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11 May 2022

Santos Reference: CB22-10

Attention: Denise Leon
Energy, Extractive and SWQ Compliance
Department of Environment and Science
GPO Box 2453
BRISBANE QLD 4001

Dear Denise,

Application to amend Environmental Authority (EA) 0002115 (PPL 2050)

Santos Limited (Santos) on behalf of Delhi Petroleum Pty Ltd, Santos Petroleum Pty Ltd, Beach Energy (Operations), Limited, Vamgas Pty Ltd and Santos Australian Hydrocarbons Pty Ltd (the proponents) has prepared the attached application to amend Environmental Authority (EA) 0002115 in accordance with Sections 226 and 227 of the *Environmental Protection Act 1994* (EP Act).

The application seeks authorisation to construct and operate two new buried gas pipelines located in the Channel Country Strategic Environmental Area, prescribed under the *Regional Planning Interests Act 2014*. EA 0002115 contains *eligibility criteria* and *standard conditions for petroleum pipeline activities*. The proposed gas pipelines comply with eligibility criteria for petroleum pipeline activities; however, they do not comply with *Schedule B – Protecting environmental values, Variation 1, Schedule B: Table 1 – Authorised Petroleum Activity(ies) Disturbance.* Santos are therefore seeking to amend EA 0002115 at *Schedule B, Variation 1 - Table 1* to explicitly authorise the proposed activities.

The following information is attached in support of the application:

- Attachment 1 – DES EA Amendment Application Form; and
- Attachment 2 – Supporting Information;

The amendment application has been prepared as a minor amendment. The application fee of $346.60 has been paid upon lodgement of the application.

Please contact Alex Clarke should you have any further enquiries.

Yours sincerely,

Principal Environmental Advisor
Santos

ATTACHMENT 1 – DES EA Amendment Application Form

Application form

Environmental Protection Act 1994

Application to amend an environmental authority

This approved form is to be used when applying to amend an environmental authority under sections 222 to 227A of the Environmental Protection Act 1994 *(EP Act) for an environmentally relevant activity (ERA).*

For applications to the Department of Environment and Science, you can apply through Online Services at: https://business.qld.gov.au/running-business/environment/online-services**.**

Note: For applications to the Department of Environment and Science, the only way to pay fees by credit card is by completing the application online using Online Services. For other fee payment options see Question 31.

It is recommended that prior to making an amendment application, you read the information on what to provide with 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 includes a diagnostic tool called a "Forms and fees finder" which will help identify fees and supporting information you need to make an application.

You are encouraged to have a pre-lodgement meeting before applying to amend your environmental authority. If you would like to have a pre-lodgement meeting:

- for prescribed ERAs 2, 3 and 4—contact the Department of Agriculture and Fisheries by email at livestockregulator@daf.qld.gov.au or by phone on 13 25 23.
- for any other ERAs —please fill out and lodge the form *Application for pre-lodgement services* (ESR/2015/1664[1]), prior to lodging this application form.

If you require assistance in answering any part of this form, or have any questions about your application please contact the relevant department. Contact details are at the end of this form (Section 33).

Privacy statement

The Department of Environment and Science (the Department) is collecting the information on this form in accordance with and as authorised by Chapter 5 of the Environmental Protection Act 1994 *(EP Act). Some of the information may be disclosed to the Department of Resources and Queensland Treasury for the purpose of processing this application.*

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.

[1] This is the publication number. The publication number can be used as a search term to find the latest version of a publication at **www.qld.gov.au**.

Section 1 – Environmental authority number	
Environmental authority number for this application	EA0002115

Section 2 – Applicant details	
Details of the applicant are to be provided in this section. If there is an agent acting on behalf of the environmental authority holder, details of the agent are to be provided. An agent could be a consultant or contactor for the environmental authority holder.	
NAME / COMPANY NAME SANTOS LIMITED, VAMGAS PTY LTD, DELHI PETROLEUM PTY. LTD., SANTOS AUSTRALIAN HYDROCARBONS PTY LTD, SANTOS PETROLEUM PTY LTD, BEACH ENERGY (OPERATIONS) LIMITED	TRADING NAME
REGISTERED / RESIDENTIAL ADDRESS 60 Flinders Street ADELAIDE SA 5000	POSTAL ADDRESS (WHERE DIFFERENT) PO BOX 1010 BRISBANE QLD 4001
ABN / ACN 80007550923	CONTACT NAME
EMAIL	TELEPHONE
☒ INDICATE IF YOU WANT TO RECEIVE CORRESPONDENCE VIA EMAIL ☐ INDICATE IF THIS FORM IS BEING COMPLETED BY AN AGENT FOR THE ENVIRONMENTAL AUTHORITY HOLDER	

Section 3 – Checklist questions An application to amend an environmental authority is not appropriate in all circumstances. If you answer **Yes** to any of the preliminary questions below, you cannot use this application form. If you answer **No** to all of the preliminary questions, you may continue to use this application form.	
Is the amendment to correct a clerical or formal error?	☐ Yes ☒ No
If yes, you cannot use this form. This request should be made in writing directly to the administering authority (no fees apply).	
Is the amendment to add an ERA to an amalgamated project authority and the proposed activity does not form part of the single integrated operation conducted under the authority?	☐ Yes ☒ No
If yes, you cannot use this form. You will need to apply for a new environmental authority.	
Is the amendment to add an ERA to the authority and the addition of the activity would result in the environmental authority applying to activities that were not being carried out as an ERA project?	☐ Yes ☒ No
If yes, you cannot use this form. You will need to apply for a new environmental authority.	
Is the amendment to amalgamate two or more environmental authorities?	☐ Yes ☒ No
If yes, you cannot use this form. Please use either the form *Application to amalgamate two or more environmental authorities into an amalgamated corporate authority* (ESR/2015/1734), or *Application to amalgamate two or more environmental authorities into an amalgamated project or local government authority* (ESR/2015/1735).	

Is the amendment to add an ERA to an amalgamated local government authority and there is not an appropriate degree of integration between the proposed activity and the existing activities on the authority?	☐ Yes ☒ No
If yes, you cannot use this form. You will need to apply for a new environmental authority.	
Is the amendment to amend the financial assurance or estimated rehabilitation cost only?	☐ Yes ☒ No
If yes, you cannot use this form. Please use the form *Application to amend or discharge financial assurance held for an environmental authority* (ESR/2015/1752) or *Application for a decision on the estimated rehabilitation cost* (ESR/2018/4426).	
Is the proposed amendment to add a resource activity to an environmental authority for a prescribed ERA project?	☐ Yes ☒ No
If yes, you cannot add the resource activity to the environmental authority. You will need to apply for a new environmental authority.	
Is the proposed amendment to add a prescribed ERA, other than an ancillary activity, to an environmental authority for a resource project?	☐ Yes ☒ No
If yes, you cannot use this form. You can apply using the standard, variation or site-specific application forms.	

Section 4 – Checklist questions for prescribed ERAs Is the application to amend an EA for a prescribed ERA?	☒ No – Go to next section
Does the proposed amendment involve changes to the relevant activity that require a new development application to be lodged under the *Planning Act 2016* and the application for the development application has not been lodged.	☐ Yes ☐ No
If yes, the development application must be lodged before an environmental authority amendment application can be made. Under EP Act, a development application for a material change of use of premises for an environmentally relevant activity is deemed to be also an application for an environmental authority. In this case, an environmental authority amendment application should not be lodged.	
Is the proposed amendment solely to add or remove vehicles for ERA 57 (Regulated waste transport)?	☐ Yes ☐ No
If yes, you do not need to submit this application form. You can update vehicle details online through Online Services or use the form *Details of regulated waste vehicles* (ESR/2015/1851).	
Is the amendment for the holder of the environmental authority to transfer all or part of the environmental authority to a person?	☐ Yes ☐ No
If yes, you cannot use this form. Please use the form *Request to transfer all or part of an environmental authority (prescribed environmentally relevant activities)* (ESR/2015/1718).	
Is the amendment for the surrender of an environmental authority?	☐ Yes ☐ No
If yes, you cannot use this form. Please use the form *Application to surrender an environmental authority for a prescribed ERA* (ESR/2015/1719).	

Section 5 – Checklist for resource activities Is the application to amend an EA for a resource activity?	☐ No – Go to next section
Is the amendment for a partial surrender of an environmental authority for a mining, geothermal or petroleum resource activity?	☐ Yes ☒ No
If yes, you cannot use this form. Please use the form *Application for surrender or partial surrender of an environmental authority (resource activity)* (ESR/2015/1751).	
Is the amendment for an EA that has a PRCP Schedule and approval of the amendment application would result in the EA to which the application relates being inconsistent with the relevant PRCP schedule?	☐ Yes ☒ No
If yes, you cannot use this form. The amendment to the EA must not be inconsistent with the PRCP Schedule otherwise you must apply to amend your PRCP Schedule. Please use the form *Application to amend a progressive rehabilitation and closure plan schedule (PRCP schedule) or joint PRCP schedule and environmental authority* (ESR/2019/4956).	

Section 6 – Major or minor amendment
Is the application for a major or minor amendment?

Your application is a minor amendment (condition conversion) if you want to convert all conditions of your environmental authority to the standard conditions for the environmentally relevant activities to which the environmental authority relates. By selecting this amendment type you are certifying that you have a complete and thorough understanding of, and can comply with, the ERA Standard (eligibility criteria and standard conditions).

For applications other than a minor amendment (condition conversion), the administering authority decides if an application is a minor amendment (threshold) or a major amendment and will send you a notice of the decision.

If the application is a major amendment, an assessment fee of 30% of the annual fee for your environmental authority is required to be paid. The assessment of your amendment application will not proceed until the assessment fee is paid.

No additional assessment fees apply if your application is determined to be a minor amendment.

By considering what type of amendment your application is likely to be, you will have a better idea of whether the assessment fee will be payable.

For further information see the guideline *Major and minor amendments* (ESR/2015/1684) and s223 of the EP Act. If you have questions regarding whether your amendment will be a minor or major amendment you are encouraged to arrange a pre-lodgement meeting with the administering authority. Only an indication can be given as to whether the proposed changes are likely to be a minor or major amendment, at a pre-lodgement meeting as this decision can only be made when the actual application is submitted.

☐ Major amendment

☒ Minor amendment (threshold)

☐ Minor amendment (condition conversion)
For minor amendment (condition conversion) go to Section 31 (Payment of fees).

For further information see the guideline on *Major and minor amendments* (ESR/2015/1684) and s223 of the EP Act. If you have questions regarding whether your amendment will be a minor or major amendment you are encouraged to arrange a pre-lodgement meeting with the administering authority. Only an indication can be given as to whether the proposed changes are likely to be a minor or major amendment, at a pre-lodgement meeting as this decision can only be made when the actual application is submitted.

Section 7 – Amendment options Complete this section for all applications, tick all that apply	
I would like to amend environmental authority:	☐ Activities – includes changes to threshold ☒ Conditions – includes conversion to standard conditions and variations ☐ Locations – removal/addition or activity locations

Section 8 – Development permits	
Is the activity a prescribed ERA?	☒ No – Go to next section ☐ Yes – Provide details below
Are there any development permits in effect or have any development applications been made under the *Planning Act 2016* to carry out the proposed amendment?	☐ No – Go to next section ☐ Yes – Provide details below

Provide a list of applicable development permits or applications below.

Development permit / application number	Development permit / application name	Assessment manager	Date of application or approval	Expiry date

☐ I HAVE ATTACHED ADDITIONAL DETAILS FOR THIS SECTION.

Section 9 – Amend activities

Do you wish to amend activities under the EA, including changes to threshold(s)?	☒ No – Go to next section ☐ Yes – Provide details below

Section 9.1 - Details of the ERA(s) to be removed.
Provide a list of all the ERAs that are to be removed from the EA and identify whether the ERA has commenced.

ERA number	Threshold	Name of ERA	Has the ERA commenced?
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No

☐ I HAVE ATTACHED DETAILS OF ADDITIONAL ERA(s) TO BE REMOVED.

Section 9.1.1 - Rehabilitation conditions Does the proposed amendment remove a prescribed ERA from the EA?	☒ No – Continue on below ☐ Yes – Continue on below
Does your EA contain any rehabilitation conditions that are applicable to the ERA(s) that are requested be removed from the EA?	☒ No – Go to section 9.2 ☐ Yes – Provide details below

A statement addressing compliance with environmental authority conditions is to be completed by, or on behalf of, the environmental authority holder. Attach a separate document to this application form which states the extent to which:

1. The ERAs being removed from the environmental authority have complied with each relevant condition of approval; and
2. The final rehabilitation report is accurate (include the date of the final rehabilitation report).

PROVIDE DETAILS OF THE DATE, METHOD AND EVIDENCE USED TO VERIFY COMPLIANCE:

PROVIDE DETAILS OF THE NAME, POSITION AND CONTACT NUMBER OF THE PERSON SIGNING THE STATEMENT:

DESCRIBE THE QUALIFICATIONS AND EXPERIENCE OF THE PERSON SIGNING THE STATEMENT:

☐ I HAVE ATTACHED THE REQUIRED STATEMENT ADDRESSING COMPLIANCE WITH CONDITIONS.

For guidance on what a rehabilitation report should contain you may use the final rehabilitation report template available at www.qld.gov.au using the publication number ESR/2015/1616 as a search term. Methods to verify compliance may include a desktop assessment of documentation, an interview with the landowner/holder or a field operator or a site inspection. Evidence used may include photographs, statements and other documents such as maps, plans, approvals, monitoring results etc.

Section 9.2 - Details of the ERA(s) to be added.
Provide details of which ERA(s) you wish to add. If the ERA has eligibility criteria and standard conditions[2], identify whether you can comply with them. Select "N/A" where there are no eligibility criteria and standard conditions for that ERA. If you cannot comply with all of the applicable standard conditions, select "no" and attach details of the standard conditions you cannot comply with.

ERA number	Threshold	Name of ERA	I can comply with the eligibility criteria	I can comply with all the standard conditions
			☐ Yes ☐ N/A ☐ No	☐ Yes ☐ No
			☐ Yes ☐ N/A ☐ No	☐ Yes ☐ No
			☐ Yes ☐ N/A ☐ No	☐ Yes ☐ No
			☐ Yes ☐ N/A ☐ No	☐ Yes ☐ No
			☐ Yes ☐ N/A ☐ No	☐ Yes ☐ No
			☐ Yes ☐ N/A ☐ No	☐ Yes ☐ No
			☐ Yes ☐ N/A ☐ No	☐ Yes ☐ No

☐ I HAVE ATTACHED DETAILS OF ADDITIONAL ERA(s) TO BE ADDED.
☐ I HAVE ATTACHED DETAILS OF THE STANDARD CONDITIONS THAT I CANNOT COMPLY WITH.

If you cannot comply with the eligibility criteria as a result of the proposed amendment, then an amendment to the relevant eligibility criteria condition will also be required. The department will only approve an amendment of the eligibility criteria condition if it is a result of factors beyond your control such as residential encroachment, rather than a change to the activity.

[2] ERAs with eligibility criteria and standard conditions are listed at: www.business.qld.gov.au (use the search term "eligibility criteria").

Section 10– Amend location(s)	
Will the area where the activity is conducted differ from the area currently designated in the existing environmental authority? (I.e.will the area where the activity is conducted increase or decrease?)	☒ No – Go to next section ☐ Yes – Provide details below

ERA number and threshold	Location (lot on plan(s), tenure(s) or mobile and temporary)	Add or remove

☐ I HAVE ATTACHED DETAILS OF ADDITIONAL LOCATIONS FOR THIS SECTION.

Section 10.1 - Rehabilitation conditions Does your EA contain any rehabilitation conditions that are applicable to the locations that are requested be removed from the EA?	☐ No – Go to next section ☐ Yes – Continue on below
Has a statement addressing compliance with EA rehabilitation conditions been attached as per section 9.1.1?	☐ No – Provide details below ☐ Yes – Go to next section

PROVIDE DETAILS OF THE DATE, METHOD AND EVIDENCE USED TO VERIFY COMPLIANCE:

PROVIDE DETAILS OF THE NAME, POSITION AND CONTACT NUMBER OF THE PERSON SIGNING THE STATEMENT:

DESCRIBE THE QUALIFICATIONS AND EXPERIENCE OF THE PERSON SIGNING THE STATEMENT:

☐ I HAVE ATTACHED THE REQUIRED STATEMENT ADDRESSING COMPLIANCE WITH CONDITIONS.

For guidance on what a rehabilitation report should contain you may use the final rehabilitation report template available at www.qld.gov.au using the publication number ESR/2015/1616 as a search term. Methods to verify compliance may include a desktop assessment of documentation, an interview with the landowner/holder or a field operator or a site inspection. Evidence used may include photographs, statements and other documents such as maps, plans, approvals, monitoring results etc.

