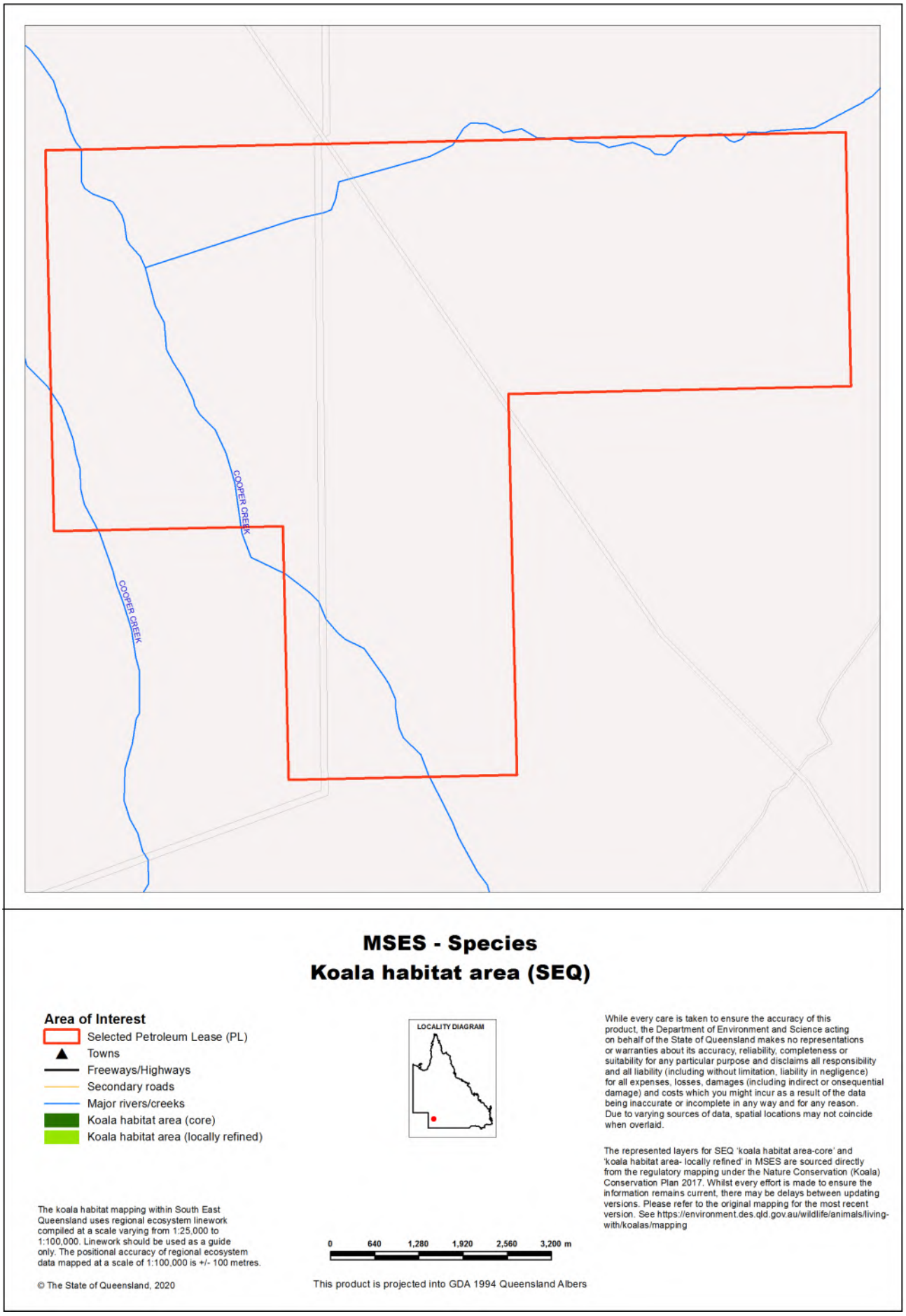
0 670 1340 2010 2680 3350 m

This product is projected into GDA 1994 Queensland Albers

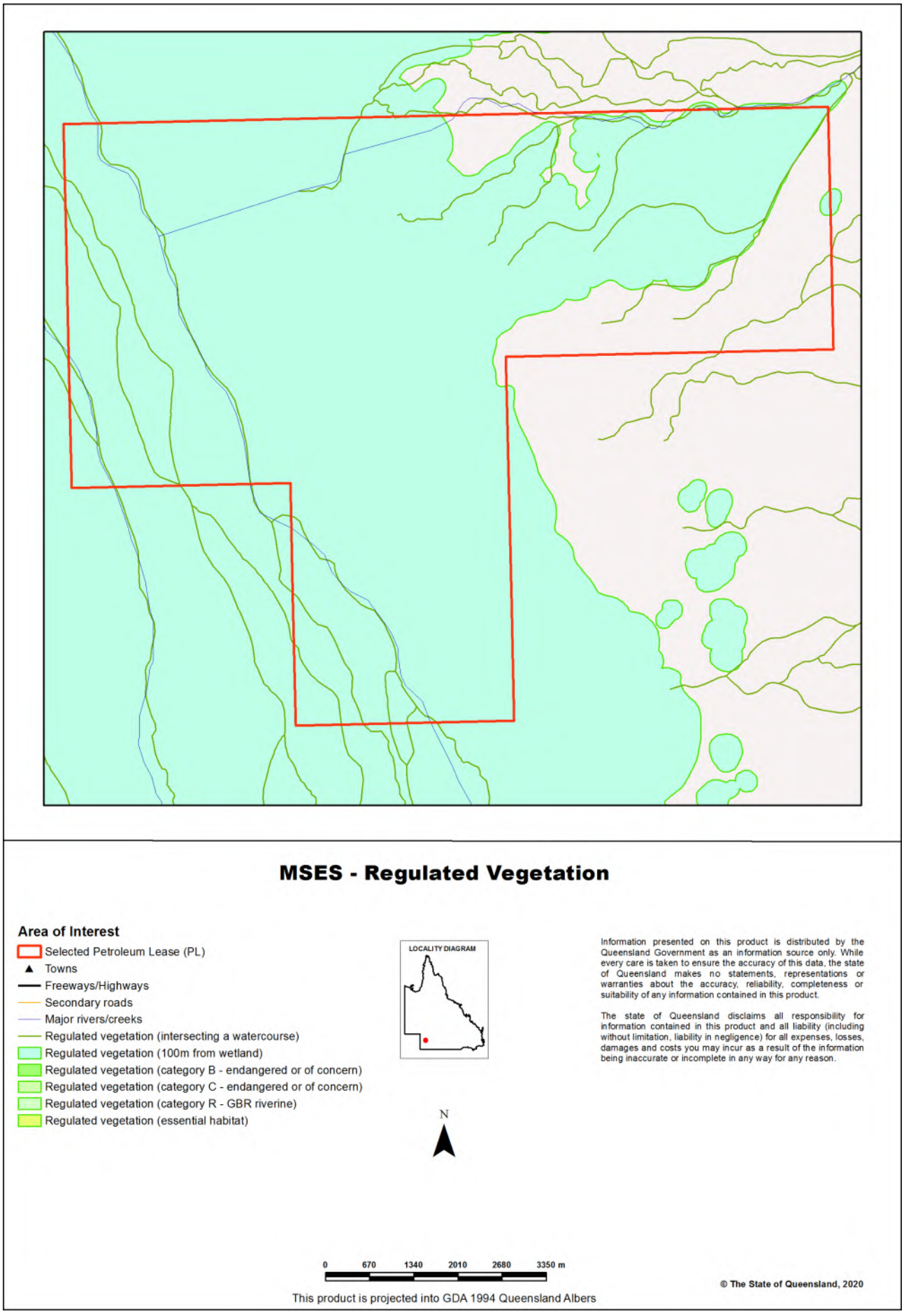
Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals



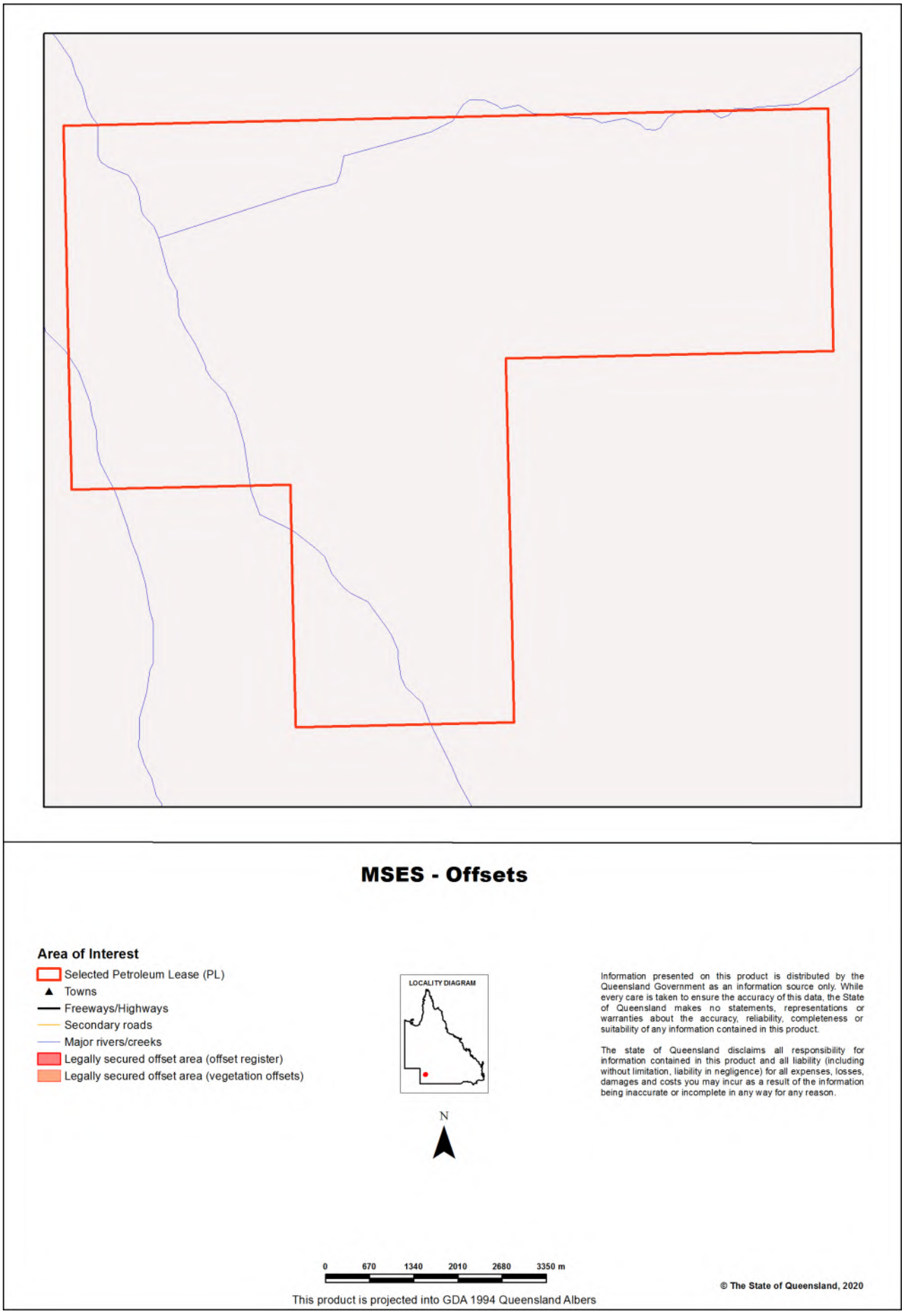
Map 3b - MSES - Species - Koala habitat area (SEQ)