Section 11 – Single integrated operation confirmation

Will the activities be undertaken as a single integrated operation?	☐ No – Go to next section ☒ Yes – Provide details below

PROVIDE DETAILS OF THE ERAS THAT WILL BE OPERATED AS A SINGLE INTEGRATED OPERATION AND SUPPORTING INFORMATION SHOWING THEY ARE A SINGLE INTEGRATED OPERATION:

There is no change to the way Santos will undertake its activities. This application seeks to change the scale and intensity for the activities authorised. No new ERAs are proposed by the application. Refer to Attachment 2 - Supporting Information

Single integrated operation occurs when all of the below criteria are met:

(a) the activities are carried out under the day-to-day management of a single responsible individual, for example, a site or operations manager;
(b) the activities are operationally interrelated;
(c) the activities are, or will be, carried out at one or more places; and
(d) the places where the activities are carried out are separated by distances short enough to make feasible the integrated day-to-day management of the activities.

Section 12 – Amend conditions

Do you wish to amend the condition(s) of the environmental authority?	☐ No – Go to next section ☒ Yes – Provide details below

Provide details of: (a) condition number(s); (b) proposed change; and (c) justification for the change.

Refer to Attachment 2 - Supporting Information

☒ I HAVE ATTACHED ADDITIONAL DETAILS FOR THIS SECTION.

If the activities were assessed as part of a coordinated project declared under the *State Development and Public Works Organisation Act 1971*, you are only able to amend Coordinator General conditions if the Coordinator General's evaluation report for the project has lapsed. If you are unsure if the Coordinator General's evaluation report has lapsed, contact the Department of State Development, Infrastructure, Local Government and Planning for more information.

Section 13 – Describe the proposed amendment

Provide a detailed description of your proposed amendment. Include justification of how your proposed amendment meets the criteria for a major or minor amendment and attach any supporting information to this application. If the amendment is to add or delete a location, tenure or activity, or to change the threshold of an activity, provide details below.

Refer to Attachment 2 - Supporting Information

☒ I HAVE ATTACHED ADDITIONAL DETAILS FOR THIS SECTION.

Section 14 – Describe the land that will be affected by the proposed amendment

Describe if the activity will be carried out within the existing designated areas of the environmental authority, a new area, or if the activity is mobile or temporary.

Refer to Attachment 2 - Supporting Information

☒ I HAVE ATTACHED ADDITIONAL DETAILS FOR THIS SECTION.

Section 15 – Compliance with any eligibility criteria	
Are there any eligibility criteria for the activity(s)?	☐ No - Go to next section ☒ Yes - Provide details below

State whether each relevant activity will, if the amendment is made, comply with any eligibility criteria for the activity.

There is no change to the way Santos will undertake its activities. The proposed activities comply with the eligibility criteria for petroleum pipeline activities. Santos is seeking to amend condition Variation 1 (Table 1) to explicitly authorise infrastructure located within the Designated Precinct of a SEA. Refer to Attachment 2 - Supporting Information

Include a declaration (below) that the above statement is correct

I Richard Nolan, HSER Manager Onshore

(INSERT NAME, POSITON AND COMPANY NAME OF PERSON MAKING THE STATEMENT)

- make the statement by or for the holder of the environmental authority;
- confirm that, to the best of my knowledge, all information provided as part of this statement, including attachments, is true, correct and complete. I am aware that it is an offence under section 480 and 480A of the *Environmental Protection Act 1994*, to give the administering authority information that I know is false, misleading or incomplete;
- confirm that, to the best of my knowledge, this statement, including attachments, does not include false, misleading or incomplete information;
- confirm that, to the best of my knowledge, I have not knowingly failed to reveal any relevant information or document to the administering authority;
- confirm that, to the best of my knowledge, all information provided in this statement, including attachments, address the relevant matters and are factually correct;
- confirm that the opinions expressed in this statement, including attachments, are honestly and reasonably held; and
- understand that all information supplied as part of this statement, including attachments, can be disclosed publicly in accordance with the *Right to Information Act 2009* and the *Evidence Act 1977*.

SIGNATURE	DATE
	11/05/2022

Only a person with appropriate environmental expertise and/or experience in planning and executing site operations should sign this statement. This person may be the environmental authority holder, a full time employee of the environmental authority holder or a consultant to the environmental authority holder.

Section 16 – Environmental offsets	
Will the ERA(s) being applied for cause, or be likely to cause, a significant residual impact to a prescribed environmental matter (other than a matter of local environmental significance)?	☒ No - Go to next section ☐ Yes - Provide details below

☐ Yes - Attach supporting information that:

- 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;
- demonstrates that all reasonable measures to avoid and minimise impacts on each of those matters will be undertaken;
- includes a notice of election, if it has not already been submitted; and
- if the activity is to be staged, details of how the activity is proposed to be staged.

An environmental offset 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 a 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 State Significant Impact Guideline at the Queensland Government website, at: www.qld.gov.au/environment/pollution/management/offsets/index.html.

Section 17 – Regional interest areas	
Is the activity a resource activity located anywhere within an area of regional interest?	☐ No - Go to next section ☒ Yes - Provide details below

If yes - Which area of regional interest, has or will require a regional interest development approval (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 or been approved for a RIDA, provide the application reference:	

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 State Development, Infrastructure, Local Government and Planning website at www.statedevelopment.qld.gov.au.

Section 18 – Matters of national environmental significance	
Would the carrying out of the proposed ERA, or where relevant the ERA project, be likely to have a significant impact on any matters of national environmental significance?	☒ No - Go to next section ☐ Yes - Provide details below
Has the proposal been referred to the Federal Government Environment Minister or a delegate for formal assessment and approval?	☐ No - Go to next section ☐ Yes - Provide details below
If Yes - Has an approval issued under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) required an environmental offset for the same, or substantially the same, impact and the same, or substantially the same, matters of national environmental significance?	☐ No - Go to next section ☐ Yes - Provide details below
If Yes - Are there any matters of national environmental significance which are assessed under the EPBC Act which are the same, or substantially the same as any matters of national environmental significance, but that were not conditioned in the approval?	☐ No - Go to next section ☐ Yes - Provide details below

☐ I HAVE ATTACHED DETAILS OF MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE.
☐ I HAVE ATTACHED A COPY OF THE EPBC ACT APPROVAL.

There are currently nine matters of national environmental significance (MNES) which have been defined in the *Environmental Protection and Biodiversity Conservation Act 1999 (Cth)*. To determine whether the proposed ERA(s) will have a significant impact on MNES and for referral requirements, please refer to the guidance provided by the Federal Government's Department of Environment on www.australia.gov.au and www.environment.gov.au.

Section 19 – ANZSIC code	
Is the activity a resource activity?	☐ No - Go to next section ☒ Yes - Provide details below

Provide the ANZSIC code for the resource activity.

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

The Australian and New Zealand Industrial Classification (ANZSIC) is used by the Australian Bureau of Statistics. It is required to be displayed in the public register.

Section 20 – Environmental impact statement (EIS)*	
Is the activity a resource activity?	☐ No - Go to next section ☒ Yes - Provide details below
Has an application been made for a decision on whether an EIS would be required for the proposed amendment activity?	☒ No ☐ Yes
Has a decision been made on the application on whether an EIS would be required for the proposed amendment activity?	☐ Yes, a decision was made that an EIS is required – Attach decision. ☐ Yes, a decision was made that an EIS is **not** required – Attach decision. ☐ No, a decision has not yet been made. ☒ NA – No application has been made.
☐ I HAVE ATTACHED THE DECISION.	
Has an environmental impact statement (EIS) process that includes the proposed amendment been completed?	☒ No - Go to next section ☐ Yes - Provide details below
If yes – I have assessed the environmental risks of the proposed amendment and consider them to be: ☐ The same as was assessed in the EIS ☐ Different to what was assessed in the EIS	
☐ I HAVE ATTACHED THE ASSESSMENT OF THE ENVIRONMENTAL RISKS OF THE PROPOSED AMENDMENT.	
* EIS in section 20 question refers to both the EIS process under the *Evironmental Protection Act 1994* and the EIS process under the *State Development and Public Works Organisation Act 1971*. * For further information about the EIS process is available at www.qld.gov.au, using the search term 'environmental impact statements'.	

Section 21 – Environmental impact statement triggers*	
Is the activity a resource activity?	☐ No - Go to next section ☒ Yes - Provide details below
Is the proposed ERA amendment for an increase in the annual extraction of more than 100% or 5 million tonnes per year (whichever is the lesser)? *NOTE: Only answer this question if the current ERA project is for an existing mine extracting between 2–10 million tonnes per year of run of mine (ROM) ore or coal; otherwise select N/A.*	☐ Yes ☐ No ☒ N/A
Is the proposed ERA amendment for an increase in annual extraction of more than 10% or 10 million tonnes per year (whichever is the lesser)? *NOTE: Only answer this question if the current ERA project is for an existing mine extracting over 10 million tonnes per year of ROM ore or coal; otherwise select N/A.*	☐ Yes ☐ No ☒ N/A
Is the proposed ERA amendment for an increase in annual extraction of greater than 25%? *NOTE: Only answer this question if the current ERA project is for an existing mine extracting over 20 million tonnes per year of ROM ore or coal extraction; otherwise select N/A.*	☐ Yes ☐ No ☒ N/A
Is the proposed ERA amendment for a mining activity that will extend into a Category A or B environmentally sensitive area, unless previously authorised by the state? *NOTE: Only answer this question if the activity is a mining activity; otherwise select N/A.*	☐ Yes ☐ No ☒ N/A

Is the proposed ERA amendment for a mining activity that would involve a substantial change in mining operations? For example: from underground to open cut, or (for underground mining) a change in operations that currently causes little subsidence but with the proposed ERA amendment, is likely to cause substantial subsidence?	☐ Yes ☐ No ☒ N/A
Is the proposed ERA amendment for a mining activity and a novel or unproven resource extraction process, technology or activity, is being proposed? *NOTE: Only answer this question if the activity is a mining activity; otherwise select N/A.*	☐ Yes ☐ No ☒ N/A
Is the proposed ERA amendment for a petroleum and gas activity that is likely to have a total disturbance area of greater than 2,000 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? *NOTE: Only answer this question if the activity is a petroleum and gas activity; otherwise select N/A.*	☐ Yes ☒ No ☐ N/A
Is the proposed ERA amendment 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? *NOTE: Only answer this question if the activity is a petroleum and gas activity; otherwise select N/A.*	☐ Yes ☒ No ☐ N/A
Is the proposed ERA amendment for a petroleum and gas activity that is likely to involve the construction of a liquefied natural gas plant? *NOTE: Only answer this question if the activity is a petroleum and gas activity; otherwise select N/A.*	☐ Yes ☒ No ☐ N/A
☐ I HAVE ATTACHED DETAILS OF HOW THE CRITERION IS TRIGGERED INCLUDING DETAILS OF THE IMPACT.	

* EIS in section 21 question refers to both the EIS process under the *Evironmental Protection Act 1994* and the EIS process under the *State Development and Public Works Organisation Act 1971*.

* There are numerous criteria used to make the EIS decision, for further information about the EIS process is available at www.qld.gov.au, using the search term 'environmental impact statements'.

Section 22 – Environmental values

Attach a document that provides an assessment of the likely impact of the proposed amendment on environmental values (EVs). Note: All fields below are mandatory, therefore a statement is required where there are no likely impacts to an EV.

Environmental Values

☒ Water	☒ Wetlands	☒ Land use	☒ Acoustic
☒ Groundwater	☒ Land	☒ Air	☒ Waste

☒ I HAVE ATTACHED A DOCUMENT THAT PROVIDES AN ASSESSMENT OF LIKELY IMPACTS ON EVs.

Note that the EP Act, s226A(1)(f) states the information required relating to impacts on EVs which include:

(i) a description of the environmental values likely to be affected by the proposed amendment; and
(ii) details of any emissions or releases likely to be generated by the proposed amendment; and
(iii) a description of the risk and likely magnitude of impacts on the environmental values; and
(iv) details of the management practices proposed to be implemented to prevent or minimise adverse impacts; and
(v) if a PRCP schedule does not apply for each relevant activity - details of how the land the subject of the application will be rehabilitated after each relevant activity ceases.

Section 23 – Waste
Attach a document that provides details of the proposed measures for minimising and managing waste generated by any amendment(s) to the relevant activity.
☒ I have attached a document that provides the required information; or ☐ If waste is to be managed according to an existing waste management plan, provide the name of the plan and the relevant page or section numbers below: ____

Section 24 – Coal seam gas (CSG) activities	
Does the application relate to an environmental authority for a CSG activity that is an ineligible ERA?	☒ No - Go to next section ☐ Yes - Provide details below
Does the amendment change the way that CSG water is managed?	☐ No - Go to next section ☐ Yes - Provide details below

If the amendment will change the way that CSG water is managed the following information must be provided with this application.

☐	The quantity of CSG water the applicant reasonably expects will be generated in connection with carrying out each relevant CSG activity.
☐	The flow rate at which the applicant reasonably expects the water will be generated.
☐	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.
☐	The proposed management of water including, for example, the use, treatment, storage and disposal of the water.
☐	The measurable criteria ('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; and (iii) the disposal of waste, including, for example, salt, generated for the management of the water.
☐	The action proposed to be taken if any of the management criteria are not complied with, to ensure that the criteria will be able to be complied with in the future.
☐	If the application includes a CSG evaporation dam, an evaluation of the following must be provided: (i) best practice environmental management for managing CSG water; (ii) alternative ways for managing CSG water; and (iii) whether there is a feasible alternative to a CSG evaporation dam for managing the water. Note if the evaluation shows that there is a feasible alternative option, the CSG evaporation dam cannot form part of the water management for this amendment application.
☐	I HAVE ATTACHED A DOCUMENT THAT PROVIDES THE REQUIRED INFORMATION FOR THIS SECTION.

Section 25 – Underground water rights	
Is the activity a resource activity?	☐ No - Go to next section ☒ Yes - Provide details below
Is the activity proposed to be undertaken on a mineral development licence (MDL), mining lease (ML) or petroleum lease (PL)?	☒ No - Go to next section ☐ Yes - Provide details below
Does the proposed amendment involve changes to the exercise of underground water rights?	☒ No - Go to next section ☐ Yes - Provide details below

☒ I have attached a document that details:

a) The areas in which underground water rights are proposed to be exercised;

b) For each aquifer affected, or likely to be affected, by the exercise of underground water rights:
   a. a description of the aquifer;
   b. 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
   c. 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.
   d. 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.

c) 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;

d) 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

e) Strategies for avoiding, mitigating or managing the predicted impacts on the environmental values of the impacts on the quality of groundwater.

For more information about exercising underground water rights or the associated requirements refer to the guideline *Requirements for site-specific and amendment applications - underground water rights* (ESR/2016/3275)

Section 26 – Financial assurance / estimated rehabilitation cost	
Do you currently have financial assurance or scheme assurance held for the approved environmental authority?	☐ No – Go to next section ☒ Yes – Provide details below

☐ I will not need to change the financial assurance or scheme assurance in relation to this amendment.

☐ I will be changing the financial assurance and have attached the form *Application to amend or discharge financial assurance held for an environmental authority* (ESR/2015/1752).

☒ I will be applying for a new estimated rehabilitation cost decision if this amendment application is approved.

Section 27 – Environmental protection orders or site management plan	
Is this land currently subject to an environmental protection order (EPO) or a site management plan (SMP)?	☒ No – Go to next section ☐ Yes (EPO) - provide details below ☐ Yes (SMP) - provide details below
PROVIDE THE REFERENCE NUMBER AND BRIEF DETAILS INCLUDING: DESCRIPTION OF LAND; LOT AND PLAN NUMBERS; AND LOCAL GOVERNMENT AREA.	

Section 28 – Environmental management register	
Is any part of the land currently recorded in, or has previously been removed from, the environmental management register?	☒ No – Go to next section ☐ Yes – Provide details below
☐ The land is currently in the environmental management register. ☐ The land has been removed from the environmental management register. You must attach evidence (e.g. Notice) advising that the details have been removed.	

Section 29 - Website address		
Is the application for a mining activity on a mining lease, or a geothermal, petroleum, or greenhouse gas storage activity?	☐ No – Go to next section ☒ Yes – Provide details below	
Provide the website address for the application notice and application documents.	https://www.santos.com/about-us/corporate-governance/public-notices/	
Provide details of the contact person if technical assistance is required.	NAME Alex Clarke	TELEPHONE
	EMAIL	

Section 30 – Site contact	
Would you like to nominate a site contact?	☒ No – Go to next section ☐ Yes – Provide details below
SITE CONTACT NAME	POSITION
EMAIL	TELEPHONE
☐ INDICATE IF YOU WANT THE SITE CONTACT TO RECEIVE CORRESPONDENCE VIA EMAIL	
A site contact is an alternative contact nominated by the legal entity which holds, or will in future hold, a relevant authority issued by the department. The department may direct correspondence relating to actual or potential compliance matters to the site contact.	

Section 31 – Payment of fees	
Application fee:	$ 346
Cheque or money order payments	
☐ Payment by cheque or money order made payable to the Department of Environment and Science (attached).	
☐ Payment by cheque or money order made payable to the Department of Agriculture and Fisheries (attached).	
Credit card payments	
☐ For credit card payments for applications to the Department of Environment and Science please lodge the application using Online Services at https://business.qld.gov.au/running-business/environment/online-services.	
☐ For credit card payments for applications relating to the Department of Agriculture and Fisheries please contact me (the applicant) for secure payment; Phone number: Insert phone no.	
An application fee is payable at the time the application is made. Information on the fee can be located in the information sheet *Fees for permits for environmentally relevant activities (ERAs)* (ESR/2015/1721). Where the proposed amendment is determined by the administering authority to be a major amendment, an assessment fee of 30% of the annual fee for the authority at the time of application, is also payable. The assessment fee is payable once notification of the assessment level decision is issued. The assessment fee must be paid before the assessment of the amendment application can proceed. The supplementary annual fee is payable where the amendment is approved and results in the aggregate environmental score (and hence the annual fee) for the EA increasing. The supplementary annual fee is a pro-rata adjustment to the annual fee for the period from when the amended EA takes effect to the next anniversary day for the EA. This is payable within 20 business days after the approval date. The supplementary annual fee can be calculated using the *Fee calculator* (ESR/2015/1731).	

Section 32 – Declaration

Note: If you have not told the truth in this application you may be prosecuted.

I declare that:

- I am the holder of the environmental authority, or authorised signatory for the holder of the environmental authority.
- If the proposed amendment is made, the relevant activities will continue to comply with the ERA Standard (eligibility criteria and standard conditions) for all eligible ERAs, or where they cannot comply, I have indicated otherwise in my application and provided the required supporting information.
- If the proposed amendment is a minor amendment (condition conversion), I can comply with the ERA Standard (eligibility criteria and standard conditions) for each of the ERAs authorised by the environmental authority.
- The information provided is true and correct to the best of my knowledge. I understand that it is an offence under section 480 and 480A of *the Environmental Protection Act 1994* to give the administering authority or an authorised person a document containing information that I know is false, misleading or incomplete in a material particular.

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 management practices proposed or implemented.

Where an agreement is in place between all holders of the environmental authority, one holder can sign on behalf of the other joint holders. Please tick the checkbox below.

☐ I HAVE AUTHORITY TO SIGN THIS FORM ON BEHALF OF ALL THE JOINT HOLDERS OF THE ENVIRONMENTAL AUTHORITY.

Applicant's signature

APPLICANT'S NAME	POSITION	COMPANY / ORGANISATION
Richard Nolan	HSER Manager - Onshore	Santos Limited Vamgas Pty Ltd Santos Petroleum Pty Ltd Santos Australian Hydrocarbons Pty Ltd
APPLICANT'S SIGNATURE		DATE 11/05/2022

Joint holder(s) signature if applicable

NAME, POSITION AND COMPANY NAME	SIGNATURE	DATE
Reneke van Soest, General Manager SA, Delhi Petroleum Pty Ltd and Beach Energy (Operations) Limited		4/5/22
NAME, POSITION AND COMPANY NAME	SIGNATURE	DATE
NAME, POSITION AND COMPANY NAME	SIGNATURE	DATE

OR ☐ I HAVE ATTACHED A DOCUMENT THAT PROVIDES THE REQUIRED INFORMATION FOR ALL JOINT HOLDERS.

Where the environmental authority holder is a company, this form must be signed by an authorised person for that company. Where there is more than one holder of the environmental authority, this declaration is to be signed by all holders, unless there is an agreement between all holders that one can sign on behalf of the other(s).

Section 33 - Submission

Please submit your completed application to:

For ERA 2, ERA 3 or ERA 4:

Post:
Senior Environmental Scientist
Animal Industries
Department of Agriculture and Fisheries
PO Box 102
TOOWOOMBA QLD 4350

Enquiries
Phone: (07) 4688 1374
Fax: (07) 4529 4192
Email: livestockregulator@daf.qld.gov.au

For a mining ERA where the proposed amendment impacts upon the resource tenure:

Enquiries
Mining Registrar
Department of Resources
The Department of Resources has a list of office locations for mining registrars on its website www.resources.qld.gov.au/.

For all other ERAs:

Post:
Permit and Licence Management
Department of Environment and Science
GPO Box 2454
BRISBANE QLD 4001

Enquiries
Website: www.business.qld.gov.au
Email: palm@des.qld.gov.au
Phone: 13 QGOV (13 74 68)

The latest version of this publication and other publications referenced in this document can be found at **www.qld.gov.au** using the relevant publication number (ESR/2015/1733 for this form) or title as a search term.

Section 34 - Definitions to terms used in this form	
(Where there is inconsistency between the definition of terms used here and the terms used in the EP Act, the terms in the EP Act apply)	
Condition conversion	For an environmental authority, means an amendment replacing all the conditions of the authority with the standard conditions for the environmentally relevant activity which the authority relates. The relevant eligibility criteria and standard conditions must be able to be met.
Eligibility criteria	For an environmentally relevant activity, means eligibility criteria that are in effect for the activity under – (a) An ERA standard; or (b) A code of environmental compliance; or (c) A regulation in respect of a mining activity.
Environmentally relevant activity (ERA)	A resource activity or a prescribed ERA.
ERA project	A prescribed ERA project or a resource project.
ERA standard	For an environmentally relevant activity, means the eligibility criteria and/ or the standard conditions set by the administering authority.
Major amendment	For an environmental authority, means an amendment that is not a minor amendment.
Material change of use of premises for an ERA	A category of assessable development requiring a development permit under the *Planning Act 2016*. Refer Schedule 10, Division 2, Item 8 of the Planning Regulation 2017.
Minor amendment	For an environmental authority, means an amendment that is – (a) a condition conversion; or (b) a minor amendment (threshold).
Minor amendment (threshold)	For an environmental authority, means an amendment that the administering authority is satisfied— (a) is not a change to a condition identified in the authority as a standard condition, other than— (i) a change that is a condition conversion; or (ii) a change that is not a condition conversion but that replaces a standard condition of the authority with a standard condition for the environmentally relevant activity to which the authority relates; and (b) does not significantly increase the level of environmental harm caused by the relevant activity; and

	(c) does not change any rehabilitation objectives stated in the authority in a way likely to result in significantly different impacts on environmental values than the impacts previously permitted under the authority; and (d) does not significantly increase the scale or intensity of the relevant activity; and (e) does not relate to a new relevant resource tenure for the authority that is— (i) a new mining lease; or (ii) a new petroleum lease; or (iii) a new geothermal lease under the Geothermal Energy Act; or (iv) a new GHG injection and storage lease under the GHG storage Act; and (f) involves an addition to the surface area for the relevant activity of no more than 10% of the existing area; and (g) for an environmental authority for a petroleum activity— (i) if the amendment involves constructing a new pipeline—the new pipeline does not exceed 150km; and (ii) if the amendment involves extending an existing pipeline—the extension does not exceed 10% of the existing length of the pipeline; and (h) if the amendment relates to a new relevant resource tenure for the authority that is an exploration permit or GHG permit—the amendment application under section 224 seeks an amended environmental authority that is subject to the standard conditions for the relevant activity or authority, to the extent it relates to the permit.
Mobile and temporary ERA	A prescribed ERA, other than an activity that is dredging material, extracting rock or other material, or the incinerating of waste: (a) carried out at various locations using transportable plant or equipment, including a vehicle (b) that does not result in the building of any permanent structures or any physical change of the landform at the locations (other than minor alterations solely necessary for access and setup including, for example, access ways, footings and temporary storage areas) (c) carried out at any one of the locations: (i) for less than 28 days in a calendar year, or (ii) for 28 or more days in a calendar year only if the activity is necessarily associated with, and is exclusively used in, the construction or demolition phase of a project.
Prescribed ERA	An environmentally relevant activity that is not a resource activity and is prescribed under section 19 of the EP Act.
Prescribed ERA project	All prescribed ERAs carried out, or proposed to be carried out, as a single integrated operation.

Registered suitable operator	A person who, or a corporation which, under section 318I of the EP Act has been assessed as being suitable to carry out an ERA and has been listed on the suitable operator register.
Resource activity	An activity that is any of the following: (a) a geothermal activity (b) a greenhouse gas (GHG) storage activity (c) a mining activity (d) a petroleum activity.
Resource project	Resource activities carried out, or proposed to be carried out, under 1 or more resource tenures, in any combination, as a single integrated operation.
Single integrated operation	Occurs when all of the below criteria are met: (a) the activities are carried out under the day-to-day management of a single responsible individual, for example, a site or operations manager; (b) the activities are operationally interrelated; (c) the activities are, or will be, carried out at one or more places; and (d) the places where the activities are carried out are separated by distances short enough to make feasible the integrated day-to-day management of the activities.
Underground water rights	Means any of the following: (a) underground water rights within the meaning of the *Mineral Resources Act 1989*; (b) underground water rights within the meaning of the *Petroleum and Gas (Production and Safety) Act 2004*; (c) underground water rights within the meaning of the *Petroleum Act 1923*, section 87(3).

ATTACHMENT 2 – Supporting Information

Santos

Attachment 2

Supporting Information for an EA Amendment Application (EA 0002115)

Petroleum Pipeline License (PPL) 2050

Table of Contents

Tables

Figures

Appendices

Abbreviations and Units

Acronym	Description
BPEM	Best Practice Environmental Management
CDZ	Construction Disturbance Zone
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*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERA	Environmentally Relevant Activities
ESA	Environmentally Sensitive Area
GAB	Great Artesian Basin
GES	General Ecological Significance
HES	High Ecological Significance
HFRA	Hydraulic Fracturing Risk Assessment
IAA	Immediately Affected Area
LTAA	Long Term Affected Area
MSES	Matters of State Environmental Significance
NC Act	*Nature Conservation Act 1992*
PL	Petroleum Lease
RE	Regional Ecosystem
RoW	Right of Way
SEA	Strategic Environmental Area
SRI	Significant Residual Impact
SWQ	South West Queensland
UWIR	Underground Water Impact Report

1.0 Introduction

Santos Limited (Santos) on behalf of the joint venture partners Delhi Petroleum Pty Ltd, Santos Petroleum Pty Ltd, Beach Energy (Operations) Limited, Vamgas Pty Ltd and Santos Australian Hydrocarbons Pty Ltd, is seeking to amend Environmental Authority (EA) 0002115.

EA 0002115 currently authorises the conduct of petroleum pipeline activities associated with Petroleum Pipeline License (PPL) 2050 (an area PPL) situated in the Cooper Basin in South-West Queensland (SWQ), approximately 25 kilometres (km) south-east of the Santos Ballera Gas Plant (refer Figure 1).

This application seeks authorisation to construct and operate two new buried gas pipelines located in the Channel Country Strategic Environmental Area (SEA), prescribed under the *Regional Planning Interests Act 2014* (RPI Act) (refer to Figure 1).

EA 0002115 contains *eligibility criteria* and *standard conditions for petroleum pipeline activities* (version 2). The proposed gas pipelines comply with the eligibility criteria for petroleum pipeline activities; however, they do not comply with *Schedule B – Protecting environmental values, Variation 1, Schedule B: Table 1 – Authorised Petroleum Activity(ies) Disturbance.*

Variation 1 limits activities in a Designated Precinct of a SEA to '*low impact petroleum activities'* as defined by EA0002115. The definition of 'low impact petroleum activities' does not include construction of pipelines. Table 1 is used by Variation 1 to explicitly authorise infrastructure located within the Designated Precinct of a SEA.

Due to the location of the proposed gas pipelines being in the Designated Precinct of a SEA, the activities do not comply with *Schedule B – Protecting environmental values, Variation 1*. The proposed pipelines will comply with all other EA and standard conditions for petroleum pipeline activities. Amendment of Variation 1 (Table 1) is therefore required to explicitly authorise the proposed activities.

Santos has prepared this amendment application as a minor amendment (threshold) in accordance with Section 223 of the EP Act. The proposed application involves amendment of a variation condition, and will not significantly increase the level of environmental harm caused by the relevant activity. Section 6.1.3 provides further information to support the assessment of this application as a minor amendment.

The holder of an EA may, at any time pursuant to Section 224 of the *Environmental Protection Act 1994* (EP Act), make an application to the assessing authority seeking an amendment to an EA. Santos has prepared this document in accordance with Sections 226 and 227 of the EP Act and considered the Department of Environment and Heritage (DEHP) (former) '*Guideline – Application requirements for petroleum activities'* (DEHP, 2013).

1.1 Regional Planning Interests Act 2014

For noting, in parallel to this application, Santos has lodged an application for a Regional Interests Development Approval (RIDA) under the RPI Act where exemptions do not apply to the proposed activities.

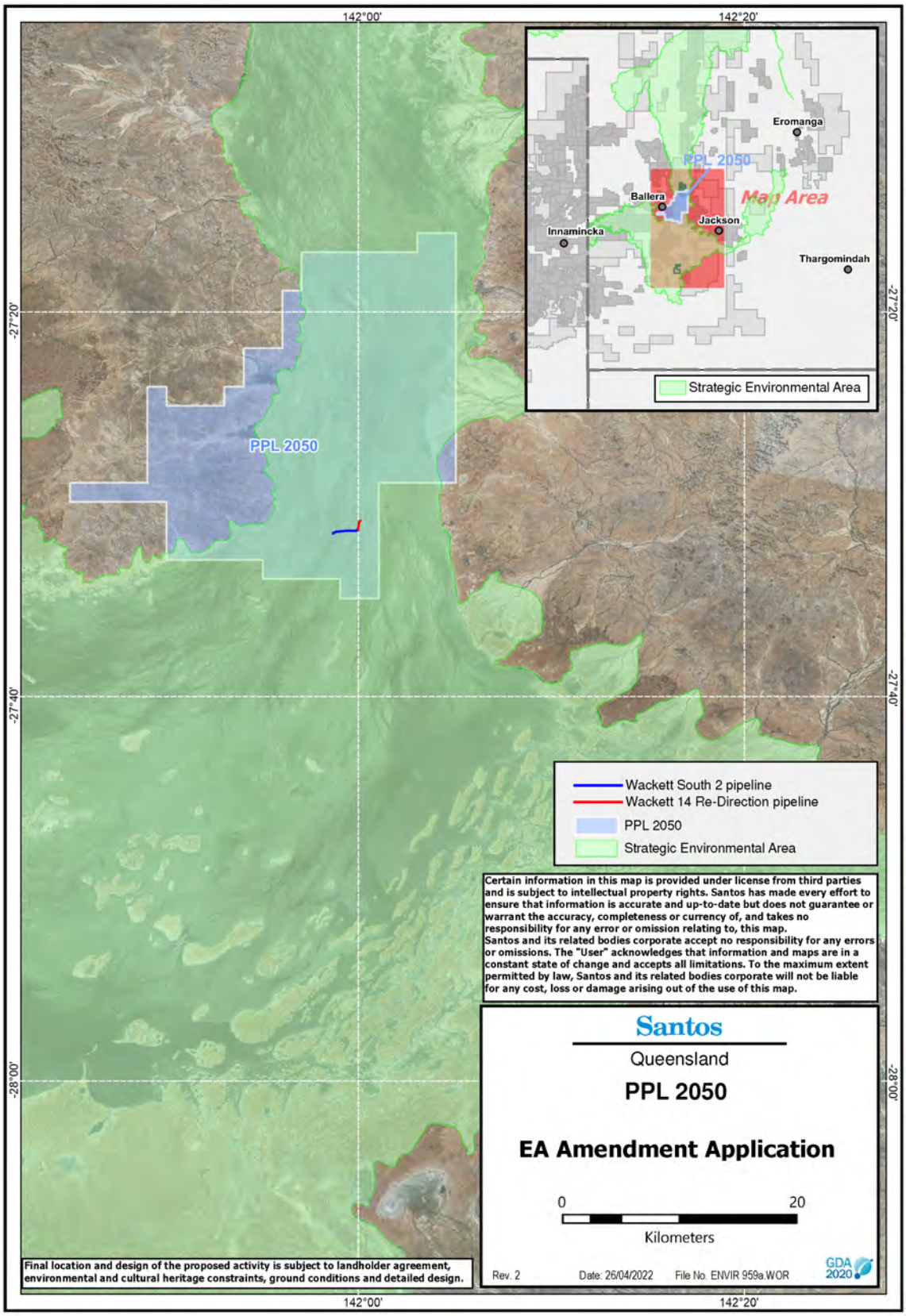


Figure 1: Regional Context

2.0 Application Description

2.1 Proposed Activities

Two new buried gas pipelines are required to connect existing and proposed gas wells located in the Wackett gas field. The proposed buried gas pipelines are located in the Channel Country SEA (refer to Figure 1).