Map 4 - MSES - Regulated Vegetation



Map 5 - MSES - Offset Areas



Appendices

Appendix 1 - Matters of State Environmental Significance (MSES) methodology

MSES mapping is a regional-scale representation of the definition for MSES under the State Planning Policy (SPP). The compiled MSES mapping product is a guide to assist planning and development assessment decision-making. Its primary purpose is to support implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations. Similarly, the SPP biodiversity policy does not override or replace specific requirements of other Acts or regulations.

The Queensland Government's "Method for mapping - matters of state environmental significance for use in land use planning and development assessment" can be downloaded from:

http://www.ehp.qld.gov.au/land/natural-resource/method-mapping-mses.html .

Appendix 2 - Source Data

The datasets listed below are available on request from:

http://qldspatial.information.qld.gov.au/catalogue/custom/index.page

- Matters of State environmental significance

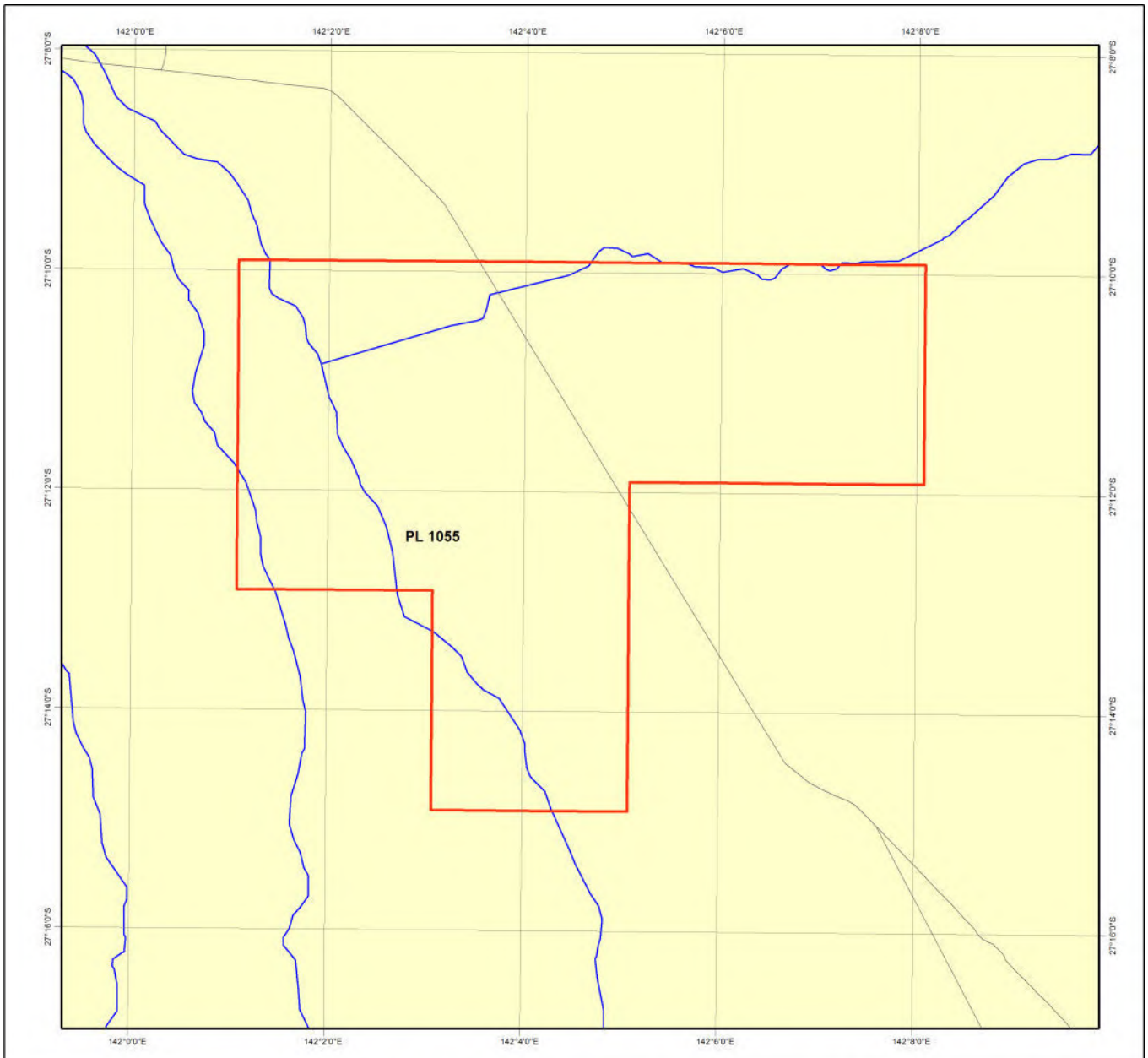
Note: MSES mapping is not based on new or unique data. The primary mapping product draws data from a number of underlying environment databases and geo-referenced information sources. MSES mapping is a versioned product that is updated generally on a twice-yearly basis to incorporate the changes to underlying data sources. Several components of MSES mapping made for the current version may differ from the current underlying data sources. To ensure accuracy, or proper representation of MSES values, it is strongly recommended that users refer to the underlying data sources and review the current definition of MSES in the State Planning Policy, before applying the MSES mapping.

Individual MSES layers can be attributed to the following source data available at QSpatial:

MSES layers	**current QSpatial data (http://qspatial.information.qld.gov.au)**
Protected Areas-Estates and Nature Refuges	- Protected areas of Queensland - Nature Refuges - Queensland
Marine Park-Highly Protected Zones	Moreton Bay marine park zoning 2008
Fish Habitat Areas	Queensland fish habitat areas
Strategic Environmental Areas-designated	Regional Planning Interests Act - Strategic Environmental Areas
HES wetlands	Map of Queensland Wetland Environmental Values
Wetlands in HEV waters	HEV waters: - EPP Water (multiple locations) intent for waters Source Wetlands: - Queensland Wetland Mapping (Current version 4, 2015) Source Watercourses: - Vegetation management watercourse and drainage feature map (1:100000 and 1:250000)
Wildlife habitat (threatened and special least concern)	-WildNet database species records - habitat suitability models (various) - SEQ koala habitat areas under the Koala Conservation Plan 2019
VMA regulated regional ecosystems	Vegetation management regional ecosystem and remnant map
VMA Essential Habitat	Vegetation management - essential habitat map
VMA Wetlands	Vegetation management wetlands map
Legally secured offsets	Vegetation Management Act property maps of assessable vegetation. For offset register data-contact DES
Regulated Vegetation Map	Vegetation management - regulated vegetation management map

Appendix 3 - Acronyms and Abbreviations

AOI	- Area of Interest
DES	- Department of Environment and Science
EP Act	- *Environmental Protection Act 1994*
EPP	- Environmental Protection Policy
GDA94	- Geocentric Datum of Australia 1994
GEM	- General Environmental Matters
GIS	- Geographic Information System
MSES	- Matters of State Environmental Significance
NCA	- *Nature Conservation Act 1992*
RE	- Regional Ecosystem
SPP	- State Planning Policy
VMA	- *Vegetation Management Act 1999*



ENVIRONMENTALLY SENSITIVE AREAS - non-mining resource activities (EP Act)

Selected Petroleum Lease (PL)

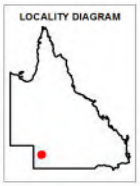
CATEGORY A
- National Parks
- Conservation Parks
- Forest Reserves
- Wet Tropics World Heritage Area
- Great Barrier Reef Marine Park Area
- Marine Parks other than General Use Zones

CATEGORY B
- Queensland Heritage Register Places
- Ramsar Sites
- Cultural Heritage Registered Areas and DLA's other than Stanbroke
- Special Forestry Areas
- Seaward Side of Highest Astronomical Tide
- Fish Habitat Areas
- Coordinated Conservation Areas
- Endangered Regional Ecosystems - regrowth and remnant (Biodiversity Status)
- General Use Zones of Marine Parks
- Marine Plants

CATEGORY C
- Essential Habitat
- Koala Plan
- Nature Refuges
- Resources Reserve
- State Forests
- Timber Reserves
- Of Concern Regional Ecosystems (remnant biodiversity status)

OTHERS
- Towns
- Roads
- Rivers
- Springs
- Queensland

LOCALITY DIAGRAM



N

0 950 1900 2850 3800 4750 m

This product is projected into GDA 1994 MGA Zone 54

NOTE TO USER: Themes presented in this map are indicative only. Field survey may be required to verify the 'true' spatial extent and value. Not all environmentally sensitive areas are presented in this map. A user should refer to the particular circumstances relevant to their situation to assess the 'completeness' of themes provided.

The user should note that some boundaries and indicated values are ambient or subject to change over time (e.g. regional ecosystem boundaries and conservation status, watercourse mapping etc).

The user should be aware that due to multiple overlapping themes present, some themes/layers may be obscured by others. Ordering in the Legend does not accurately reflect the order by which themes are displayed.