The Wackett-14 redirection pipeline will provide a new connection from the Wackett-14 well to the Wackett-4 gas pipeline (PPL 2050) and will also include a mid-line riser. This new pipeline is required to facilitate improved gas production from the Wackett-14 well.

The Wackett South-2 pipeline is required to connect proposed well Wackett South-2 to the existing gas pipeline network. The Wackett South-2 pipeline has been co-located with the existing Wackett South 1 gas pipeline Right of Way (RoW) (PPL 2050) to minimise disturbance.

The gas pipelines will be buried, and the surface will be rehabilitated following installation to ensure natural surface water flows in the area are maintained. The pipelines will be approximately 4 km total combined length, and they will be constructed from 100 mm diameter steel (DN100) pipe, buried to a minimum depth of 750 mm. A construction disturbance zone (CDZ) has been defined to allow a degree of flexibility during final alignment placement. Total required disturbance area for construction will be approximately 9.6 ha. This is a conservative estimate to allow a degree of flexibility, and the total disturbance area will likely be less than 9.6 ha.

Post ground-truthing, the final location of the infrastructure may shift within the CDZ to avoid engineering constraints and cultural heritage and environmental sensitivities. The tentative location of the proposed pipelines and their CDZs are shown in Figure 2.

2.1.1 Construction

An average RoW width of 19 m is required for installation of the proposed buried gas pipelines. The RoW must provide sufficient area to locate topsoil banks on either side of the RoW, safe access for pipe truck and side boom tractor/excavator movement, the pipeline trench, and a trench spoil bank. RoW widths will be restricted to the smallest extent practicable through watercourses.

Once the pipeline is laid within the trench, it will be hydrotested, bedded with padding placed around it, backfilled and compacted. Hydrotest water will not be released to land; it will be transported to the nearest licensed water management facility for treatment and/or disposal.

The RoW will then be reinstated to the condition and surface profiles existing at the commencement of activities to ensure natural surface water flows in the area are maintained. Any wheel and equipment ruts created along the pipeline route during installation will be filled in and levelled by grading equipment.

Topsoil and seed stock removed during installation will be re-spread over the RoW, and any windrows will be removed.

2.1.2 Operation

Once operational, the pipelines will transfer gas from the wells into the existing gas pipeline network. Pipeline maintenance activities and inspections will be carried out from time to time. A maximum 3 m wide corridor located within the rehabilitated RoW will be used to provide access for inspections via light vehicles. No formed roads will be required or be maintained within the RoW. The pipelines will be decommissioned at end-of-life in accordance with the *Petroleum and Gas (Production and Safety) Act 2004* (P&G Act) and the relevant conditions of EA 0002115.

2.2 Proposed Amendment to EA0002115

As discussed in Section 1.0, EA0002115 contains *eligibility criteria* and *standard conditions for petroleum pipeline activities* (version 2). The proposed gas pipelines meet the eligibility criteria for petroleum pipeline activities; however, they do not comply with condition Variation 1 due to their location in the Channel Country SEA. Variation 1 limits activities in a Designated Precinct of a SEA to '*low impact petroleum activities'* as follows:

> *'only low impact petroleum activities or activities detailed in Schedule B: Table 1 – Authorised Petroleum Activity(ies) Disturbance, are permitted in a designated precinct of a Strategic Environmental Area'*

The definition of '*low impact petroleum activities*' in EA0002115 does not include construction of pipelines as follows:

> "*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"*

As a result, an EA amendment is required to authorise the construction of the pipelines and associated disturbance (9.6 ha) within the Channel Country SEA. Accordingly, Santos seeks to amend condition Variation 1, and Schedule B: Table 1 – Authorised Petroleum Activity(ies) Disturbance of EA0002115 as follows (changes in red):

> ***Schedule B – Protecting Environmental Values***
>
> ***Variation 1****.*
>
> *Only low impact petroleum activities or activities detailed in Schedule B: Table 1 – Authorised Petroleum Activity(ies) Disturbance, are permitted in a designated precinct of a Strategic Environmental Area.*
>
> *Schedule B: Table 1 – Authorised Petroleum Activity(ies) Disturbance*

Tenure	***Description of infrastructure***	***Number***	***Size of disturbance in Strategic Environmental Area (ha)***	***Location***
PPL 2050	*Mid-line riser*	*1*	*0.8*	*PPL 2050* *Lot 1 on Plan SP133822* *Strategic Environmental Area and 'No Concern at Present' Biodiversity Status*
PPL 2050	*Wackett 2 south pipeline*	*1*	*9.6*	*Lot 1 on Plan SP133822* *Strategic Environmental Area and 'No Concern at Present' Biodiversity Status*
PPL 2050	*Wackett 14 re-direction pipeline*	*1*		*Lot 1 on Plan SP133822* *Strategic Environmental Area and 'No Concern at Present' Biodiversity Status*

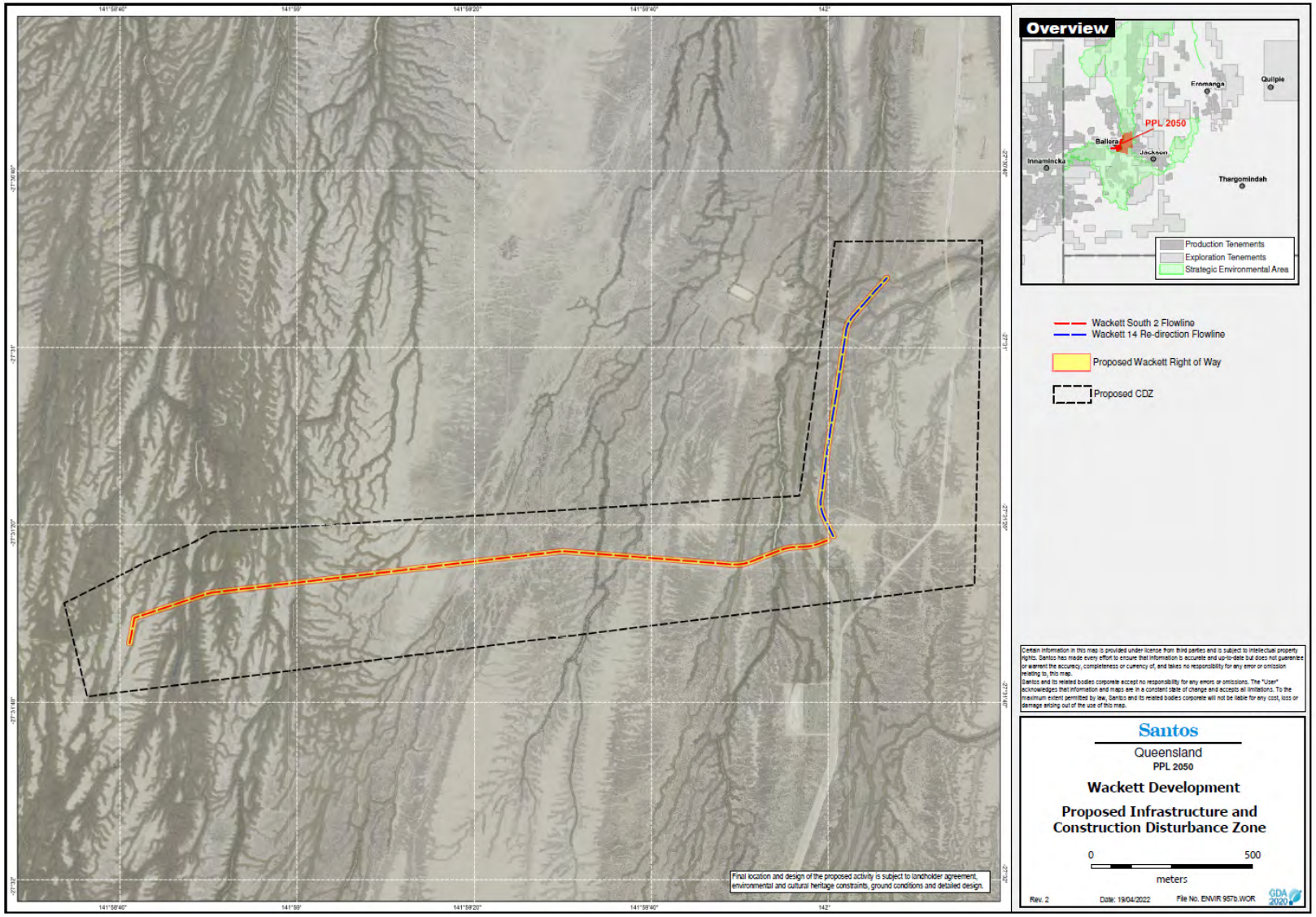


Figure 2: Proposed Activities Location

3.0 Site Description, Land Use and Climate

3.1 Site Description and Land Use

PPL 2050 is located in the Cooper Basin SWQ, approximately 30 km east of the township of Durham. PPL 2050 is an area PPL, authorising Santos to build a system of pipelines within the area of the licence.

The proposed activities are located on Durham Downs Pastoral Station (Lot 1 on Plan SP133822). Durham Downs is a pastoral lease that operates as a cattle station with a capacity of up to 21,500 head of cattle[1]. Primary land uses for PPL 2050 and its surrounding area, include cattle grazing and petroleum exploration and production. The proposed pipelines within PPL 2050 are located on graticular blocks / sub-blocks as detailed in Table 1.

Table 1: Sub-Block Identification – PPL 2050 for proposed pipelines

BIM Name	BIM Code and Block	Sub-Blocks
COOP	3073	a
COOP	3073	f
COOP	3072	k
COOP	3072	j

3.2 Climate

The Channel Country SEA is located in an arid to semi-arid region of central Australia where the average rainfall is low. Seasons in the area are characterised by dry, hot summers and short, very dry winters. Average annual rainfall in the region ranges from 232 mm at Nockatunga Station (Station Number: 045024) to 200 mm at Orientos Station (Station Number: 045029) (BOM, 2021). In summer, mean maximum temperature is 37.5°C and mean minimum temperature is 24.6°C (BOM, 2021). In winter, mean maximum temperature is 21°C and mean minimum temperature is 7.6°C (BOM, 2021).

The El-Nino Southern Oscillation (ENSO) exerts significant influence on inter-annual climate variability across the area, produced marked fluctuations in the amount, timing and distribution of rainfall. As such, there is considerable year-to-year variation, particularly during the summer months, ranging from 'failed' wet seasons, to 'normal' and above average rainfall and tropical cyclone activity.

[1] https://www.kidman.com.au/locations/durham-downs/

4.0 Relevant Environmental Values

As described in Section 2, this application seeks to authorise disturbance of 9.6 ha for the construction of two new buried gas pipelines located in the Channel Country SEA. The values associated with the Channel Country SEA defined in Section 7 of the *Regional Planning Interests Regulation 2014* (RPI Reg) include:

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*
   iv. *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;*

c) *the beneficial flooding of land that supports flood plain grazing and ecological processes in the area.*

DSDMIP's RPI Act Statutory Guideline 05/14 - *Carrying out resource activities and regulated activities within a Strategic Environmental Area*, summarises the above values to broadly relate to:

- riparian process
- wildlife corridors
- water quality
- hydrologic processes
- geomorphic processes; and
- beneficial flooding.

As this EA amendment application seeks to authorise activities within the Channel Country SEA, environmental values associated with this application are limited to the Channel Country SEA. However, for completeness, regional ecosystems, environmentally sensitive areas, and protected plants and animals are also discussed. Matters of State Environmental Significance (MSES) are addressed in Section 6.2.

The proposed activities are not expected to negatively impact environmental values associated with noise, air, waste or rehabilitation activities beyond what is currently authorised by EA 0002115, and these values are therefore not discussed further.

The risks and potential impacts to applicable environmental values as a result of the proposed activities, and mitigation measures for potential impacts, are discussed in Section 5.0.

Desktop environmental search reports are provided in Appendix A.

4.1 Riparian Processes, Regional Ecosystems and Environmentally Sensitive Areas

Regional Ecosystem (RE) mapping indicates vegetation within PPL 2050 is typical of the Channel Country bioregion being dominated by sparse open shrublands and ephemeral herblands. More specifically, vegetation in the proposed disturbance area is mapped to be dominated by sparse Queensland bluebush (*Chenopodium auricomum*) open shrubland and ephemeral herbland (REs 5.3.18a and b), with minor areas of low open Coolibah woodland and Lignum (*Duma florulenta*) (RE 5.3.8a). These REs are widespread and common in the local and broader area surrounding PPL 2050 and in the Cooper Creek bioregion. Further, vegetation in PPL 2050 has been subject to long-term cattle grazing from the operation of Durham Downs Pastoral Station.

State mapped REs present in the proposed disturbance area are shown in Figure 3 and detailed in Table 2. All REs located in the disturbance area are listed to have a Biodiversity Status (BD) of No Concern at Present (NCAP). Further, these REs are mapped to have 99% of their pre-clearing extent remaining in 2019 (i.e. the area is largely remnant native vegetation). There are no mapped Environmentally Sensitive Areas (ESAs) present within the proposed disturbance area.

Table 2: State Mapped Regional Ecosystems

RE Code	RE Description	VM Act Status	BD Status	Structural Category	% RE in Disturbance Area
5.3.18a/b	RE 5.3.18: Braided channel complex of major alluvial plains, includes *Chenopodium auricomum* open shrubland and variable sparse to open-herbland: a) *Chenopodium auricomum* open shrubland, frequently with pure stands of *Chenopodium auricomum*, however, scattered *Eucalyptus coolabah* low trees and *Eremophila bignoniiflora* tall shrubs may be present; b) Variable sparse to open-herbland with either grasses or forbs dominating the ground layer depending on incidence of flooding and seasonal conditions.	LC	NCAP	Sparse	90%
5.3.8a	*Eucalyptus coolabah* low open woodland +/- *Duma florulenta* on braided channels, drainage lines, flood plain lakes and claypans.	LC	NCAP	Very Sparse	10%

Key: VM Act Status: LC – least concern, BD status: NCAP – no concern at present.

4.2 Wildlife Corridors and Protected Flora and Fauna

Figure 4 displays state and regional riparian and terrestrial corridors in the vicinity of the proposed activities as per the DES *Biodiversity Planning Assessments and Aquatic Conservation Assessments* (attached as Appendix A). The proposed pipelines intersect a riparian corridor primarily associated with the Cooper Creek (refer to Figure 4). The nearest terrestrial corridor is located approximately 13 km east of the pipelines.

REs located within the proposed disturbance area (as described in Section 4.1) may provide suitable general habitat for a range of fauna and flora, particularly water birds during larger Cooper Creek flood events. Further, environmental database search results (Wildnet) and modelled potential habitat for the proposed disturbance area indicate the area may provide suitable habitat for three (3) species listed as endangered, vulnerable or near threatened (EVNT) under the *Nature Conservation Act 1992* (NC Act) (refer to Table 3).

Table 3: EVNT species with potential to occur within proposed disturbance area

Scientific Name	Common Name	NC Act Status	RE Association / Habitat Preference
Epthianura crocea crocea	Yellow chat (gulf)	Vulnerable	Nil preferred RE present in proposed disturbance area – species prefers marshy plains and floodplains that are seasonally inundated, dominated by salt-tolerant grasses, saltbush (*Atriplex* spp.) and sedges with patches of samphire (*Tecticornia* spp.).
Notomys fuscus	Dusky hopping-mouse	Endangered	Nil preferred RE present in proposed disturbance area - species inhabits sandy habitats, preferring sand dunes, hills and ridges with Cane Grass (Zygochloa paradoxa), Sandhill Wattle (*Acacia ligulata*), Nitrebush (*Nitraria billardiera*), Sticky Hopbush (*Dodonea viscose*) and other annual and perennial shrubs. Sandy habitat is needed for N. fuscus to build burrow systems it requires to live communally and breed.
Amytornis barbatus barbatus or diamantina subspecies	Grey Grasswren	Endangered or Near Threatened*	RE 5.3.8a – species inhabits wetland / floodplain REs containing lignum (*Duma florulenta*) and swamp canegrass (*Eragrostis australasica)* thickets.

The Cooper Creek floodplain is known to support multiple subspecies of grey grasswren; however, the subspecies status of the population is uncertain. 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 NT under the NC Act. In light of this uncertainty, for the purposes of this application, the grey grasswren population has been assumed to comprise the endangered Bulloo subspecies.

The proposed pipelines are not located within a High-Risk Area on the Flora Survey Trigger Map, or an area identified as Essential Habitat on the Essential Habitat map for an animal or plant that is endangered or vulnerable wildlife. Refer to environmental reports and database search results attached as Appendix A for further information.

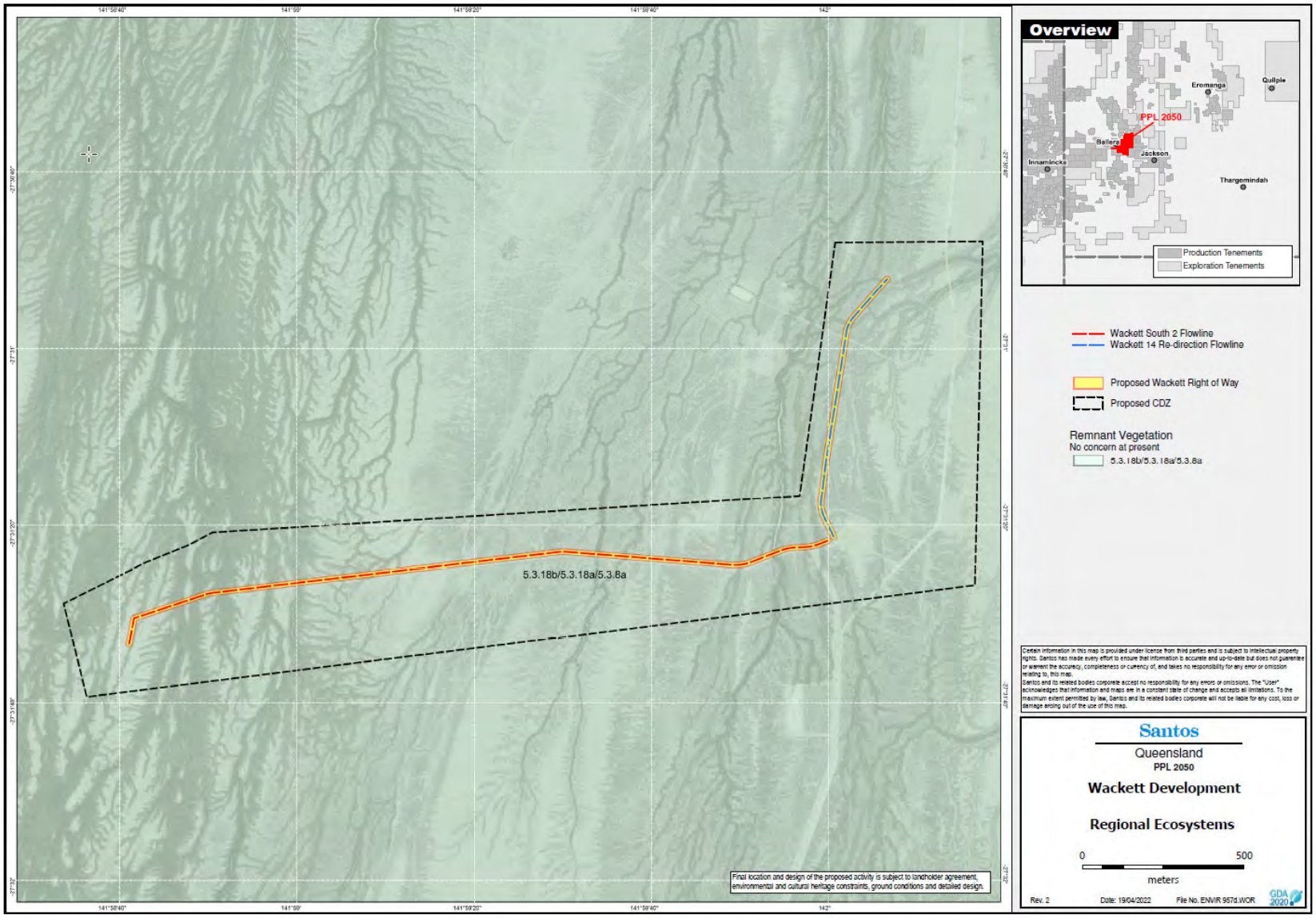


Figure 3: State Mapped Regional Ecosystems

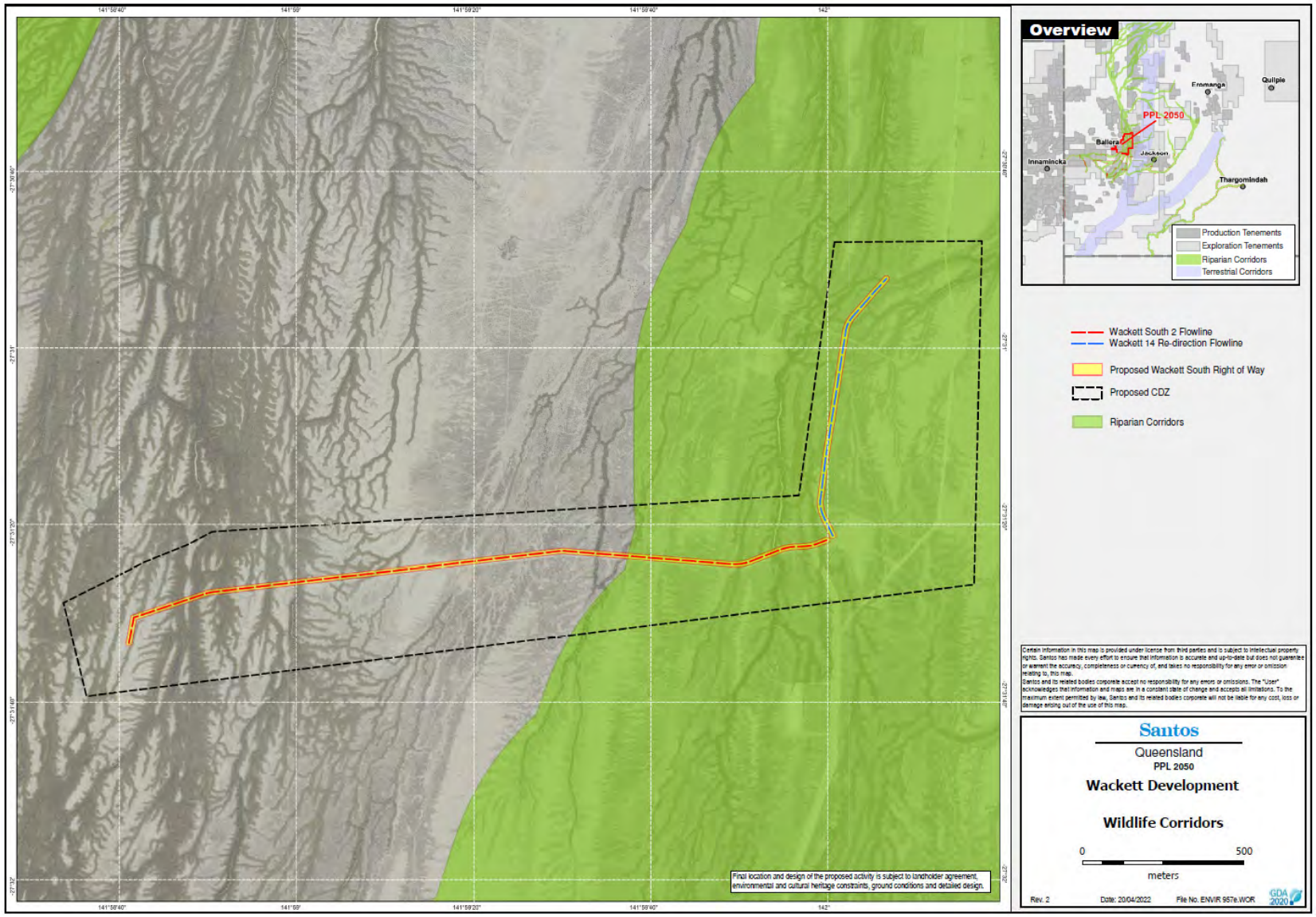


Figure 4: State and Regional Biodiversity Corridors

4.3 Water Quality

The proposed activities are located in the Cooper Creek drainage basin. The Cooper Creek drainage basin has a catchment area of 300,000 km² and is Australia's largest braided stream and inland floodplain (Wainwright et al, 2006). Cooper Creek is approximately 1,500 km long and stretches from the Warrego Range in Queensland to Lake Eyre in South Australia (Kotwicki, 1986).

Historical (1965-2020) water quality data from the QLD Government's Cooper Creek gauging station 003103A, located approximately 85km south-west of the proposed pipelines, is summarised in Table 4. 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).

The proposed activities are located within the Cooper Creek floodplain, and intersect several minor drainage features of the Cooper Creek (refer to Figure 5). The proposed disturbance area and drainage features are typically dry, but may be subject to intermittent shallow inundation and surface water flows associated with Cooper Creek flood events (refer to Section 4.4 for further information on Cooper Creek flood events).

Table 4: Cooper Creek Surface Water Quality (1956-2016)

Parameter	Average Value
Conductivity @ 25°C	345 µS/cm
Turbidity	512 NTU
pH	7.4
Total Nitrogen	1.4 mg/L
Total Phosphorus as P	0.4 mg/L
Sodium as Na	44.6 mg/L
Magnesium as Mg	7.4 mg/L
Chloride as Cl	62.6 mg/L
Fluoride as F	0.2 mg/L

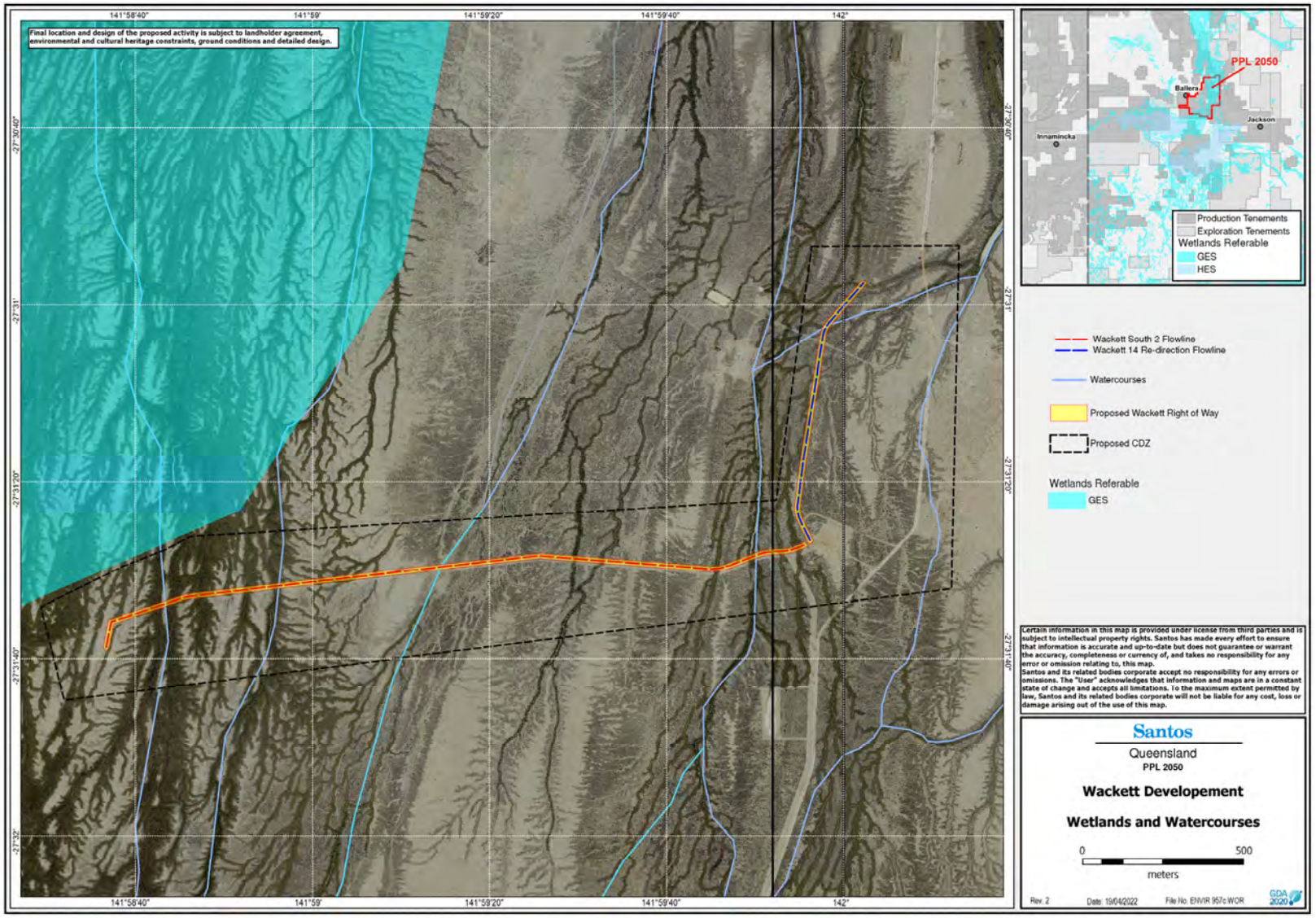


Figure 5: Wetlands and Watercourses

4.4 Hydrologic Processes and Beneficial Flooding

4.4.1 Regional

The Channel Country is characterised by vast flat-lying, braided, flood and alluvial plains surrounded by gravel or gibber plains, dunefields and low ranges. The low resistant hills and tablelands are remnants of the flat-lying Cretaceous sediments.

The drainage system is dominated by the Cooper Creek Basin, which drains towards Lake Eyre. As discussed in Section 4.3, the Cooper Creek catchment covers approximately 300,000 km^2 and is Australia's largest braided stream and inland floodplain. Cooper Creek is ephemeral and predominantly influenced by surface flows with little input from groundwater. 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, 2018). Heavy rainfall events are more likely to occur from October to April (BOM, 2018).

Minor Cooper Creek flow events generally occur each year, causing inflows from south-west Queensland into north-east South Australia. Minor flows within Cooper Creek are typically confined to the main creek channels, however, every 3-4 years, flows are sufficient to inundate parts of the Cooper floodplain. During extended periods of no flow, the Cooper Creek generally contracts to a largely dry floodplain with a series of waterholes. Very large Cooper Creek flood events with the potential to inundate the broader Channel Country region, and flow water into the lower Cooper Creek in South Australia, occur on average once every 10 years.

4.4.2 Local

The proposed pipelines intersect several minor drainage features of the Cooper Creek (refer to Figure 5). As discussed in Section 4.4.1, minor annual flows within Cooper Creek are typically confined to the main creek channels and the broader floodplain is typically dry, but every 3-4 years, flows are sufficient to inundate parts of the Cooper floodplain.

The proposed activities are located within the Cooper Creek floodplain, and intersect several minor drainage features of the Cooper Creek. This area and the drainage features are typically dry, but may be subject to intermittent shallow inundation and surface water flows associated with moderate to larger Cooper Creek flood events. Further, Cooper Creek floodwaters are typically slow-moving, and sufficient time (i.e. several weeks to months) is generally available to plan activities to avoid periods of inundation or surface water flows.

Further, no mapped HES or GES wetlands will be intersected by the proposed pipelines (refer Figure 5). The proposed disturbance area (CDZ) is located approximately 30 m from a mapped GES wetland, and the nearest HES wetland is located approximately 4.2 km south-east of the proposed pipelines.

4.5 Geomorphic Processes

4.5.1 Regional

Surface geology is dominated by Quaternary alluvium deposits associated with flood plains, with consolidated Tertiary sediments or Winton Formation on the higher ground. Cooper Creek is a large sedimentary sump accreting over a vast floodplain[2]. Fluvial processes also play a role in the geomorphology of the Channel Country SEA, as evident by the presence of isolated sand dunes.

4.5.2 Local

Land systems mapping, as detailed in the Western Arid Region Land Use Study – Part 1 (DES, 2019) indicates the proposed activities are located within C1C2, described as:

> *Alluvial plains with gradients of less than 1:5,000; with anastomosing channels (0.1 to 1 m relief), main channels (<10 m relief), shallow flood depressions, waterholes, billabongs and swamps, and slightly elevated more stable alluvial islands. Isolated sand dunes.*

[2] Maroulis, J (undated) *Channel Country landforms and the processes that shape them*. University of Southern QLD Faculty of Education/Australian Centre for Sustainable Catchments

5.0 Potential Impacts and Mitigation Measures

As discussed in Section 2.0, this EA amendment seeks to authorise the construction and operation of two new gas pipelines with a total disturbance area of approximately 9.6 ha located in the Channel Country SEA. As discussed in 2.1, the proposed disturbance area is a conservative estimate to allow a degree of flexibility, and total disturbance area will likely be less than 9.6 ha.