Australian Government

Department of Agriculture, Water and the Environment

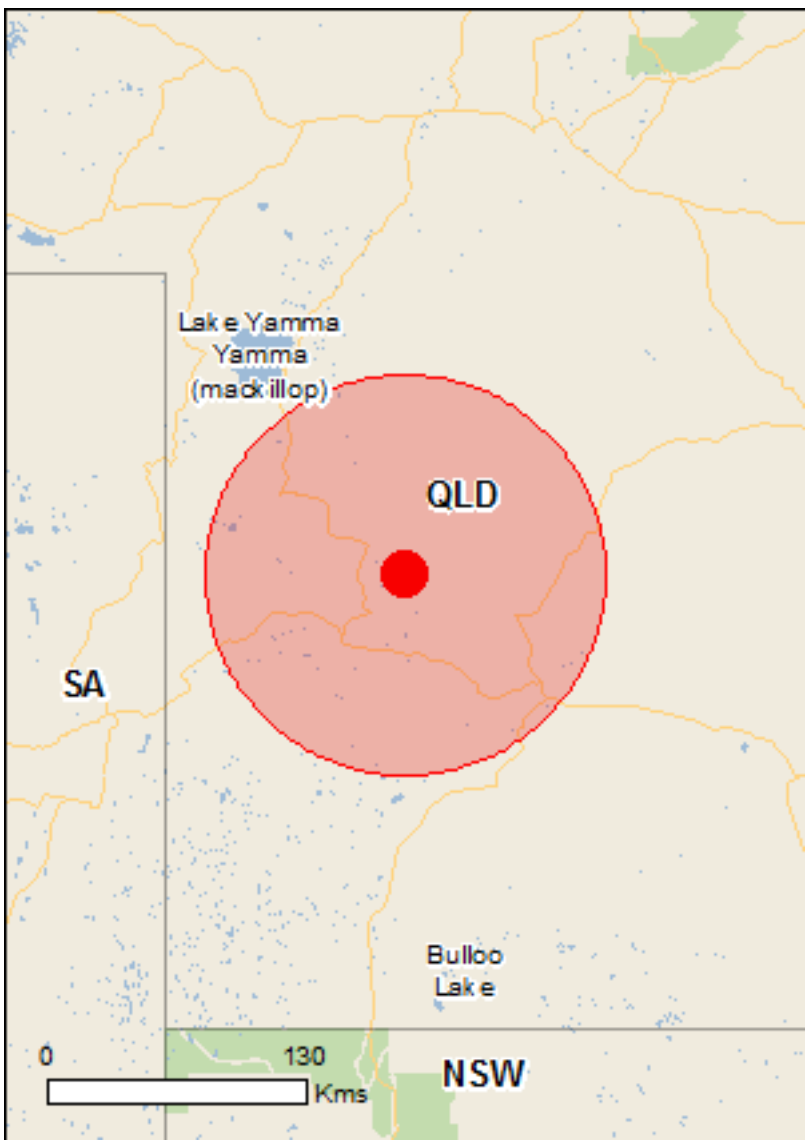
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

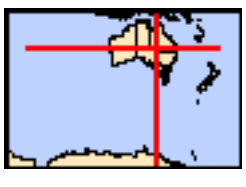
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 09/11/20 19:57:59



Coordinates

Buffer: 100.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	14
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	14
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	17
Nationally Important Wetlands:	2
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Coongie lakes	20 - 30km upstream

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Amytornis barbatus barbatus		
Bulloo Grey Grasswren, Grey Grasswren (Bulloo) [67065]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Falco hypoleucos		
Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area
Grantiella picta		
Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Pedionomus torquatus		
Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area
Pezoporus occidentalis		
Night Parrot [59350]	Endangered	Species or species habitat likely to occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Macrotis lagotis		
Greater Bilby [282]	Vulnerable	Species or species habitat may occur within area
Notomys fuscus		
Dusky Hopping-mouse, Wilkiniti [125]	Vulnerable	Species or species habitat likely to occur within area
Petrogale xanthopus celeris		
Yellow-footed Rock-wallaby (central-western Queensland) [87608]	Vulnerable	Species or species habitat may occur within area
Plants		
Frankenia plicata		
[4225]	Endangered	Species or species habitat likely to occur within area
Grevillea kennedyana		
Flame Spider-flower [6974]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Sclerolaena walkeri [16152]	Vulnerable	Species or species habitat likely to occur within area
Xerothamnella parvifolia [3141]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Extra Information

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		

Name	Status	Type of Presence
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area

Nationally Important Wetlands	[Resource Information]
Name	State

Name	State
Cooper Creek - Wilson River Junction	QLD
Cooper Creek Swamps - Nappa Merrie	QLD

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-27.20274 142.07645

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Appendix B Species lists

B.2 Species lists

Opportunistic fauna observations

Common name	Scientific name	NC Act Status	EPBC Act Status
Birds			
Australasian pipit	*Anthus novaeseelandiae*	Least concern	Marine
Australian hobby	*Falco longipennis*	Least concern	-
Australian pratincole	*Stiltia isabella*	Least concern	Marine
Black kite	*Milvus migrans*	Least concern	-
Black-faced cuckoo-shrike	*Coracina novaehollandiae*	Least concern	Marine
Black-fronted dotterel	*Elseyornis melanops*	Least concern	-
Brown songlark	*Cincloramphus cruralis*	Least concern	-
Crimson chat	*Epthianura tricolor*	Least concern	-
Fairy martin	*Petrochelidon ariel*	Least concern	-
Galah	Eolophus roseicapilla	Least concern	-
Grey fantail	Rhipidura albiscapa	Least concern	-
Grey shrike-thrush	Colluricincla harmonica	Least concern	-
Horsfield's bronze-cuckoo	*Chalcites basalis*	Least concern	Marine
Inland dotterel	*Charadrius australis*	Least concern	-
Little corella	*Cacatua sanguinea*	Least concern	-
Little crow	*Corvus bennetti*	Least concern	-
Masked woodswallow	*Artamus personatus*	Least concern	-
Orange chat	*Epthianura aurifrons*	Least concern	-
Pacific black duck	*Anas superciliosa*	Least concern	-
Pallid cuckoo	*Cacomantis pallidus*	Least concern	Marine
Red-kneed dotterel	*Erythrogonys cinctus*	Least concern	-
Rufous songlark	*Cincloramphus mathewsi*	Least concern	-
White-winged triller	*Lalage tricolor*	Least concern	-

Appendix C Likelihood of occurrence assessments

Likelihood of Occurrence for Matters of National Environmental Significance

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Flora				
Frankenia plicata	E	LC	The species grows in a range of habitats, including on small hillside channels, which take the first run-off after rain (DEWHA 2008a). In the Simpson Desert, the species has been recorded predominantly from swales of loamy sands to clay (DEWHA 2008a). This species is found in a wide range of vegetation communities that have good drainage (DEWHA 2008a).	**Unlikely to occur** The PL is outside of the current known distribution of the species. The species has not been recorded within Queensland (Queensland Herbarium 2019b).
Maireana cheelii chariot wheels	V	LC	The Chariot Wheels is usually found in chenopod shrubland and grassland communities on heavy clay soils, dominated by various native shrubs, grasses and herbs (Mavromihalis 2010). The species was recorded in south-western Queensland in 1936, at two locations close to Eulo on the Paroo River plain and on a private pastoral property (Nockatunga) about 125 km west of Thargomindah, in the Mulga Lands IBRA bioregion (Mavromihalis 2010). No record of the species has been made at either location since 1936 (Mavromihalis 2010). The species has since been recorded in Queensland in Currawinya National Park (ALA 2019).	**Unlikely to occur** Previous records of this species within 100 km of the PL were recorded in 1936, with no further record of the species being made at these locations (Mavromihalis 2010).
Sclerolaena walkeri	V	LC	The species is known to occur on saline river channels, flats and floodplains (Department of the Environment, Water, Heritage and the Arts 2008b).	**Possible occurrence** The PL contains broadly suitable habitat for the species. The nearest records of the species to the PL are from the Bulloo River Floodplain (ALA 2019). The nearest record of the species within the Cooper Creek floodplain are from approximately 230 km to the north-east.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Xerothamnella parvifolia	V	LC	The species has typically been recorded in association with skeletal clay soils in minimally vegetated areas associated with mesas (DEWHA 2008b). It has been recorded within mulga woodland as well as *Acacia cambagei* woodland with a Senna understory in Queensland and NSW (DEWHA 2008b).	**Unlikely to occur** The PL does not contain suitable habitat for the species.
Birds				
Common sandpiper *Actitis hypoleucos*	Marine, Migratory	SLC	The species has been recorded from a wide range of wetland habitats, of varying levels of salinity (DEE 2019). The species typically forages in shallow water and on bare soft mud at the edges of wetlands (DEE 2019).	**Possible occurrence** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Grey falcon *Falco hypoleucos*	V	V	Habitat for the species is generally timbered lowland plains that are crossed by tree-lined watercourses, and adjacent to treeless areas, grasslands and open woodlands that are used for foraging (Garnett, Szabo & Dutson 2011). Key habitat is identified as *Acacia* shrublands that are crossed by tree-lined watercourses (Garnett, Szabo & Dutson 2011).	**Unlikely to occur** The PL is not mapped to contain Acacia shrublands, which are the preferred habitat for the species. In addition, the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Grey grasswren (bulloo) *Amytornis barbatus barbatus*	E	E	The species occurs on periodically-inundated swampy floodplains (DEE 2019). It inhabits patches of dense vegetation that are comprised of lignum thickets, 1.0 to 2.5 m tall, with clumps of *Eragrostis australasica*, about 1 or 2 m tall, and/or clumps of *Atriplex nummularia* (DEE 2019). It also sometimes occurs in areas of *Halosarcia pergranulata* that lie adjacent to more typical habitat (DEE 2019).	**Likely to occur** The Cooper Creek floodplain is known to support grey grasswren; however, the subspecies status of this population is uncertain (Black *et al*. 2011; DEE 2019). The Cooper Creek population may comprise either the Bulloo subspecies (*Amytornis barbatus barbatus*), listed as endangered under the EPBC Act; or the Diamantina subspecies (*Amytornis barbatus diamantina*), not listed under the EPBC Act. In light of this uncertainty, for the purposes of this report, the grey grasswren population has been assumed to comprise the endangered Bulloo subspecies.
Fork-tailed swift *Apus pacificus*	Marine, Migratory	SLC	The species is predominantly aerial and occurs over inland areas and occasionally above the foothills in coastal areas with dry and open habitat (DEE 2019). The species can also occur over low scrub, heathland, saltmarsh and riparian woodlands and are associated with low pressure systems that favour the occurrence of insect prey (DEE 2019).	**Likely to occur** The species is a wide-ranging and nomadic aerial feeder. The species is likely to occur within the airspace above the PL while foraging. The species does not breed in Australia (DEE 2019).
Eastern great egret *Ardea alba modesta*	Marine	LC	The species occurs in a wide range of wetland habitats (for example inland and coastal, freshwater and saline, permanent and ephemeral, open and vegetated, large and small, natural and artificial) (DEE 2019). These include swamps, marshes, margins of rivers and lakes, damp or flooded grasslands, pastures or agricultural lands; reservoirs, sewage treatment ponds, drainage channels, salt pans, salt lakes, salt marshes, estuarine mudflats, tidal streams, mangrove swamps, coastal lagoons and offshore reefs (DEE 2019).	**Likely to occur** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has previously been recorded within 100 km of the PL (ALA 2019).