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 potential 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 potential risks and 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 the 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 risk assessment process is provided in Appendix B. The results of the risk assessment are summarised in Table 5.

Impacts to MSES in context of the *Environmental Offset Act 2014* (EO Act) are discussed in Section 6.2.

5.1 Riparian Processes, Regional Ecosystems and Environmentally Sensitive Areas

As discussed in Section 4.0, the proposed activities are located within a naturally ephemeral floodplain environment, and the proposed pipelines intersect several minor ephemeral drainage features. Further, the proposed disturbance area is typically dry, but may be subject to shallow inundation and surface water flows associated with larger Cooper Creek flood events.

As discussed in Section 2.0, the proposed pipelines will be buried, and the RoW will be reinstated to the condition and surface profiles existing at the commencement of activities. This will ensure natural surface water flows in the area are maintained following completion of pipeline construction. Further, topsoil and seed stock removed during installation will be re-spread over the RoW, and any windrows will be removed.

Further, as discussed in Section 4.1, vegetation located in the project area is dominated by BD status NCAP sparse shrubland and ephemeral herbland vegetation, which has been subject to long-term cattle grazing from the operation of Durham Downs Pastoral Station. These REs are widespread and common in the local and broader area surrounding PPL 2050 and in the Cooper Creek bioregion. Moreover, PPL 2050 and the broader surrounding region are mapped to be predominantly remnant native vegetation, and there are no ESAs present within the proposed disturbance area.

Given the sparse ephemeral nature of vegetation located within the project area, minimal clearing of perennial woody vegetation is expected to be required for the proposed activities. In the context of the very large areas of similar remnant native vegetation present in the local and broader region, the proposed disturbance area (approximately 9.6 ha) represents a very minor disturbance.

As such, the proposed activities are unlikely to compromise riparian function or critically impede use of the riparian vegetation for migration, shelter and habitat associated with the floodplain or drainage features located in the local or broader area. Further, Santos will implement a range of management measures to ensure the proposed activities do not compromise riparian processes or wildlife corridor function as detailed in Table 5 and summarised below:

- Vegetation disturbance would be minimised where practicable by:
  - co-locating pipelines with existing infrastructure to reduce the overall RoW disturbance width;
  - relocating the pipeline alignment within the CDZ to avoid mature trees; and
  - lopping/trimming tree branches rather than removing entire mature trees and shrubs where practicable.
- Where the pipelines intersect watercourses, the RoW will be restricted to the smallest width practicable.
- Chemicals and fuels will be stored and handled in accordance with Australian Standards and spill kits would be located on site to contain any spills if required.
- Access to and from the site via designated access tracks only.
- Rehabilitation to promote natural revegetation of disturbed areas will occur following completion of construction in accordance with the relevant conditions of EA 0002115.

Management (control) strategies, risk sources, potential impacts and the level of risk associated with the proposed activities are summarised in Table 5. Given the sparse and ephemeral characteristics of vegetation in the project area, the minimal disturbance area required for the proposed activities, and implementation of management measures (and those detailed in Table 5), the proposed activities are unlikely to cause widespread or irreversible impacts to riparian processes and regional ecosystems within the Channel Country SEA.

5.2 Wildlife Corridors and Protected Flora and Fauna

Wildlife corridors mapped in the proposed disturbance area are associated with the Cooper Creek.

As discussed in Section 2.0, the proposed pipelines will be buried, and the RoW will be reinstated to the condition and surface profiles existing at the commencement of activities. This will ensure the natural surface water flows in the area are maintained, and natural rehabilitation processes can occur, following completion of construction activities. Further, topsoil and seed stock removed during installation will be re-spread over the RoW, and any windrows will be removed.

The proposed activities are therefore temporary and short-term in nature, and are unlikely to compromise riparian function or critically impede use of the riparian vegetation for migration, shelter and habitat associated with watercourses.

Further, as discussed in Section 4.2, the proposed disturbance area may provide suitable general habitat for a range of fauna, flora (and water birds during Cooper Creek flooding). Potential impacts to flora and fauna during construction activities may include:

- Temporary disturbance to minor areas of potential general habitat;
- Minor disturbance, injury or loss of fauna and flora; and
- Introduction and / or spread of weeds, pest plants, animals and pathogens.

These impacts, if eventuated, would be minor in nature and temporary in duration, and are unlikely to result in significant impacts to protected species. Further, Santos will implement a range of management measures to ensure the proposed activities avoid and minimise potential impacts as detailed in Table 5 and summarised below:

- Maximise avoidance of areas that may represent habitat for protected fauna as far as reasonably practicable; and
- Measures implemented to reduce risks to fauna from entrapment and injury in pipes and excavations.
- Hygiene protocols implemented as appropriate to minimise the introduction, spread and persistence of weeds, pest plants, animals and pathogens.
- Access to and from the site via designated access tracks only.

Management (control) strategies, risk sources, potential impacts and the level of risk associated with the proposed activities are summarised in Table 5. Given the characteristics of vegetation to be removed, minimal disturbance area required and implementation of the above management measures (and those detailed in Table 5), the proposed activities are unlikely to cause widespread or irreversible impacts on wildlife corridors and protected flora and fauna within the Channel Country SEA.

5.3 Water Quality

As discussed in Section 4.4.2, the proposed pipelines intersect several minor drainage features of the Cooper Creek. The proposed disturbance area is typically dry, but may be subject to intermittent shallow inundation and surface water flows associated with larger Cooper Creek flood events.

The proposed activities may cause minor temporary disturbance to soil and vegetation, which could increase the potential for erosion, which in turn may lease to minor sedimentation of surrounding watercourses. However, it should be noted that the disturbance area is typically dry, the Cooper Creek floodplain is a naturally turbid environment. Further, the proposed activities would be undertaken in accordance with existing EA conditions for soil management, including PPSCC 9, which requires sediment and erosion control measures are implemented and maintained to prevent soil loss and deposition beyond significantly disturbed land. Moreover, the proposed buried gas pipelines have been co-located with existing pipeline infrastructure as much as practicable to reduce the total disturbance.

Santos will commence rehabilitation as soon as reasonably practicable following completion of construction activities. This will promote conditions suitable for natural progressive revegetation of disturbed areas, and further reduce potential for erosion of disturbed areas.

Further, as per existing EA condition PPSCE 3, work programs in riparian and water crossing areas will be scheduled to take into account potential rainfall and surface water flows. Construction will 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.

Further, due to the slow-moving nature of flood waters in the Cooper Creek system, sufficient time (i.e. several weeks to months) is generally available to prepare operational areas for potential flood impacts. In these situations, all non-essential materials present on site at the time (e.g. hydrocarbons, chemicals, infrastructure) will be removed from construction and/or operational areas prior to the arrival of floodwaters.

Fuels/chemicals used on site will be stored and handled in accordance with Australian Standards and spill kits will be located on site where required to contain any spills should they occur. All waste materials and non-essential infrastructure will be removed as soon as reasonably practicable following completion of petroleum activities, minimising risks associated with contamination, or a reduction in water quality, in accordance with relevant conditions of EA0002115. Further, measures for unplanned releases of contaminants will be implemented in accordance with relevant EA conditions.

Hydrotest water will not be released to land; it will be transported to the nearest licenced facility for treatment and/or disposal.

Management (control) strategies, risk sources, potential impacts and the level of risk associated with the proposed activities are summarised in Table 5. Given the scope and nature of the proposed activities, combined with the implementation of the above management measures (and those detailed in Table 5), the proposed activities will not cause a widespread or irreversible impact on water quality within the Channel Country SEA.

5.4 Hydrologic Processes and Beneficial Flooding

The proposed activities are unlikely to affect existing hydrological processes and beneficial flooding given the pipelines will be buried, and the RoW will be reinstated to the condition and surface profiles existing at the commencement of activities. This will ensure the natural surface water flows in the area are maintained, and natural rehabilitation processes can occur, following completion of construction activities.

Further, due to the slow-moving nature of flood waters in the Cooper Creek system, sufficient time (i.e. several weeks to months) is generally available to prepare operational areas for potential flood impacts. In these situations, all non-essential materials present on site at the time (e.g. hydrocarbons, chemicals, infrastructure) will be removed from construction and/or operational areas prior to the arrival of floodwaters.

Management (control) strategies, risk sources, potential impacts and the level of risk associated with the proposed activities are summarised in Table 5. Given the nature of the activities, minimal disturbance area required and implementation of the above management measures (and those detailed in Table 5), the proposed activities are unlikely to cause widespread or irreversible impacts on hydrologic processes and beneficial flooding within the Channel Country SEA.

5.5 Geomorphic Processes

The proposed activities are considered unlikely to significantly affect geomorphic processes of the SEA given the pipelines will be buried, and construction disturbance will be temporary and minor in nature.

Further, Santos will commence rehabilitation as soon as reasonably practicable following completion of construction activities, and the RoW will be reinstated to the condition and surface profiles existing at the commencement of activities. This will ensure natural surface water flows in the area are maintained, and will be undertaken to promote conditions suitable for natural progressive revegetation of disturbed areas, and reduce potential for erosion of disturbed areas.

Further, as discussed in Sections 5.3 and 5.4, Santos will implement a range of mitigation measures to reduce the potential for erosion and sedimentation risk.

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

Given the scope and nature of the proposed activities, combined with the implementation of the above mentioned management measures (and those detailed in Table 5), the proposed activities will not cause a widespread or irreversible impact on geomorphic processes in the Channel Country SEA.

Table 5: 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
Pipeline construction and operation and incidental activities	Riparian Processes, REs and ESAs	Compromise riparian processes and wildlife corridor function Introduction and/or spread of weeds, pest plants, animals and pathogens Contamination of soil	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 Fire (ignition sources resulting from activities) Bushfire and flood (natural events)	III	c	Low	**General** • Surface disturbance restricted to the minimum area required to safely carry out activities. • Consider alternate alignments, locations and construction methods during planning and scouting phases to minimise environmental impacts. • Where practicable, use existing routes/disturbed ground, and co-locate pipelines to reduce the total disturbance area. • 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. • Erosion and sediment control measures in place where appropriate. • Infrastructure located to minimise impacts to drainage patterns, soil and vegetation. **Regional ecosystems** • 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. • Maximise avoidance of Regulated Vegetation. • 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 (Schedules D and E). **Introduction and/or spread of weeds, pest plants, animals and pathogens** • Hygiene protocols implemented as appropriate to minimise the introduction, spread and persistence of weeds, pest plants, animals and pathogens. • 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. **Vehicle and plant movements** • No unauthorised off-site driving. • Access to and from the site via designated access tracks only. • 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. **Fire/Flood** • Activity planning will consider seasonal conditions and the risk of bushfire and flood. • Work programs in 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 (i.e. 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. **Fuel, oil and chemical storage and handling** • 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).	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
							• 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 (i.e. oil leak or hydraulic hose failure). **Production operations** • 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 (i.e. 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 i.e. hydrotest. **Loss of containment** • Regular monitoring of control systems (i.e. emergency shutdown valves) to ensure that protection levels are adequate. • 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. **Waste** • Waste managed in accordance with the waste and resource management hierarchy, defined in Section 9 of the Waste Reduction and Recycling Act 2011. • Hydrotest water will not be released to land. • Where practicable, Santos would implement the waste and resource management hierarchy, and reduce risks to environmental values from waste storage and disposal, by: - designing activities to incorporate less resource-intensive materials and more efficient processes. - designing contracts which encourage waste avoidance and set waste reduction targets. - identifying and separating waste streams for re-use, recycling, treatment or disposal. - storing waste in appropriate receptacles or designated areas prior to their re-use or collection for recycling, treatment or disposal. - ensuring wastes are removed by transporters which are appropriately licensed or authorised to transport that particular waste type. - ensuring all wastes removed from the site are recycled, treated or disposed of at an appropriately licensed waste facility. - reviewing and auditing waste management practice to confirm legal compliance and identify opportunities for improvement. • Covered bins are provided for the collection and storage of wastes. • Rubbish loads are covered during transport to a licensed waste facility. • 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. **Rehabilitation** • 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 (as specified in the EA). • Rehabilitation to commence as soon as reasonably practicable following completion of construction activities. • 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 to ensure natural surface water flows are maintained, and natural rehabilitation processes can occur.			

Identification				Unmitigated Risk			Control Strategies	Residual Risk		
Risk Event/ Activity	Relevant EV	Potential Impact	Risk Source	Consequence	Likelihood	Risk		Consequence	Likelihood	Risk
Pipeline construction and operation, and incidental activities	Wildlife corridors and protected flora and fauna	Temporary disturbance to minor areas of potential general habitat Minor disturbance, injury or loss of fauna and flora Introduction and/or spread of weeds, pest plants, animals and pathogens	Infrastructure construction (earthworks activities) Entrapment in trenches 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 Bushfire and flood (natural events)	II	c	Low	• Refer to 'General', 'Introduction and/or spread of weeds, pest plants, animals and pathogens', Vehicle and plant movements', 'Fire/Flood', 'Fuel, oil and chemical storage and handling', 'Loss of containment', 'Waste' and "Rehabilitation' control strategies listed under Riparian Processes and REs and ESAs EVs. • Field and desktop-based assessments will be undertaken to preferentially place infrastructure/disturbance outside of areas that are likely to represent preferred habitat for listed species (where practicable). • Maximise avoidance of areas that may represent habitat for threatened fauna and flora as far as reasonably practicable. • Should clearing of threatened flora be required, approvals will be required. • Hollow logs (located on ground) within disturbance areas retained and shifted to adjacent undisturbed areas. • • 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 of active nest sites must not occur while the nest is active, with adults, eggs or nestlings. • Petroleum activities will be undertaken in a way that will minimise the potential for ignition / fire. • Disturbance of large hollow bearing trees will be avoided (wherever practicable) as they may represent breeding habitat for listed species. • As discussed in Section 4.4.2 , proposed activities will not result in significant disturbance to HES or GES wetlands • Measures implemented to reduce risks to fauna from entrapment and injury in pipes and excavations: - 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.	II	b	Very Low
Pipeline construction and operation, and incidental activities	Water Quality	Disturbance to natural drainage patterns Degradation of water quality from sediment releases, spills or leaks of fuels and chemicals Contamination of surface water	Infrastructure construction (earthworks activities) Storage and disposal of general waste, chemical and process wastes Equipment failure Minor spills or leaks of fuels, chemicals or other produced fluids Loss of containment Flood (natural event).	III	c	Low	• Refer to 'General', 'Fire/Flood', 'Fuel, oil and chemical storage and handling', 'Production operations', 'Loss of containment', 'Waste' and "Rehabilitation' control strategies listed under Riparian Processes and REs and ESAs EVs. • Preferentially select dry crossing sites with minimal earthworks requirements. • Pre-existing areas of disturbance used to place infrastructure wherever practicable. • Areas subject to inundation are assessed for conduciveness to support vehicles prior to access. • Erosion and sediment controls installed, where necessary. • Pipelines located and constructed to maintain pre-existing surface water flows. • Hydrotest water transported to the nearest licenced facility for treatment and/or disposal.	II	c	Low
Pipeline construction and operation, and incidental activities	Hydrologic processes and beneficial flooding	Disturbance to natural drainage patterns / flooding regime Degradation of water quality	Infrastructure construction (earthworks activities)	II	b	Very Low	• Surface disturbance restricted to the minimum area required to safely carry out activities. • Where practicable, use existing routes/disturbed ground, and co-locate pipelines to reduce the total disturbance area. • Where the pipelines intersect watercourses, the RoW will be restricted to the smallest width practicable. • Erosion and sediment control measures in place where appropriate. • Work programs in riparian/water crossing areas scheduled to take into account seasonal conditions and rainfall/flood likelihood. • Construction activity not undertaken during or immediately prior to flooding.	I	b	Very Low

Identification				Unmitigated Risk			Control Strategies	Residual Risk		
Risk Event/ Activity	Relevant EV	Potential Impact	Risk Source	Consequence	Likelihood	Risk		Consequence	Likelihood	Risk
		from sediment releases, spills or leaks of fuels and chemicals Contamination of surface water					• Pipelines will be buried to a depth of 750mm. • Rehabilitation to commence as soon as reasonably practicable following completion of construction activities. • 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 to ensure natural surface water flows are maintained, and natural rehabilitation processes can occur.			
Pipeline construction and operation, and incidental activities	Geomorphic processes	Disturbance to natural drainage patterns / flooding regime Disturbance to natural erosion, transport and deposition of sediment processes	Infrastructure construction (earthworks activities)	II	b	Very Low	• Surface disturbance restricted to the minimum area required to safely carry out activities. • Where practicable, use existing routes/disturbed ground, and co-locate pipelines to reduce the total disturbance area • Where the pipelines intersect watercourses, the RoW will be restricted to the smallest width practicable. • Erosion and sediment control measures in place where appropriate. • Work programs in riparian/water crossing areas scheduled to take into account seasonal conditions and rainfall/flood likelihood. • Construction activity not undertaken during or immediately prior to flooding. • Rehabilitation to commence as soon as reasonably practicable following completion of construction activities. • 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 to ensure natural surface water flows are maintained, and natural rehabilitation processes can occur.	I	b	Very Low

6.0 Legislative Considerations

6.1 Environmental Protection Act 1994 (EP Act)

6.1.1 General Requirements for an EA Amendment Application (s226 EP Act)

Section 226 and Section 226A of the EP Act specify the requirements for an EA amendment application. Table 6 summarises the EP Act requirements assessed against this proposed EA amendment application.

Table 6: Requirements EA Amendment Application (s226 and s226A EP Act)

Section of the EP Act	Relevance to Amendment Application
s226(1)(a) be made to the administering authority	The EA amendment application has been lodged with DES, who is the administering authority for the EP Act.
s226(1)(b) be made in the approved form	Refer to Attachment 1 of the application package, which includes the form 'application to amend an environmental authority'.
s226(1)(c) be accompanied by the fee prescribed under a regulation	The prescribed application fee was paid at lodgement of the EA amendment application.
s226(1)(d) describe the proposed amendment	Refer to Section 2.0.
s226(1)(e) describe the land that will be affected by the proposed amendment	Refer to Sections 3.0 and 4.0.
s226(1)(f) include any other document relating to the application prescribed under a regulation.	Refer to the information provided throughout this supporting report.
s226A(1)(a) describe any development permits in effect under the Planning Act for the carrying out of the relevant activity for the authority; and	Not applicable - no development permits are in effect under the *Planning Act 2016* for the activities, which are the subject of this EA amendment application.
s226A(1)(b) state whether each relevant activity will, if the amendment is made, comply with any eligibility criteria for the activity	The proposed activities if approved will continue to comply with the eligibility criteria.
s226A(1)(c) if the application states that each relevant activity will, if the amendment is made, comply with any eligibility criteria for the activity—include a declaration that the statement is correct	The EA amendment as described in Sections 2.0 and 4.0 will continue to comply with EA0002115 Eligibility criteria as listed below: PPEC 1. The applicant for the environmental authority is the holder of, or an applicant for a Pipeline Licence (PPL) tenure type issued under the *Petroleum and Gas (Production and Safety) Act 2004* - **No change.** PPEC 2. The petroleum activities are authorised petroleum activities for the purposes of the *Petroleum and Gas (Production and Safety) Act 2004* - **The proposed activities are authorised.** PPEC 3. The petroleum activity does not include extending an existing pipeline by more than 150 kilometres under a petroleum authority - **No change.** PPEC 4. The petroleum activity does not include constructing a new pipeline of more than 150 kilometres under a petroleum authority - **No change.** PPEC 5. The petroleum activities do not occur in coastal waters of Queensland – **No change.**

Section of the EP Act	Relevance to Amendment Application
	PPEC 6. The petroleum activity is not, or will not be, carried out under an environmental authority under which any of the following is, or is to be, authorised: (a) the injection of a waste fluid or gas for gas storage into a natural underground reservoir or aquifer (b) a regulated dam (c) the carrying out of the following environmentally relevant activities (ERAs): i. ERA 8 – Chemical Storage ii. ERA 60(1a) – (1d) – Regulated waste disposal iii. ERA 60(2d) – (2h) – General waste disposal > 10,000t/year iv. ERA 63(1a)(ii) – (1b)(ii), (1c) – (1g) – Sewage treatment with a total daily peak design capacity of greater than 21 equivalent persons (EP) which releases to other than an infiltration trench or irrigation scheme or where the sewage treatment activities have a total combined daily peak design capacity exceeding 1500 equivalent persons (EP) v. ERA 64(2a) and (2b) and (4a) and (4b) – Water treatment where desalination of more than 0.5ML of water is treated, allowing the release of waste to waters other than seawater; or carrying out, in a day, advanced treatment of 5ML or more of water, allowing the release of waste only to seawater; or to waters other than seawater. **No change.**
s226A(1)(d) state whether the application seeks to change a condition identified in the authority as a standard condition	The application seeks to amend Variation 1 to authorise the construction and operation of pipelines in a designated precinct of a Strategic Environmental Area.
s226A(1)(e) if the application relates to a new relevant resource tenure for the authority that is an exploration permit or GHG permit—state whether the applicant seeks an amended environmental authority that is subject to the standard conditions for the relevant activity or authority, to the extent it relates to the permit	Not applicable - the proposed amendment does not relate to a new resource tenure that is an exploration permit or a GHG permit.
s226A(1)(f) include an assessment of the likely impact of the proposed amendment on the environmental values, including—	
(i) a description of the environmental values likely to be affected by the proposed amendment;	Refer to Section 4.0.
(ii) details of any emissions or releases likely to be generated by the proposed amendment;	Refer to Section 5.0.
(iii) a description of the risk and likely magnitude of impacts on the environmental values;	Refer to Section 5.0.
(iv) details of the management practices proposed to be implemented to prevent or minimise adverse impacts;	Petroleum activities will be conducted in compliance with the conditions of EA0002115, and implementation of environmental management practices/control measures outlined in Section 5.0.
(v) details of how the land the subject of the application will be rehabilitated after each relevant activity ceases;	Land within PPL 2050 subject to significant disturbance would be rehabilitated to meet the rehabilitation conditions required by EA0002115.

Section of the EP Act	Relevance to Amendment Application
s226A(1)(g) include a description of the proposed measures for minimising and managing waste generated by any amendments to the relevant activity	As discussed in Section 4.0, the proposed amendment will not result in changes to waste management objectives (as defined in EA0002115). The proposed activities will not result in the generation of additional wastes (outside of that already authorised by the existing EA). Waste management practices would continue to be implemented in accordance with the conditions of EA0002115.
s226A(1)(h) include details of any site management plan or environmental protection order that relates to the land the subject of the application;	Not applicable - there is no relevant site management plan or current Environmental Protection Orders relating to land located within PPL 2050.

6.1.2 CSG Activities Requirements for an EA Amendment Application (s227 EP Act)

Section 227 of the EP Act, specifies the requirements for an amendment application for coal seam gas (CSG) activities where the application:

a) relates to an EA for a CSG activity; and

b) the proposed amendment would result in changes to the management of CSG water; and

c) the CSG activity is an ineligible ERA.

The proposed amendment does not relate to CSG activities. This section of the EP Act is not relevant.

6.1.3 Assessment Level Decision for Amendment Application (s228 EP Act)

Santos has prepared this amendment application as a minor amendment (threshold) in accordance with Section 223 of the EP Act. The proposed application involves amendment of a variation condition, and will not significantly increase the level of environmental harm caused by the relevant activity. Section 223 of the EP Act provides the minor amendment (threshold) assessment. Table 7 provides information to support the assessment of this EA amendment application as a minor amendment.

Within 10 business days after receiving an EA amendment application, the administering authority must decide on the assessment level decision for the EA amendment application. The assessment level decision will determine whether the EA amendment application is a major or minor amendment.

Table 7: Minor Amendment (Threshold) Assessment (s223 EP Act)

Minor amendment (threshold), for an environmental authority, means an amendment that the administering authority is satisfied -	Relevance to Amendment Application	
(a) is not a change to a condition identified in the authority as a standard condition, other than- (i) a change that is a condition conversion; or (ii) a change that is not a condition conversion but that replaces a standard condition of the authority with a standard condition for the environmentally relevant activity to which the authority relates; and	✓	Whilst the EA is a standard EA, Santos is proposing to change a condition identified in the authority as a variation condition (Variation 1).

Minor amendment (threshold), for an environmental authority, means an amendment that the administering authority is satisfied -	Relevance to Amendment Application	
(b) does not significantly increase the level of environmental harm caused by the relevant activity; and	✓	The amendment will not significantly increase the level of environmental harm authorised by the EA as identified in the risk assessment in Table 5. Following the implementation of the environmental management practices/control measures outlined in Section 5.0, the overall risk of harm posed by the proposed activities has been categorised as low to very low.
(c) does not change any rehabilitation objectives stated in the authority in a way likely to result in significantly different impacts on environmental values than the impacts previously permitted under the authority; and	✓	The proposed amendment does not seek to change any rehabilitation objectives or conditions.
(d) does not significantly increase the scale or intensity of the relevant activity; and	✓	The eligibility criteria limits the relevant activity to: • No more than 150 km for extending an existing pipeline: or • Constructing a new pipeline by more than 150 km The proposed amendment seeks approval to construct two new pipelines (total length 4 km) within the SEA. The proposed disturbance area will be a maximum of 9.6 ha. This is a conservative estimate to allow a degree of flexibility, and the total disturbance area will likely be less than 9.6 ha. Further, as discussed in Section 2.1.1, upon completion of pipeline construction, the pipeline RoW will be rehabilitated, and a maximum 3 m wide corridor located within the rehabilitated RoW will be used to provide access for inspections via light vehicles. No formed roads will be required or be maintained within the RoW. The proposed activities will therefore not significantly increase the scale or intensity of the relevant activity.
(e) does not relate to a new relevant resource tenure for the authority that is – (i) a new mining lease; or (ii) a new petroleum lease; or (iii) a new geothermal lease under the Geothermal Energy Act; or (iv) a new GHG injection and storage lease under the GHG storage Act; and	✓	The proposed amendment does not relate to a new relevant resource tenure.
(f) involves an addition to the surface area for the relevant activity of no more than 10% of the existing area; and	✓	The proposed amendment does not involve an addition to the surface area for the relevant activity (being the area PPL) of more than 10% of the existing area. The area PPL covers approximately 61,270 ha and the proposed amendment will disturb a maximum area of 9.6 ha. This is a conservative estimate to allow a degree of flexibility, and the total disturbance area will likely be less than 9.6 ha. This represents

Minor amendment (threshold), for an environmental authority, means an amendment that the administering authority is satisfied -	Relevance to Amendment Application	
		less than 1% of the existing surface area for the relevant activity. Further, as discussed in Section 2.1.1, upon completion of pipeline construction, the pipeline RoW will be rehabilitated, and a maximum 3 m wide corridor located within the rehabilitated RoW will be used to provide access for inspections via light vehicles. No formed roads will be required or be maintained within the RoW.
(g) for an environmental authority for a petroleum activity – (i) if the amendment involves constructing a new pipeline – the new pipeline does not exceed 150km; and (ii) if the amendment involves extending an existing pipeline- the extension does not exceed 10 % of the existing length of the pipeline; and	✓	The proposed amendment does not involve constructing a new pipeline more than 150 km in length. The proposed amendment does not involve extending an existing pipeline.
(h) if the amendment relates to a new relevant resource tenure for the authority that is an exploration permit or GHG permit - the amendment application under section 224 seeks an amended environmental authority that is subject to the standard conditions for the relevant activity or authority to the extent it relates to the permit.	✓	The proposed amendment does not relate to a new relevant resource tenure that is an exploration permit or GHG permit.

6.1.4 The Standard Criteria (EP Act)

The standard criteria (as defined by Schedule 4 of the EP Act) are required to be considered by the administering authority for both a major and minor amendment applications. Table 8 provides an assessment of the proposed amendment against the standard criteria.

Table 8: Standard Criteria (EP Act)

Schedule of the EP Act	Relevance to the EA Amendment Application
(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. It is considered that the proposed activities will use 'proven' technology and sufficient scientific data exists that a reverse onus does not exist. The principle of intergenerational equity was considered for the application. It is considered that the proposed activities would not impact the use of environmental values by future generations. 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.
(b) any Commonwealth or State government plans, standards, agreements or requirements	The proposed activities will be undertaken in accordance with the applicable requirements of the following:

Schedule of the EP Act	Relevance to the EA Amendment Application
about environmental protection or ecologically sustainable development	• EP Act; • *Environment Protection and Biodiversity Conservation Act 1999 (*EPBC Act); • NC Act; • *Petroleum and Gas (Production and Safety) Act*; • *Regional Planning Interests Act 2014;* and • *Vegetation Management Act 1999*. The relevance of these Acts to this application is referenced throughout the supporting information.
(c) any relevant environmental impact study, assessment or report	N/A – an EIS has not previously been prepared for the amendment application.
(d) the character, resilience and values of the receiving environment	Refer to Sections 3.0 to 5.0
(e) all submissions made by the application and submitters	The EA amendment should not be subject to public notification as there is not likely to be a substantial increase in the risk of environmental harm under the amended EA, nor a substantial change in the contaminants permitted to the be released to the environment.
(f) the best practice environmental management (BPEM) 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	BPEM of the proposed activities would be achieved through compliance with the conditions of EA 0002115 and implementation of management measures as described in Section 5.0 of 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 the EA.
(h) the public interest; and	The proposed amendment 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 provide an ongoing source of revenue to support government services provided to the public. Furthermore, in Australia and Queensland, oil and gas plays an important role in domestic energy security and diversification, supporting intermittent renewable energy sources.
(i) any relevant site management plan (SMP); and	There are no SMPs applicable to the application.

Schedule of the EP Act	Relevance to the EA Amendment Application
(j) any relevant integrated environmental management system (IEMS) or proposed IEMS; and	The Santos Management System will be implemented for the proposed activities.
(k) any other matters prescribed under a regulation.	The *Environmental Protection Regulation 2019* prescribes an environmental objective assessment relating to an environmental management decision as an additional matter for the standard criteria. Section 2.0 to 5.0 addresses the matters raised in the environmental objective assessment.

6.1.5 Prescribed Matters for Particular Resource Activities (s28 EP Reg)

Section 226 of the EP Act specifies the general requirements for an EA amendment application. This includes item (1)(f), which specifies any other documents relating to the application prescribed under a regulation. Section 28 of the EP Reg describes the prescribed documents for an EA application for a CSG activity. This proposed amendment does not involve the management of CSG water.

6.2 Environmental Offsets Act 2014

In accordance with Section 207(1)(c) of the EP Act, the administering authority may impose an environmental offset condition on an EA. However, Section 14(1) of the 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 SRI on the prescribed environmental matter, and all reasonable on-site mitigation measures for the prescribed activity have been, or will be, undertaken.

The proposed amendment would be undertaken in an area where an environmental matter is prescribed under Schedule 2 of the Environmental Offsets Regulation 2014 (EO Reg), as detailed in Table 9.

Table 9: Prescribed Environmental Matter Assessment

Schedule 2 Environmental Offsets Regulation 2014	Relevance to PPL 2050	
2. Regulated vegetation	✓	The prescribed activity: • Will not impact of concern regional ecosystem, as defined under the *Vegetation Management Act 1999*. • Will not impact endangered regional ecosystem, as defined under the *Vegetation Management Act 1999*. • Will be undertaken within the defined distance from the defining banks of a watercourse identified on the vegetation management watercourse map, as defined under the *Vegetation Management Act 1999*. Refer to Section 6.2.1. • Will not be undertaken within an area shown on the vegetation management wetlands map, however clearing may occur within 50m of the defining bank of a mapped wetland, as defined under the *Vegetation Management Act 1999.* Refer to Section 6.2.1 for further discussion.
3. Connectivity areas	☒	The current extent of remnant vegetation within the proposed disturbance area largely represents the pre-clearing extent i.e. REs within and surrounding the proposed disturbance area are mapped to have 99% of their pre-clearing extent remaining in 2019. Therefore, impacts are unlikely to trigger for significance under the Landscape Fragmentation and Connectivity Tool as follows: 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. The proposed disturbance area is mapped as 99% 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.

Schedule 2 Environmental Offsets Regulation 2014	Relevance to PPL 2050	
		The proposed disturbance area is mapped as 99% remnant vegetation (regional scale extent of core remnant ecosystem > 90%); 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	☒	The prescribed activity will not be undertaken in the following: • Wetlands in a wetland protection area as shown on the Map of referrable wetlands under schedule 12, part 2 of the *Environmental Protection Regulation 2008*; • Wetlands of high ecological significance as shown on the Map of referrable wetlands under schedule 12, part 2 of the *Environmental Protection Regulation 2008*; or • Wetlands or watercourses in a high ecological value waters as identified under the *Environmental Protection (Water) Policy 2009*, schedule 2.
5. Designated precinct in a strategic environmental area	✓	PPL 2050 is wholly located within the Channel Country Strategic Environmental Area. Refer to Section 6.2.2 for further discussion.
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 (i.e. foraging, roosting, nesting or breeding habitat) for an animal that is vulnerable, endangered or special least concern. o Grey grasswren (*Amytornis barbatus*), NC Act Endangered; o Dusky hopping-mouse (*Notomys fuscus*), NC Act Endangered; and o Yellow chat (gulf) (*Epthianura crocea crocea*), NC Act Vulnerable. Refer to Section 6.2.3 for further discussion.
7. Protected areas	☒	The prescribed activity will not be undertaken within a protected area.
8. Highly protected zones of State marine parks	☒	The prescribed activity will not be undertaken in a state marine park.
9. Fish habitat areas	☒	The prescribed activity will not be undertaken in a fish habitat area.
10. Waterway providing for fish passage	✓	The prescribed activity will be undertaken within waterways. Refer to Section 6.2.4 for further discussion.
11. Marine plants	☒	The prescribed activity will be not be undertaken in an area containing marine plants.
12. Legally secured offset areas	☒	The prescribed activity will not be undertaken in a legally secured offset area.