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Cattle egret *Ardea ibis*	Marine	LC	Typical habitat for the species comprises tropical and temperate grasslands, wooded lands and terrestrial wetlands (DEE 2019). High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass; it avoids low grass pastures (DEE 2019). It has been recorded on earthen dam walls and ploughed fields (DEE 2019). It is commonly associated with the habitats of farm animals, particularly cattle, but also pigs, sheep, horses and deer (DEE 2019). It uses predominately shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora (DEE 2019). They have sometimes been observed in swamps with tall emergent vegetation (DEE 2019).	**Possible occurrence** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Sharp-tailed sandpiper *Calidris acuminata*	Marine, Migratory	SLC	The species typically inhabits muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation (DEE 2019). This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland (DEE 2019). The species may use flooded paddocks, sedgelands and other ephemeral wetlands, but vacate these habitats during dry conditions (DEE 2019). Marine habitats for the species include intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves (DEE 2019). Sometimes occur on rocky shores and rarely on exposed reefs (Higgins & Davies 1996).	**Likely to occur** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has previously been recorded within 100 km of the PL.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Curlew sandpiper *Calidris ferruginea*	CE, Marine, Migratory	E	In Australia, this species usually forages and roosts in intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms (DEE 2019).	**Possible occurrence** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Pectoral sandpiper *Calidris melanotos*	Marine, Migratory	SLC	Typical habitat for the species comprises shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands (DEE 2019). The species is usually found in coastal or near coastal habitat but occasionally further inland (DEE 2019). Also recorded in swamp overgrown with lignum (DEE 2019).	**Possible occurrence** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Black-eared cuckoo *Chrysococcyx osculans*	Marine	LC	The species inhabits drier woodlands and scrublands, including mallee, mulga, lignum, saltmarsh and riverside thickets (Pizzey & Knight 2007).	**Likely to occur** The PL is likely to contain suitable habitat for the species, including lignum thickets. While the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database, the PL is within the species distribution and a public record of the species occurs within approximately 30 km of the PL (ALA 2019).

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Grey falcon *Falco hypoleucos*	V	V	Habitat for the species is generally timbered lowland plains that are crossed by tree-lined watercourses, and adjacent to treeless areas, grasslands and open woodlands that are used for foraging (Garnett, Szabo & Dutson 2011). Key habitat is identified as *Acacia* shrublands that are crossed by tree-lined watercourses (Garnett, Szabo & Dutson 2011).	**Unlikely to occur** The PL is not mapped to contain Acacia shrublands, which are the preferred habitat for the species. In addition, the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Latham's snipe, japanese snipe *Gallinago hardwicki*i	Marine, Migratory	SLC	In Australia the species typically occurs in permanent and ephemeral wetlands up to 2000 m above sea-level (DEE 2019). They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies) (DEE 2019). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity (DEE 2019). Various other freshwater habitats can be used including bogs, waterholes, billabongs, lagoons, lakes, creek or river margins, river pools and floodplains (DEE 2019).	**Possible occurrence** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Painted honeyeater *Grantiella picta*	V	V	The species forages on mistletoes in eucalypt forests/woodlands, riparian woodlands of black box and river red gum, box-ironbark-yellow gum woodlands, acacia-dominated woodlands, paperbarks, casuarinas, callitris, and trees on farmland or gardens. The species prefers woodlands which contain a higher number of mature trees, as these host more mistletoes (DEE 2019).	**Possible occurrence** Mapped vegetation within the PL is largely unsuitable for the species as it is primarily dominated by lignum, ephemeral grassland and ephemeral forbland. Areas mapped as containing *Eucalyptus coolabah* dominated vegetation may provide suitable habitat for the wide-ranging and nomadic species. In addition, the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Rainbow bee-eater *Merops ornatus*	Marine	LC	Occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation (Higgins 1999). It usually occurs in open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water (DEE 2019). The species is known to occur in a wide variety of other habitats, including mangroves, grasslands, wetlands, vine thickets and heathlands (DEE 2019).	**Likely to occur** The PL contains suitable habitat for the species and the species has been previously recorded within 100 km of the PL (ALA 2019).
Grey wagtail *Motacilla cinerea*	Marine, Migratory	SLC	Near running water in disused quarries, sandy and rocky streams in escarpments and rainforests, sewage ponds, ploughed fields, airfields (Pizzey & Knight 2007).	**Unlikely to occur** The species is an uncommon vagrant to Australia. In addition, the PL is unlikely to contain suitable habitat for the species.
Yellow wagtail *Motacilla flava*	Marine, Migratory	SLC	The species typically inhabits short grass and bare ground; swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land and town lawns (Pizzey & Knight 2007). The species is regularly recorded as a summer migrant to coastal northern Australia (Pizzey & Knight 2007).	**Unlikely to occur** The species is an uncommon vagrant to Australia. In addition, the PL is unlikely to contain suitable habitat for the species.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Plains-wanderer *Pedionomus torquatus*	CE	V	The species typically occurs within sparse, treeless, lowland native grasslands which usually occur on hard red-brown clay soils (Department of the Environment (DotE) and the Department of Environment, Water and Natural Resources (DEWNR) 2016). Grassland structure is much more important than floristic composition with the species showing a strong preference for sites with approximately 50% bare ground and most vegetation less than 5 cm in height and some widely-spaced plants up to 30 cm (DotE & DEWNR 2016). The species occasionally occurs in other types of habitat such as in stubble; amongst low cereal crops; and in low, sparse chenopod shrubland (DotE & DEWNR 2016).	**Possible occurrence** Vegetation within the PL is likely to include sparsely treed native grasslands; including grasslands on alluvial and gibber plain soils (land zones 3 and 9). However; the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database. The PL is located within the 'species may occur' area in the species recovery plan (DotE & DEWNR 2016).
Night parrot *Pezoporus occidentalis*	E	E	Queensland records for the species are typically associated with *spinifex triodia hummock* grasslands, *Astrebla spp.* grasslands, shrubby samphire and chenopod associations and occasional areas with *Acacia cambagei* or *A. aneura* (TSSC 2016). Roosting and nesting sites are consistently reported as within clumps of dense vegetation, primarily old and large Spinifex clumps, but sometimes other vegetation types (TSSC 2016).	**Possible occurrence** The PL is likely to contain suitable foraging habitat for the species, particularly *Astrebla* spp. grasslands. While the species has not been recorded within 100 km of the PL, the species is highly cryptic with an uncertain present day distribution.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Glossy ibis *Plegadis falcinellus*	Marine, Migratory	SLC	The species typically inhabits freshwater marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation (DEE 2019). The species is occasionally found in coastal locations such as estuaries, deltas, saltmarshes and coastal lagoons (DEE 2019). Sometimes recorded in wooded swamps, artificial wetlands (such as irrigated fields), and in mangroves for breeding (DEE 2019). Feeds in very shallow water (DEE 2019).	**Likely to occur** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has previously been recorded within 100 km of the PL.
Australian painted snipe *Rostratula australis*	E, Marine	V	Generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans (DEE 2019). They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains (DEE 2019). The species has been recorded to sometimes utilise areas that are lined with trees, or that have some scattered fallen or washed-up timber (Marchant & Higgins 1993). Breeding occurs in shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby, typically from or near small islands in fresh water wetlands (DEE 2019).	**Possible occurrence** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Gull-billed tern *Gelochelidon nilotica*	Marine, Migratory	SLC	The species inhabits beaches, mudflats, brackish wetlands, including inland wetlands, grasslands, crops, ploughed fields and airfields (Pizzey and Knight 2007). The species usually breeds in small colonies on islands in inland lakes (Pizzey and Knight 2007).	**Likely to occur** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has previously been recorded within 100 km of the PL.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Common greenshank *Tringa nebularia*	Marine, Migratory	SLC	The species occurs in all types of wetlands (Higgins & Davies 1996). Typical habitat for this species a wide variety of inland wetlands and sheltered coastal habitats of varying salinity (DEE 2019), including sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass, both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats (DEE 2019).	**Possible occurrence** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Mammals				
Ghost bat *Macroderma gigas*	V	E	The species occurs across a range of habitats, from arid Pilbara to tropical savanna woodlands and rainforests (DEE 2019). During the daytime they roost in caves, rock crevices and old mines (DEE 2019). Roost sites used permanently are generally deep natural caves or disused mines with a relatively stable temperature of 23°–28°C and a moderate to high relative humidity of 50–100 percent (DEE 2019). The average foraging distance is approximately 2 km from the daytime roost (DEE 2019).	**Unlikely to occur** The PL is unlikely to support suitable roosting habitat for the species. In addition, suitable roosting habitat is unlikely to occur within the foraging distance of the PL.
Greater bilby *Macrotis lagotis*	V	E	The remaining populations of the greater bilby occupy three main habitats: open tussock grassland on uplands and hills, *Acacia aneura* (mulga) woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas (TSSC 2016b).	**Unlikely to occur** The PL is outside of the current known distribution of the species (TSSC 2016b).

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Dusky hopping-mouse, wilkiniti *Notomys fuscus*	V	E	This species inhabits a variety of soft sandy habitats, preferring sand dunes, hills and ridges with cane grass (*Ophiuros exaltatus*), sandhill wattle (*Acacia ligulata*), nitrebush (*Nitraria billardiera*), sticky hopbush (*Dodonaea viscose*) and other annual and perennial shrubs (DEWHA 2008b).	**Unlikely to occur** The PL is not mapped to contain preferred sand dune habitat for the species. In addition, the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database the PL is outside of the current known distribution of the species (DEWHA 2008d; ALA 2019).
Yellow-footed rock-wallaby *Petrogale xanthopus celeris*	V	V	The yellow-footed rock-wallaby (central-western Queensland) is mostly nocturnal, and shelters during the day in caves and rock crevices (TSSC 2016). It is closely associated with rugged rocky areas, along the edges of low sandstone tablelands and hills, typically with low Acacia woodlands or shrublands (TSSC 2016c).	**Unlikely to occur** The PL is unlikely to support suitable rocky habitat for the species.

[1] EPBC Act = Environment Protection and Biodiversity Conservation Act 1999; NC Act = Nature Conservation Act 1992. E-Endangered, V-Vulnerable, NT-Near Threatened, SLC-Special Least Concern

[2] **Known** to occur: species were recorded during field surveys. **Likely** to occur: suitable habitat to support the species is present and the species has previously been recorded within the desktop search extent. **Possible** occurrence: The PL is within the species known distribution and suitable habitat to support the species is present; however, the species has not previously been recorded within the desktop search extent; and/or, suitable habitat is degraded or of limited extent, thereby reducing the likelihood of the species occurrence. **Unlikely** to occur: the PL does not comprise suitable habitat for the species, or is outside of the species known distribution.

Likelihood of Occurrence for Matters of State Environmental Significance

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Flora				
Indigofera oxyrachis	-	V	The species has been recorded from stony ground and along creek lines with Acacia species (Wilson 1994). This species is typically found in the sandy beds of creeks (Wilson 1994).	**Unlikely to occur** While this species has been previously recorded within 100 km of the PL, the PL does not contain suitable habitat for the species. The species has not been previously recorded within similar alluvial floodplain or gibber plain habitat (ALA 2019).
Rhodanthe rufescens	-	NT	Occurrence records for the species have identified habitat to include *Acacia aneura* and *A. cambagei* woodland, with soil types including pale brown clay, red loamy soil and on a low ridgetop (ALA 2019).	**Unlikely to occur** The PL does not contain suitable habitat for the species. The species has not been previously recorded within similar alluvial floodplain or gibber plain habitat (ALA 2019).
Birds				
Common sandpiper *Actitis hypoleucos*	Marine, Migratory	SLC	The species has been recorded from a wide range of wetland habitats, of varying levels of salinity (DEE 2019). The species typically forages in shallow water and on bare soft mud at the edges of wetlands (DEE 2019).	**Possible occurrence** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Grey grasswren (bulloo) *Amytornis barbatus barbatus*	E	E	The species occurs on periodically-inundated swampy floodplains (DEE 2019). It inhabits patches of dense vegetation that are comprised of lignum thickets, 1.0 to 2.5 m tall, with clumps of *Eragrostis australasica*, about 1 or 2 m tall, and/or clumps of *Atriplex nummularia* (DEE 2019). It also sometimes occurs in areas of *Halosarcia pergranulata* that lie adjacent to more typical habitat (DEE 2019).	**Likely to occur** The Cooper Creek floodplain is known to support grey grasswren; however, the subspecies status of this population is uncertain (Black *et al*. 2011; DEE 2019). The Cooper Creek population may comprise either the Bulloo subspecies (*Amytornis barbatus barbatus*), listed as endangered under the NC Act; or the Diamantina subspecies (*Amytornis barbatus diamantina*), listed as near threatened under the NC Act. In light of this uncertainty, for the purposes of this report, the grey grasswren population has been assumed to comprise the endangered Bulloo subspecies.
Fork-tailed swift *Apus pacificus*	Marine, Migratory	SLC	The species is predominantly aerial and occurs over inland areas and occasionally above the foothills in coastal areas with dry and open habitat (DEE 2019). The species can also occur over low scrub, heathland, saltmarsh and riparian woodlands and are associated with low pressure systems that favour the occurrence of insect prey (DEE 2019).	**Likely to occur** The species is a wide-ranging and nomadic aerial feeder. The species is likely to occur within the airspace above the PL while foraging. The species does not breed in Australia (DEE 2019).

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Sharp-tailed sandpiper *Calidris acuminata*	Marine, Migratory	SLC	The species typically inhabits muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation (DEE 2019). This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland (DEE 2019). The species may use flooded paddocks, sedgelands and other ephemeral wetlands, but vacate these habitats during dry conditions (DEE 2019). Marine habitats for the species include intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves (DEE 2019). Sometimes occur on rocky shores and rarely on exposed reefs (Higgins & Davies 1996).	**Likely to occur** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has previously been recorded within 100 km of the PL.
Curlew sandpiper *Calidris ferruginea*	CE, Marine, Migratory	E	In Australia, this species usually forages and roosts in intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms (DEE 2019).	**Possible occurrence** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Pectoral sandpiper *Calidris melanotos*	Marine, Migratory	SLC	Typical habitat for the species comprises shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands (DEE 2019). The species is usually found in coastal or near coastal habitat but occasionally further inland (DEE 2019). Also recorded in swamp overgrown with lignum (DEE 2019).	**Possible occurrence** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Grey falcon *Falco hypoleucos*	V	V	Habitat for the species is generally timbered lowland plains that are crossed by tree-lined watercourses, and adjacent to treeless areas, grasslands and open woodlands that are used for foraging (Garnett, Szabo & Dutson 2011). Key habitat is identified as Acacia shrublands that are crossed by tree-lined watercourses (Garnett, Szabo & Dutson 2011).	**Unlikely to occur** The PL is not mapped to contain Acacia shrublands, which are the preferred habitat for the species. In addition, the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Latham's snipe, japanese snipe *Gallinago hardwicki*i	Marine, Migratory	SLC	In Australia the species typically occurs in permanent and ephemeral wetlands up to 2000 m above sea-level (DEE 2019). They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies) (DEE 2019). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity (DEE 2019). Various other freshwater habitats can be used including bogs, waterholes, billabongs, lagoons, lakes, creek or river margins, river pools and floodplains (DEE 2019).	**Possible occurrence** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Painted honeyeater *Grantiella picta*	V	V	The species forages on mistletoes in eucalypt forests/woodlands, riparian woodlands of black box and river red gum, box-ironbark-yellow gum woodlands, acacia-dominated woodlands, paperbarks, casuarinas, callitris, and trees on farmland or gardens. The species prefers woodlands which contain a higher number of mature trees, as these host more mistletoes (DEE 2019).	**Possible occurrence** Mapped vegetation within the PL is largely unsuitable for the species as it is primarily dominated by lignum, ephemeral grassland and ephemeral forbland. Areas mapped as containing *Eucalyptus coolabah* dominated vegetation may provide suitable habitat for the wide-ranging and nomadic species. In addition, the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Major Mitchell's cockatoo *Lophochroa leadbeateri*	-	V	The species prefers semi-arid and arid regions, typically occurring in dry woodlands dominated by *Eucalyptus, Callitris* and *Casuarina spp.* (Curtis & Dennis 2012).	**Likely to occur** Areas of suitable vegetation for the breeding and foraging of the species occurs within the PL, namely RE 5.3.7 along major watercourse channels, which contain large hollow-bearing coolabah (*Eucalyptus coolabah*) trees and RE 5.3.8a (foraging habitat only), which also contain coolabah trees that are typically smaller, with limited large hollows and away from major water holes. The species has previously been recorded within 100 km of the PL.
Grey wagtail *Motacilla cinerea*	Marine, Migratory	SLC	Near running water in disused quarries, sandy and rocky streams in escarpments and rainforests, sewage ponds, ploughed fields, airfields (Pizzey & Knight 2007).	**Unlikely to occur** The species is an uncommon vagrant to Australia. In addition, the PL is unlikely to contain suitable habitat for the species.
Yellow wagtail *Motacilla flava*	Marine, Migratory	SLC	The species typically inhabits short grass and bare ground; swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land and town lawns (Pizzey & Knight 2007). The species is regularly recorded as a summer migrant to coastal northern Australia (Pizzey & Knight 2007).	**Unlikely to occur** The species is an uncommon vagrant to Australia. In addition, the PL is unlikely to contain suitable habitat for the species.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Plains-wanderer *Pedionomus torquatus*	CE	V	The species typically occurs within sparse, treeless, lowland native grasslands which usually occur on hard red-brown clay soils (Department of the Environment (DotE) and the Department of Environment, Water and Natural Resources (DEWNR) 2016). Grassland structure is much more important than floristic composition with the species showing a strong preference for sites with approximately 50% bare ground and most vegetation less than 5 cm in height and some widely-spaced plants up to 30 cm (DotE & DEWNR 2016). The species occasionally occurs in other types of habitat such as in stubble; amongst low cereal crops; and in low, sparse chenopod shrubland (DotE & DEWNR 2016).	**Possible occurrence** Vegetation within the PL is likely to include sparsely treed native grasslands; including grasslands on alluvial and gibber plain soils (land zones 3 and 9). However; the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database. The PL is located within the 'species may occur' area in the species recovery plan (DotE & DEWNR 2016).
Night parrot *Pezoporus occidentalis*	E	E	Queensland records for the species are typically associated with *spinifex triodia hummock* grasslands, *Astrebla spp.* grasslands, shrubby samphire and chenopod associations and occasional areas with *Acacia cambagei* or *A. aneura* (TSSC 2016). Roosting and nesting sites are consistently reported as within clumps of dense vegetation, primarily old and large Spinifex clumps, but sometimes other vegetation types (TSSC 2016).	**Possible occurrence** The PL is likely to contain suitable foraging habitat for the species, particularly *Astrebla spp.* grasslands. While the species has not been recorded within 100 km of the PL, the species is highly cryptic with an uncertain present day distribution.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Glossy ibis *Plegadis falcinellus*	Marine, Migratory	SLC	The species typically inhabits freshwater marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation (DEE 2019). The species is occasionally found in coastal locations such as estuaries, deltas, saltmarshes and coastal lagoons (DEE 2019). Sometimes recorded in wooded swamps, artificial wetlands (such as irrigated fields), and in mangroves for breeding (DEE 2019). Feeds in very shallow water (DEE 2019).	**Likely to occur** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has previously been recorded within 100 km of the PL.
Australian painted snipe *Rostratula australis*	E, Marine	V	Generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans (DEE 2019). They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains (DEE 2019). The species has been recorded to sometimes utilise areas that are lined with trees, or that have some scattered fallen or washed-up timber (Marchant & Higgins 1993). Breeding occurs in shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby, typically from or near small islands in fresh water wetlands (DEE 2019).	**Possible occurrence** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Gull-billed tern *Gelochelidon nilotica*	Marine, Migratory	SLC	The species inhabits beaches, mudflats, brackish wetlands, including inland wetlands, grasslands, crops, ploughed fields and airfields (Pizzey and Knight 2007). The species usually breeds in small colonies on islands in inland lakes (Pizzey and Knight 2007).	**Likely to occur** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has previously been recorded within 100 km of the PL.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Common greenshank *Tringa nebularia*	Marine, Migratory	SLC	The species occurs in all types of wetlands (Higgins & Davies 1996). Typical habitat for this species a wide variety of inland wetlands and sheltered coastal habitats of varying salinity (DEE 2019), including sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass, both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and salt flats (DEE 2019).	**Possible occurrence** The PL is likely to contain ephemeral wetlands within channels of the Cooper Creek floodplain, primarily following flood events. The species may temporarily use these ephemeral wetlands while present. The species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Mammals				
Ghost bat *Macroderma gigas*	V	E	The species occurs across a range of habitats, from arid Pilbara to tropical savanna woodlands and rainforests (DEE 2019). During the daytime they roost in caves, rock crevices and old mines (DEE 2019). Roost sites used permanently are generally deep natural caves or disused mines with a relatively stable temperature of 23°–28°C and a moderate to high relative humidity of 50–100 percent (DEE 2019). The average foraging distance is approximately 2 km from the daytime roost (DEE 2019).	**Unlikely to occur** The PL is unlikely to support suitable roosting habitat for the species. In addition, suitable roosting habitat is unlikely to occur within the foraging distance of the PL.
Greater bilby *Macrotis lagotis*	V	E	The remaining populations of the greater bilby occupy three main habitats: open tussock grassland on uplands and hills, *Acacia aneura* (mulga) woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas (TSSC 2016b).	**Unlikely to occur** The PL is outside of the current known distribution of the species (TSSC 2016b).

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Dusky hopping-mouse, wilkiniti *Notomys fuscus*	V	E	This species inhabits a variety of soft sandy habitats, preferring sand dunes, hills and ridges with cane grass (*Ophiuros exaltatus*), sandhill wattle (*Acacia ligulata*), nitrebush (*Nitraria billardiera*), sticky hopbush (*Dodonaea viscose*) and other annual and perennial shrubs (DEWHA 2008b).	**Unlikely to occur** The PL is not mapped to contain preferred sand dune habitat for the species. In addition, the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Yellow-footed rock-wallaby *Petrogale xanthopus celeris*	V	V	The yellow-footed rock-wallaby (central-western Queensland) is mostly nocturnal, and shelters during the day in caves and rock crevices (TSSC 2016). It is closely associated with rugged rocky areas, along the edges of low sandstone tablelands and hills, typically with low Acacia woodlands or shrublands (TSSC 2016c).	**Unlikely to occur** The PL is unlikely to support suitable rocky habitat for the species.
Short-beaked echidna *Tachyglossus aculeatus*	-	SLC	The species occurs throughout Australia in a wide variety of habitats; wherever there is a supply of ants and termites, upon which it feeds (Van Dyck & Strahan 2008). The species usually seeks shelter under thick bushes, in hollow logs, under piles debris, or occasionally in a rabbit burrow (Van Dyck & Strahan 2008).	**Likely to occur** The PL contains suitable habitat for the species and the species has been previously recorded within 100 km of the PL.

[1] EPBC Act = Environment Protection and Biodiversity Conservation Act 1999; NC Act = Nature Conservation Act 1992. E-Endangered, V-Vulnerable, NT-Near Threatened, SLC-Special Least Concern

[2] **Known** to occur: species were recorded during field surveys. **Likely** to occur: suitable habitat to support the species is present and the species has previously been recorded within the desktop search extent. **Possible** occurrence: The PL is within the species known distribution and suitable habitat to support the species is present; however, the species has not previously been recorded within the desktop search extent; and/or, suitable habitat is degraded or of limited extent, thereby reducing the likelihood of the species occurrence. **Unlikely** to occur: the PL does not comprise suitable habitat for the species, or is outside of the species known distribution.

Appendix D MNES significant impact assessment

D.2 MNES significant impact assessment

Definitions and terminology

Term	Definition under the EPBC Act
Important population	A population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are: • key source populations either for breeding or dispersal • populations that are necessary for maintaining genetic diversity, and/or • populations that are near the limit of the species range.
Habitat critical to the survival of the species	Areas that are necessary: • for activities such as foraging, breeding, roosting, or dispersal • for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators) • to maintain genetic diversity and long term evolutionary development, or • for the reintroduction of populations or recovery of the species or ecological community. Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the minister under the EPBC Act.
Invasive species	An introduced species, including an introduced (translocated) native species, which out-competes native species for space and resources or which is a predator of native species. Introducing an invasive species into an area may result in that species becoming established. An invasive species may harm listed threatened species or ecological communities by direct competition, modification of habitat or predation.

MNES significant impact assessment for grey grasswren

MNES Significant Impact Guideline criteria for endangered species	Response
Lead to a long-term decrease in the size of a population	**No significant impact** The proposed disturbance will require the clearing of approximately 57.8 ha of grey grasswren habitat, which represents 14.2% of the grey grasswren habitat identified within the PL. This disturbance area is based on an assumed five wells and associated infrastructure being located within the species habitat. The proposed disturbance is unlikely to lead to a long-term decrease in the size of a population as: • Suitable habitat for the species is widely available within the PL and the surrounding Cooper Creek floodplain • Lignum, which is the key habitat feature for the species, rapidly re-establishes within disturbed areas following flood events (Dawson et al. 2017; Higgisson et al. 2018). Approximately 19.5 ha of the disturbance footprint is proposed for rehabilitation, which includes pipeline right of ways, sump pits and a proportion of the lease areas (assumed five wells and associated infrastructure). These areas are expected to re-establish to suitable habitat for grey grasswren • Management measures have been identified to mitigate impacts on the species habitat (Section 5.3).
Reduce the area of occupancy of the species	**No significant impact** The proposed clearing comprises a minimal proportion of the overall area of occupancy of the species and will not impact connectivity of suitable habitat.
Fragment an existing population into two or more populations	**No significant impact** The project is unlikely to impact the movement of grey grasswren individuals among habitat areas within and surrounding the PL.

MNES Significant Impact Guideline criteria for endangered species	Response
Adversely affect habitat critical to the survival of a species	**No significant impact** Habitat critical to the survival of the grey grasswren is identified as swampy floodplains dominated by lignum (*Duma florulenta*) and swamp canegrass (*Eragrostis australasica*), where these plants form dense thickets of 1 m or greater in diameter and 1-2 m in height (DotE 2014). The precautionary principle was applied to consider all grey grasswren habitat mapped within the PL to be habitat critical to the survival of the species. The project is unlikely to significantly affect habitat critical to the survival of the species as: • Suitable habitat for the species is widely available within the PL and the surrounding Cooper Creek floodplain • Lignum, which is the key habitat feature for the species, rapidly re-establishes within disturbed areas following flood events (Dawson et al. 2017; Higgisson et al. 2018). Approximately 19.5 ha of the disturbance footprint is proposed for rehabilitation, which includes pipeline right of ways, sump pits and a proportion of the lease areas (assumed five wells and associated infrastructure). These areas are expected to re-establish to suitable habitat for grey grasswren • Management measures have been identified to mitigate impacts on the species habitat (Section 5.3).
Disrupt the breeding cycle of a population	**No significant impact** Given the small area of suitable habitat to be impacted by the proposed works in comparison to the large extent of suitable habitat within and surrounding the PL, the proposed works will not disrupt the breeding cycle of a population of the species. In addition, management measures have been identified to mitigate impacts on the species habitat (Section 5.3).
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**No significant impact** Given suitable habitat for the species is widely available within the PL and the surrounding region the proposed vegetation clearing is unlikely to lead to a long-term decrease in the size of the local grey grasswren population.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	**No significant impact** Feral predators (cats and foxes), pigs and rabbits are listed as threatening processes to the species (DotE 2014). The project is unlikely to increase the abundance of these invasive species above their current levels or result in the introduction of new invasive species.
Introduce disease that may cause the species to decline	**No significant impact** Disease is not listed as a potential threat to the species (DotE 2014; DEE 2019). The project is unlikely to introduce a disease that may cause the species to decline.

MNES Significant Impact Guideline criteria for endangered species	Response
Interfere with the recovery of the species	**No significant impact** The proposed works are unlikely to interfere with the recovery of the species due to the minimal impact on the grey grasswren population. No actions proposed are in contrast to the specific recovery actions for the species (DotE 2014; DEE 2019).

Appendix E MSES significant residual impact assessment

E.2 MSES significant residual impact assessment

Definitions and terminology

Term	Definition under the EO Act
Habitat	An area occupied, or periodically or occasionally occupied, by any species, population or ecological community and includes all the different aspects (both biotic and abiotic) used by species during the different stages of their life cycles.
Long-term decrease	Any decline in a local population that is greater than which would be apparent without the action being present.
Population	An occurrence of the species in a particular area. In relation to *Endangered*, *Vulnerable* and *Special Least Concern* species, occurrences include but are not limited to: • a geographically distinct regional population, or collection of local populations; or • a population, or collection of local populations, that occurs within a particular bioregion.

Significant residual impact assessment for grey grasswren

MSES Significant Residual Impact Guideline criteria. The action is likely to:	Response
Lead to a long-term decrease in the size of a local population	**No significant impact** The proposed disturbance will require the clearing of approximately 57.8 ha of grey grasswren habitat, which represents 14.2% of the grey grasswren habitat identified within the PL. This disturbance area is based on an assumed five wells and associated infrastructure being located within the species habitat. A SRI to the species is unlikely as: • Suitable habitat for the species is widely available within the PL and the surrounding Cooper Creek floodplain • Lignum, which is the key habitat feature for the species, rapidly re-establishes within disturbed areas following flood events (Dawson et al. 2017; Higgisson et al. 2018). Approximately 19.5 ha of the disturbance footprint is proposed for rehabilitation, which includes pipeline right of ways, sump pits and a proportion of the lease areas (assumed five wells and associated infrastructure). These areas are expected to re-establish to suitable habitat for grey grasswren • Management measures have been identified to mitigate impacts on the species habitat (Section 5.3).
Reduce the extent of occurrence of the species	**No significant impact** The proposed clearing comprises a minimal proportion of the overall extent of occurrence of the species and will not impact connectivity of suitable habitat.
Fragment an existing population	**No significant impact** The project is unlikely to impact the movement of grey grasswren individuals among habitat areas within and surrounding the PL and is unlikely to fragment the local grey grasswren population.
Result in genetically distinct populations forming as a result of habitat isolation	**No significant impact** The project is unlikely to impact the movement of grey grasswren individuals among habitat areas within and surrounding the PL.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat	**No significant impact** Feral predators (cats and foxes), pigs and rabbits are listed as threatening processes to the species (DotE 2014). The project is unlikely to increase the abundance of these invasive species above their current levels or result in the introduction of new invasive species.
Introduce disease that may cause the population to decline	**No significant impact** Disease is not listed as a potential threat to the species (DotE 2014; DEE 2019). The project is unlikely to introduce a disease that may cause the species to decline.

MSES Significant Residual Impact Guideline criteria. The action is likely to:	Response
Interfere with the recovery of the species.	**No significant impact** The proposed works are unlikely to interfere with the recovery of the species due to the minimal impact on the grey grasswren population. No actions proposed are in contrast to the specific recovery actions for the species (DotE 2014; DEE 2019).
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.	**No significant impact** The precautionary principle was applied to consider all grey grasswren habitat mapped within the PL to represent ecologically significant locations for the species as this habitat predominantly comprises lignum dominated communities that are used at all stages of the grey grasswren lifecycle. The project is unlikely to cause disruption to ecologically significant locations as: • Suitable habitat for the species is widely available within the PL and the surrounding Cooper Creek floodplain • Lignum, which is the key habitat feature for the species, rapidly re-establishes within disturbed areas following flood events (Dawson et al. 2017; Higgisson et al. 2018). Approximately 19.5 ha of the disturbance footprint is proposed for rehabilitation, which includes pipeline right of ways, sump pits and a proportion of the lease areas. These areas are expected to re-establish to suitable habitat for grey grasswren • Management measures have been identified to mitigate impacts on the species habitat (Section 5.3)

Significant residual impact assessment for Major Mitchell's cockatoo

MSES Significant Residual Impact Guideline criteria. The action is likely to:	Response
Lead to a long-term decrease in the size of a local population	**No significant impact** The proposed disturbance will require the clearing of approximately 1.8 ha of Major Mitchell's cockatoo habitat, which represents 1.9% of the Major Mitchell's cockatoo habitat identified within the PL. Given suitable habitat for the species is widely available within and surrounding the PL, the proposed vegetation clearing is unlikely to lead to a long-term decrease in the size of the Major Mitchell's cockatoo population. Approximately 0.2 ha of the Major Mitchell's cockatoo habitat has been identified as foraging habitat only, due to the absence of suitable hollow-bearing trees for nesting. In addition, management measures have been identified to mitigate impacts on habitat for Major Mitchell's cockatoo (refer to Section 5.3).
Reduce the extent of occurrence of the species	**No significant impact** The proposed clearing comprises a minimal proportion of the overall extent of occurrence of the species and will not impact connectivity of suitable habitat.
Fragment an existing population	**No significant impact** The project is unlikely to impact the movement of Major Mitchell's cockatoo individuals between habitat areas within and surrounding the PL and is unlikely to fragment the local Major Mitchell's cockatoo population.
Result in genetically distinct populations forming as a result of habitat isolation	**No significant impact** The project is unlikely to impact the movement of Major Mitchell's cockatoo individuals between habitat areas within and surrounding the PL.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat	**No significant impact** Feral herbivores such as rabbits and goats are listed as a threatening process to the species (Curtis & Dennis 2012). The project is unlikely to increase the abundance of these invasive species above their current levels or result in the introduction of new invasive species.
Introduce disease that may cause the population to decline	**No significant impact** Psittacine beak and feather disease is a potential threat to the species (DotE 2015). The project is unlikely to introduce Psittacine beak and feather disease or any other disease that may cause the species to decline.

MSES Significant Residual Impact Guideline criteria. The action is likely to:	Response
Interfere with the recovery of the species.	**No significant impact** The proposed works are unlikely to interfere with the recovery of the species due to the minimal impact on the Major Mitchell's cockatoo population. No actions proposed are in contrast to the specific conservation needs identified for the species (Curtis & Dennis 2012).
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.	**No significant impact** The project is unlikely to cause disruption to ecologically significant locations as: • The proposed clearing comprises a negligible proportion of the species habitat, which is widely available surrounding the PL. • The PL contains foraging habitat only for the species, with no suitable breeding habitat present. • Management measures have been identified to mitigate impacts on the species habitat (Section 5.3). • Infrastructure will be sighted to avoid disturbance to hollow bearing trees (if present) wherever practicable. For example, roads and pipeline alignments will be aligned to avoid the requirement to disturb or clear large mature, or hollow bearing trees (dead or alive). • The proposed clearing will not increase fragmentation of the species habitat. • Approximately 0.8 ha of the disturbance footprint is proposed for rehabilitation, which includes pipeline right of ways, sump pits and a proportion of the lease areas. These areas are expected to re-establish to suitable habitat for the species following rehabilitation.

Significant residual impact assessment for echidna

MSES Significant Residual Impact Guideline criteria. The action will result in:	Short-beaked echidna
A long-term decrease in the size of a local population	**No significant impact** The proposed disturbance will require the clearing of approximately 115.5 ha of echidna habitat. As the species is widely distributed and has no particular habitat preferences, except for the supply of ants and termites (Van Dyck & Strahan 2008), the project is unlikely to lead to a long-term decrease in the local population of the species.
A reduced extent of occurrence of the species	**No significant impact** As the species is widely distributed and has no particular habitat preferences, except for the supply of ants and termites (Van Dyck & Strahan 2008), the project is unlikely to reduce the extent of occurrence of the species.
Fragmentation of an existing population	**No significant impact** The project will have negligible impact on the species local and regional movement.
Reduced gene flow among populations	**No significant impact** The project will have negligible impact on the species local and regional movement.
Disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species	**No significant impact** The proposed disturbance will require the clearing of approximately 115.5 ha of echidna habitat, which is likely to include breeding, feeding and nesting habitat. However, as the species is widely distributed and has no particular habitat preferences, except for the supply of ants and termites (Van Dyck & Strahan 2008), the project is unlikely to lead to a long-term decrease in the local population of the species.

Significant residual impact assessment for regulated vegetation within the PL

MSES	Disturbance type	Residual impact criteria	Significant residual impact assessment
Regulated vegetation - within 100 m of a Vegetation Management Wetland	Linear	20 m wide in a sparse or very sparse RE; or 25 m wide in a grassland RE. Clearing must also occur within the wetland or within 50 m of the defining bank to trigger an SRI (as described in Section 5.3.2)	**No significant impact** As discussed in Section 5.3.2 (Table 6), where disturbance occurs in Vegetation Management Wetlands and within 50 m of the defining bank, it will comply with SRI clearing limits. Flowline Right of Ways (RoW) will cause temporary disturbance of up to 16 m in width. 13 m of the flowline RoW width will be reinstated as soon as practicable following installation (inclusive of reinstatement of trenches where flowlines are buried). Access tracks will be up to 13 m wide.
	Non-linear	2 ha within a sparse or very sparse RE; or 5 ha within in a grassland RE. Clearing must also occur within the wetland or within 50 m of the defining bank to trigger an SRI (as described in Section 5.3.2)	**No significant impact** As discussed in Section 5.3.2 (Table 6), where disturbance occurs in Vegetation Management Wetlands and within 50 m of the defining bank, it will comply with SRI clearing limits. Well pads will be up to 1.6 ha.

MSES	Disturbance type	Residual impact criteria	Significant residual impact assessment
Regulated vegetation - intersecting a watercourse	Linear	20 m wide in a sparse or very sparse RE; or 25 m wide in a grassland RE. Clearing must also occur within the defined distance or within 5 m of the defining bank to trigger an SRI (as described in Section 5.3.2).	**No significant impact** As discussed in Section 5.3.2 (Table 6), where disturbance occurs within the defined distance of Vegetation Management Watercourses and Drainage Features and within 5 m of the defining bank, it will comply with SRI clearing limits. Flowline Right of Ways (RoW) will cause temporary disturbance of up to 16 m in width. 13 m of the flowline RoW width will be reinstated as soon as practicable following installation (inclusive of reinstatement of trenches where flowlines are buried). Access tracks will be up to 13 m wide. Flowlines and access tracks will be restricted as much as practicable at watercourse crossings.
	Non-linear	2 ha within a sparse or very sparse RE; or 5 ha within a grassland RE. Clearing must also occur within the defined distance or within 5 m of the defining bank to trigger an SRI (as described in Section 5.3.2).	**No significant impact** As discussed in Section 5.3.2 (Table 6), where disturbance occurs within the defined distance of Vegetation Management Watercourses and Drainage Features and within 5 m of the defining bank, it will comply with SRI clearing limits. Well pads will be up to 1.6 ha.

Significant residual impact assessment for Strategic Environmental Area

The majority of the PL is located within a 'designated precinct' of the Channel Country SEA. The proposed works will result in disturbance to approximately 115.5 ha of SEA. Under the *Regional Planning Interests Act 2014*, a resource activity is determined to have an 'impact' on a SEA if the impact affects:

- a feature, quality, characteristic or other attribute of the area; or
- the suitability of land in the area to be used for a particular purpose.

Assessment against the SRI criteria for SEAs within the SRI Guideline is provided within the below table.

Significant residual impact assessment for Channel Country SEA environmental attributes

Environmental attribute	Significant residual impact (SRI) assessment
The natural hydrologic processes of the area characterised by: • natural, unrestricted flows in and along stream channels and the channel network in the area; and • overflow from stream channels and the channel network onto the flood plains of the area, or the other way; and • natural flow paths of water across flood plains connecting waterholes, lakes and wetlands in the area; and • groundwater sources, including the Great Artesian Basin and springs, that support waterhole persistence and ecosystems in the area.	**SRI unlikely** The proposed development is unlikely to significantly affect natural hydrologic processes as: • no drilling is proposed in waterways • the small extent of disturbance in unlikely to affect water movement, erosion and sedimentation processes • rehabilitation of pipelines will be completed when no surface water is expected to be present on site and outside of flood events/inundation periods • all non-essential infrastructure will be decommissioned and rehabilitated prior to the onset of flood events/inundation periods (wherever practicable and safe to do so) • possible diversion or interception of overland flow from surface infrastructure (i.e. borrow pits) is negligible when considering the small footprint of proposed works compared to the catchment area and water movement; and • access tracks, infrastructure and seismic lines located, prepared and constructed to maintain pre-existing surface water flows. Culverts and floodways installed where required.

Environmental attribute	Significant residual impact (SRI) assessment
The natural water quality in the stream channels and aquifers and on flood plains in the area.	**SRI unlikely** The proposed development is unlikely to significantly affect natural water quality as, typically: • proposed drilling locations are set back from the surrounding Cooper Creek channels • drilling will be scheduled to be completed when no surface water is expected to be present on site and outside of flood events/inundation periods • the width of linear infrastructure corridors through waterway crossings has been restricted to the minimum width practicable, which is below the maximum width of SRI to regulated vegetation – intersecting a watercourse • no activities proposed involve the discharge of water (point or diffuse sources) or the construction or operation of regulated dams and other major infrastructure (i.e. separator ponds, permanent camps) • groundwater modelling and assessment has identified groundwater dependent ecosystems are unlikely to be affected; and • additional management and contingency measures for fuels/chemicals and unplanned releases of contaminants will be identified in associated Management Plans.
The beneficial flooding of land that supports flood plain grazing and ecological processes in the area.	**SRI unlikely** The proposed development is unlikely to significantly affect the hydrological processes and flooding in the area as: • possible diversion or interception of overland flow from surface infrastructure (i.e. borrow pits) is negligible when considering the small footprint of proposed works compared to the catchment area and water movement; and • construction activities will be temporary in nature and will be scheduled to be completed when no surface water is expected to be present on site and outside of flood events/inundation periods.

Appendix D – Underground Water Impact Report (February, 2020) - Santos Cooper Basin Oil and Gas Fields, South-West Queensland

Appendix E – Santos Risk Assessment Process

The environmental risk assessment contained in Section 5.0 was undertaken in accordance with the Santos Management System (SMS) Risk Management Standard. The risk assessment process involves:

- identifying the potential hazards or threats posed by the activities;
- categorising the potential consequences and their likelihood of occurring; and
- using a risk matrix to characterise the level of risk (Figure D1).

Control Measure Identification

Based on identified potential impacts, and the ranking of their unmitigated risk, 'Management Practices' ('Control Strategies') were identified to eliminate, prevent, reduce or mitigate consequences associated with each of the identified potential impacts. Appropriate control strategies were identified from previous activities, current Santos management practices, and through review of best practice techniques across the industry.

Determination of Severity of Consequence

The potential level of impact (consequence) was assessed and assigned in line with potential hazards and receptors, using the 'Santos Environmental Consequence Classification' (see Figure D1) from the Santos Risk Matrix. The consequence level for each risk source is documented in the risk assessment tables in Section 5.0. To describe the severity, scale and duration of potential impacts, six categories of consequence are used (as displayed in Figure D1).

Determination of Likelihood

Likelihood relates to the potential for a consequence to occur. This includes the likelihood of an event occurring and the subsequent potential consequence. This is defined using the Santos Risk Matrix (See Figure F1). To describe the likelihood of a potential environmental consequence occurring, six categories of likelihood are used. The Santos Risk Matrix is then used to characterise the resultant risk into one of five levels.

Determination of Residual Risk

Risk is expressed in terms of a combination of the consequence of an impact and the likelihood of the impact occurring. Santos uses a risk matrix (see Figure D1) to plot the consequence and likelihood to determine the level of risk.

Santos Risk Matrix

Santos

Consequence							
	Safety	**Negligible Harm** + No bodily damage or minimal harm or impairment (hours to days)	**Minor Harm** + Short term impairment (days to weeks)	**Moderate Harm** + Temporary disablement or medium term impairment (weeks to months)	**Severe Harm** + Long term/life altering disablement or impairment	**Single Fatality OR Critical Life Threatening Injuries**	**Multiple Fatalities**
	Environment	+ No impact to Environmental Value (EV).	+ Small-scale impact to EV(s) of conservation significance + Potential surface or groundwater impact.	+ Moderate-scale impact to EV(s) of conservation significance + Localised surface or groundwater impact.	+ Large-scale impact to EV(s) of conservation significance + Moderate-scale surface water impact; + Localised impact to groundwater with potential or known beneficial use.	+ Extensive population or community scale impact to EV(s) of conservation significance + Extensive impact to other EV(s).	+ Irreversible impact to EV(s).
	Community & Reputation	+ No actual or potential community criticism + Details remain within Santos sites and/or offices	+ Minor level local community criticism (< week) + No reputation impact	+ Local community criticism (> week) or one-day community protest + Local company reputation impacted	+ State-level community criticism or protest over multiple days/locations + State-based company reputation impacted + Very short-term share price impact (< week)	+ National community criticism or large scale protest + Company reputation and approvals impacted + Shareholder intervention or short-term share price impact (< month)	+ Sustained national community criticism or widespread protest + Industry reputation and approvals impacted + Changes at executive/board level or long-term share price impact (> month)
	Financial (A$)	< $30k	$30k to $300k	$300k to $3m	$3m to $30m	$30m to $300m	> $300m
	Workforce	+ Will require some staff attention over several days. + No actual or potential impact to culture	+ Will require several days local management time. + Minor impact to employee engagement and limited staff turnover	+ Will require head office staff and take several weeks of site management time. + Moderate impact to employee engagement and staff turnover above industry average with some key roles	+ Will require several weeks of senior management time + Impact to employee engagement (< 6 months), moderate turnover of key roles and no succession	+ Will require several months of senior management time + Impact to employee engagement (< 18 months), high staff turnover and attraction issues	+ Will require more than a year of senior management involvement and operations severely disrupted + Impact to employee engagement (> 18 months), significant key role turnover and attraction issues
	Compliance	+ Non-conformance with legislation, instruments (e.g. tenure licence) or contract + No regulatory or punitive action	+ Minor breach of legislation, instruments or contract + Notification/report to; request for information by; and/or administrative/ warning notice from the regulator + LOCI Tier 3 or non-hydrocarbon releases notifiable to the regulator	+ Limited number of minor breaches of legislation, instruments or contract + Statutory notice from the regulator + LOCI Tier 2 or non-hydrocarbon releases immediately reportable to the regulator	+ Systemic minor breaches (or one moderate breach) of legislation, instruments or contract + Company charged with an offence with minor penalty/fine + LOCI Tier 1 or cumulative regulator notification of non-hydrocarbon releases	+ Systemic moderate breaches (OR single material breach) of legislation, instruments or contract + Company charged with an offence with moderate penalty/fine	+ Material breaches of legislation, instruments or contract + Company or officers charged with an offence with material penalty/fine, or loss of tenure/operatorship
		I	II	III	IV	V	VI
Likelihood	ALMOST CERTAIN **(< 4 monthly)** Occurs in almost all circumstances OR could occur *within days to weeks*	f	Low	Medium	High	Very High	Very High	Very High
	LIKELY **(4 monthly - 1 yearly)** Occurs in most circumstances OR could occur *within weeks to months*	e	Low	Medium	High	High	Very High	Very High
	OCCASIONAL **(1 - 3 yearly)** Has occurred before in Santos OR could occur *within months to years*	d	Low	Low	Medium	High	High	Very High
	POSSIBLE **(3 - 10 yearly)** Has occurred before in the industry OR could occur *within the next few years*	c	Very Low	Low	Low	Medium	High	Very High
	UNLIKELY **(10 - 30 yearly)** Has occurred elsewhere OR could occur *within decades*	b	Very Low	Very Low	Low	Low	Medium	High
	REMOTE **(30 - 100 yearly)** Requires exceptional circumstances and is unlikely even in the long term OR only occurs as a *"one in 100 year event"*	a	Very Low	Very Low	Very Low	Low	Medium	Medium

Operational Risk Assessment Requirements

Risk Level	Action	Governance Mechanism	Authority for Continued Tolerance of Risk	Control Development and Timeframe	Control Ownership
Very High	+ Following verification of the risk at 'Very High' activity must stop + Activity cannot recommence until controls are implemented to reduce risk to 'High' or lower + For incidents, a dedicated multi-disciplinary incident investigation team will be formed + Level 3 Manager or Excom member will be included in the investigation team	+ Controls will be governed at the Operations Committee meeting or equivalent forum + Sponsorship of incident investigation by EVP or Level 2 Manager	+ CEO	+ Intolerable Risk Level + Develop and implement controls urgently to reduce risk to 'High' or lower as soon as practicable	+ Level 2 Manager (e.g. Executive Vice President)
High	+ Assess risk to determine if it is reduced So Far As Is Reasonably Practicable (SFAIRP) + If SFAIRP, activities related to maintenance of controls will be prioritised and managed + If not SFAIRP, improve existing controls and/or implement new control(s) + For incidents, a dedicated multi-disciplinary incident investigation team will be formed	+ Controls will be governed at Divisional level meeting or equivalent forum + Sponsorship of incident investigation by Level 3 Manager	+ EVP or Level 2 Manager	+ Action to reduce risk level to 'Medium' or below	+ Level 3 Manager (e.g. General Manager)
Medium	+ Assess risk to determine if SFAIRP + If SFAIRP, activities related to maintenance of controls will be prioritised and managed + If not SFAIRP, improve existing controls and/or implement new control(s) + Incidents are assessed using Mining the Diamond and investigated relative to the incident potential	+ Controls will be governed at Area level meeting or equivalent forum + Sponsorship of incident investigation at Level 4 Manager	+ General Manager or Level 3 Manager	+ Manage and monitor risk efficiently in accordance with business management plans	+ Level 4 Manager (e.g. Asset or Functional Manager)
Low	+ Assess risk to determine if SFAIRP + If SFAIRP, activities related to maintenance of controls will be prioritised and managed + If not SFAIRP, improve existing controls and/or implement new control(s) + Incidents are assessed using Mining the Diamond and investigated relative to the incident potential	+ Controls will be governed at site level meeting or equivalent forum + Sponsorship for incident investigation at Level 5 Manager	+ Level 4 Manager	+ Manage and monitor risk efficiently in accordance with business management plans	+ Level 5 Manager (e.g. Area Manager, Team Leader, Superintendent or equivalent)
Very Low	+ Risk to be managed as stipulated by the related work processes	+ Governed if required	+ Level 5 Manager	+ Manage and monitor risk efficiently in accordance with business management plans	+ Any individual contributor

Figure D 1: Santos Risk Matrix

Appendix F – SWQ Hydraulic Fracture Risk Assessment