As per Section 8 of the EO Act, a SRI 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 SRI 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'.

Assessment against these criteria for relevant matters is provided in Sections 6.2.1 to 6.2.4.

6.2.1 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 minor areas of regulated vegetation located within 50 m of a Vegetation Management Wetland (as shown on the Vegetation Management Wetlands Map), however no clearing will occur within a regional ecosystem that lies within the Vegetation Management Wetland as the proposed disturbance area is located outside the wetland. For a prescribed activity to have a significant residual impact on a RE that lies within a mapped wetland, criteria 1 and 2 in Table 1 of the Significant Residual Impact Guideline must be exceeded. **As such, a SRI to this MSES will not occur.**

In addition, areas of regulated vegetation intersecting a watercourse will require clearing (as identified on the Vegetation Management Watercourse and Drainage Feature Map). 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 per Table in the Significant Residual Impact Guideline i.e the proposed RoW is 19m wide and will be located in a Sparse to Very Sparse structural category RE. **As such, a SRI to this MSES will not occur.**

6.2.2 Designated Precinct in a Strategic Environmental Area

There is no SRI test for a strategic environmental area defined in the *Significant Residual Impact Guideline* (DEHP, 2014).

Section 7 of the *Regional Planning Interests Regulation 2014* prescribes the following environmental attributes relevant to the Channel Country SEA. To assess for significance, an assessment of the proposed activities against the environmental attributes relevant to the Channel Country SEA has been undertaken and is detailed in Table 10.

With implementation of avoidance and mitigation measures described in Table 10, the impacts on the environmental attributes relevant to the Channel Country SEA are **unlikely to constitute a SRI to this MSES.**

Table 10: 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 activities in a watercourse will be conducted in accordance with existing EA0002115 conditions contained in Schedule E (*Activities in watercourses, wetlands, lakes and springs*) where applicable. For example, existing EA Condition (PPSCE 3) limits activities within a watercourse to linear infrastructure and 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 Further, the proposed activities are unlikely to affect existing hydrological processes and beneficial flooding given that the pipelines will be buried, and the RoW will be reinstated to the condition and surface profiles existing at the commencement of activities. This will ensure natural surface water flows in the area are maintained, and will be undertaken to promote conditions suitable for natural progressive revegetation of disturbed areas, and reduce potential for erosion of disturbed areas. Further, as discussed in Sections 5.3 and 5.4, Santos will implement a range of mitigation measures to reduce the potential for erosion and sedimentation risk. Therefore, activities undertaken within PPL 2050 will not restrict flows in and along stream channels, the channel network in the area. Further, EA condition (PPSCE 5 and 6) specify that construction and/or maintenance for linear infrastructure that will result in significant disturbance to a lake, spring, watercourse or wetland must be designed and undertaken by a suitably qualified person in accordance with the guideline Activities in a watercourse, lake or spring associated with a resource activity or mining operations.
(iv) groundwater sources, including the Great Artesian Basin and springs, that support waterhole persistence and ecosystems in the area	**SRI unlikely** The proposed amendment is to construct and operate pipelines. This activities will not alter groundwater sources, including the Great Artesian Basin and springs that support waterhole persistence and ecosystems in the area (nil springs are present in PPL 2050).
(b) the natural water quality in the stream channels and aquifers and on flood plains in the area	**SRI unlikely** Proposed activities will be undertaken in accordance with existing EA conditions for soil management, including PPSCC 9, which requires sediment and erosion control measures are implemented and maintained to prevent soil loss and deposition beyond significantly disturbed land. Further, Santos will commence rehabilitation as soon as reasonably practicable following completion of construction activities. This will promote conditions suitable for natural progressive revegetation of disturbed areas, and further reduce potential for erosion of disturbed areas. As per existing EA condition PPSCE 3, work programs in riparian and water crossing areas will be scheduled to take into account potential

Environmental attribute relevant to Channel Country SEA (s7 of the Regional Planning Interests Regulation 2014)	Significant Residual Impact Assessment
	rainfall and surface water flows. Construction will 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. Further, due to the slow-moving nature of flood waters in the Cooper Creek system, sufficient time (i.e. several weeks to months) is generally available to prepare operational areas for potential flood impacts. In these situations, all non-essential materials present on site at the time (e.g. hydrocarbons, chemicals, infrastructure) will be removed from construction and/or operational areas prior to the arrival of floodwaters. Further, any fuels/chemicals used on site will be stored and handled in accordance with Australian Standards and spill kits will be located on site where required to contain any spills should they occur. All waste materials and non-essential infrastructure will be removed as soon as reasonably practicable following completion of petroleum activities, minimising risks associated with contamination, or a reduction in water quality, in accordance with relevant conditions of EA 0002115. Further, measures for unplanned releases of contaminants will be implemented in accordance with relevant EA conditions. Hydrotest water will not be released to land; it will be transported to the nearest licenced facility for treatment and/or disposal. Further, no mapped HES or GES wetlands will be intersected by the proposed pipelines. Activities undertaken within PPL 2050 will not alter groundwater sources, including the Great Artesian Basin and springs that support waterhole persistence and ecosystems in the area (nil springs are present in PPL 2050). Activities undertaken within PPL 2050 will therefore 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** The proposed activities are unlikely to affect existing hydrological processes and beneficial flooding given that the pipelines will be buried, and the RoW will be reinstated to the condition and surface profiles existing at the commencement of activities. This will ensure natural surface water flows in the area are maintained, and will be undertaken to promote conditions suitable for natural progressive revegetation of disturbed areas, and reduce potential for erosion of disturbed areas. Further, as discussed in Sections 5.3 and 5.4, Santos will implement a range of mitigation measures to reduce the potential for erosion and sedimentation risk. As per existing EA condition PPSCE 3, work programs in riparian and water crossing areas will be scheduled to take into account potential rainfall and surface water flows. Construction will 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 Activities undertaken within PPL 2050 will therefore not significantly impact the beneficial flooding of land that supports flood plain grazing and ecological processes in the area.

6.2.3 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.

As discussed in Section 4.2, the proposed disturbance area may provide suitable habitat for three (3) species listed as endangered or vulnerable under the NC Act – these include:

- Grey grasswren (Bulloo) (*Amytornis barbatus barbatus*), NC Act listed Endangered;
- Dusky hopping-mouse (*Notomys fuscus*), NC Act listed Endangered; and
- Yellow chat (gulf) (*Epthianura crocea crocea*), NC Act listed Vulnerable.

The following tables (Table 11 to Table 13) provide a significant residual impact assessment for each identified listed species.

Table 11: Significant Residual Impact Assessment for Grey grasswren (Bulloo)

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 may require clearing of approximately 9.6 ha of potential habitat for grey grasswren (Bulloo). This is a conservative estimate to allow a degree of flexibility, and the total disturbance area will likely be less than 9.6 ha. A SRI to the species is unlikely as: • The proposed disturbance area is mapped to contain approximately 10% of RE 5.3.8a (as discussed in Section 4.1), which may support areas of Lignum (*Duma florulenta*), which is key habitat for the species. Further, Lignum typically re-establishes rapidly in disturbed areas following Cooper Creek flood events. • Dense sections of lignum will be avoided where practicable. • Desktop and field based assessments will be undertaken to preferentially place infrastructure / disturbance outside of potential grey grasswren habitat where practicable. • Where 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; and clearing must not occur while the nest is active, with adults, eggs or nestlings. • Petroleum activities will be undertaken in a way to minimise potential for ignition / fire i.e. activity planning will consider seasonal conditions and the risk of bushfire and flood, and ignition sources will be controlled via a permit to work system. • Large areas of suitable habitat (REs containing Lignum) for the species are widely available in PPL 2050, in the nearby areas surrounding PPL 2050, and in the broader Cooper Creek floodplain i.e. there are several thousand hectares of similar habitat located in the region. • Following pipeline construction, the entirety of the disturbance footprint (pipeline RoW) is proposed to be rehabilitated, and no permanent access track will be maintained within the RoW. The disturbance area is expected to rehabilitate within a reasonable timeframe given suitable environmental conditions. Further, management measures have been identified to mitigate impacts on protected fauna and habitat (refer to Section 5.2 and Table 5).
Reduce the extent of occurrence of the species	**No Significant Impact** The proposed disturbance area comprises a minimal proportion of the overall extent of occurrence of the species in the region, the area will be rehabilitated following completion of construction activities and will not impact connectivity of suitable habitat.
Fragment an existing population	**No Significant Impact** The proposed disturbance area represents a very small amount of potential habitat for the species, and will not result in fragmentation of habitat due to the availability of large areas of suitable habitat (REs containing Lignum) for the species in PPL 2050, in the nearby areas surrounding PPL 2050, and in the broader Cooper Creek floodplain i.e. several thousand hectares. Further, following pipeline construction, the entirety of the disturbance footprint (pipeline RoW) is proposed to be rehabilitated, and no permanent access track will be maintained within the RoW. The disturbance area is expected to

MSES Significant Residual Impact Guideline criteria. The activity is likely to:	Assessment
	rehabilitate within a reasonable timeframe given suitable environmental conditions.
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 PPL given the proposed disturbances will be rehabilitated following completion of construction and is expected to rehabilitate within a reasonable timeframe given suitable environmental conditions.
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** Implementation of hygiene protocols will reduce the risk of increasing the abundance of 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.
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 proposed disturbance area 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 PPL and the surrounding Cooper Creek floodplain. • The proposed disturbance area is mapped to contain approximately 10% of RE 5.3.8a (as discussed in Section 4.1), which may support areas of Lignum (*Duma florulenta*), which is key habitat for the species. Further, Lignum typically re-establishes rapidly in disturbed areas following Cooper Creek flood events; and • Following pipeline construction, the entirety of the disturbance footprint (pipeline RoW) is proposed to be rehabilitated, and no permanent access track will be maintained within the RoW. The disturbance area is expected to rehabilitate within a reasonable timeframe given suitable environmental conditions. Further, management measures have been identified to mitigate impacts on protected fauna and habitat (refer to Section 5.2 and Table 5).

Table 12: Significant Residual Impact Assessment for Dusky hopping-mouse

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 footprint does not involve clearing mapped REs that provide suitable habitat for *Notomys fuscus.* As discussed in Section 4.2, *N. fuscus* preferably inhabit sandy habitats, preferring sand dunes, hills and ridges with Sandhill cane grass (*Zygochloa paradoxa*), Sandhill wattle (*Acacia ligulata*), Nitrebush (*Nitraria billardiera*), Sticky hopbush (*Dodonea viscose*) and other annual and perennial shrubs present. Sandy habitat is needed for *N. fuscus* to build burrow systems it requires to live communally and breed. Although the species may occur in floodplain habitats during good seasons, it is highly unlikely an important or ongoing population of the species occurs within the proposed disturbance area. As such, the proposed disturbance is unlikely to lead to a long-term decrease in the size of an important population of the species. Further, management measures have been identified to mitigate impacts on protected fauna and habitat (refer to Section 5.2 and Table 5).
Reduce the extent of occurrence of the species	**No Significant Impact** The proposed disturbance footprint does not involve clearing mapped REs that provide suitable habitat for *N. fuscus.* As such, the project is unlikely to result in direct or indirect impacts to the species, or clearing, altering or fragmentation of the species' habitat.
Fragment an existing population	
Result in genetically distinct populations forming as a result of habitat isolation	
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** Implementation of hygiene protocols will reduce the risk of increasing the abundance of 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** 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 as the proposed disturbance footprint does not involve clearing mapped REs that provide suitable habitat for *N. fuscus.* As such, the project is unlikely to result in direct or indirect impacts to the species, or clearing, altering or fragmentation of the species' habitat.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.	**No Significant Impact** The proposed disturbance footprint does not involve clearing mapped REs that provide suitable habitat for *N. fuscus.* As such, the project is unlikely to result in direct or indirect impacts to the species, or clearing, altering or fragmentation of the species' habitat. Further, management measures have been identified to mitigate impacts on protected fauna and habitat (refer to Section 5.2 and Table 5).

Table 13: Significant Residual Impact Assessment for Yellow chat (gulf)

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** As discussed in Section 4.2, the proposed disturbance footprint does not involve clearing mapped REs that provide suitable habitat for *Epthianura crocea crocea. E. crocea crocea* prefers marshy plains and floodplains that are seasonally inundated, and dominated by salt-tolerant grasses, saltbush (*Atriplex* spp.) and sedges with patches of samphire (*Tecticornia* spp.). The proposed disturbance area is dominated by open shrublands and variable sparse to open-herblands. Although the species may occur in these floodplain habitats from time to time, it is unlikely an important or ongoing population of the species occurs within the proposed disturbance area. As such, the proposed disturbance is unlikely to lead to a long-term decrease in the size of an important population of the species. Further, management measures have been identified to mitigate impacts on protected fauna and habitat (refer to Section 5.2 and Table 5).
Reduce the extent of occurrence of the species	**No Significant Impact** The proposed disturbance footprint does not involve clearing mapped REs that provide suitable habitat for *E. crocea crocea.* As such, the project is unlikely to result in direct or indirect impacts to the species, or clearing, altering or fragmentation of the species' habitat.
Fragment an existing population	
Result in genetically distinct populations forming as a result of habitat isolation	
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** Implementation of hygiene protocols will reduce the risk of increasing the abundance of 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** 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 as the proposed disturbance footprint does not involve clearing mapped REs that provide suitable habitat for *N. fuscus.* As such, the project is unlikely to result in direct or indirect impacts to the species, or clearing, altering or fragmentation of the species' habitat.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.	**No Significant Impact** The proposed disturbance footprint does not involve clearing mapped REs that provide suitable habitat for *E. crocea crocea.* As such, the project is unlikely to result in direct or indirect impacts to the species, or clearing, altering or fragmentation of the species' habitat. Further, management measures have been identified to mitigate impacts on protected fauna and habitat (refer to Section 5.2 and Table 5).

6.2.4 Waterway providing for fish passage

The *Queensland Environmental Offsets Policy Significant Residual Impact Guideline* provides the criteria for determining significant impacts on a waterway providing for fish passage. An action is likely to have a significant impact on a waterway providing for fish passage if there is a **real possibility** that it will:

- result in the mortality or injury of fish; or
- result in conditions that substantially increase risks to the health, wellbeing and productivity of fish seeking passage such as through the depletion of fishes energy reserves, stranding, increased predation risks, entrapment or confined schooling behaviour in fish; or
- reduce the extent, frequency or duration of fish passage previously found at a site; or
- substantially modify, destroy or fragment areas of fish habitat (including, but not limited to in-stream vegetation, snags and woody debris, substrate, bank or riffle formations) necessary for the breeding and/or survival of fish; or
- result in a substantial and measurable change in the hydrological regime of the waterway, for example, a substantial change to the volume, depth, timing, duration and frequency of flows; or
- lead to significant changes in water quality parameters such as temperature, dissolved oxygen, pH and conductivity that provide cues for movement in local fish species.

As discussed in Section 4.4, the proposed activities are located within the Cooper Creek floodplain, and intersect several minor drainage features of the Cooper Creek. This area and the drainage features are typically dry, but may be subject to intermittent shallow inundation and surface water flows associated with moderate to larger Cooper Creek flood events. Further, Cooper Creek floodwaters are typically slow-moving, and sufficient time (i.e. several weeks to months) is generally available to plan activities to avoid periods of inundation or surface water flows. The minor drainage features located within PPL 2050 therefore only provide potential for fish passage during periods of high rainfall causing streamflow or during moderate to larger Cooper Creek flood events.

Further, the proposed pipelines will be buried and the construction works will preferentially occur in dry periods, avoiding fish mortality or injury. Rehabilitation will commence as soon as reasonably practicable following completion of construction activities, including the restoration of natural landform contours to ensure natural surface water flows are maintained.

Construction within watercourses would occur in accordance with existing EA Condition (PPSCE 3), which limits activities within a watercourse to linear infrastructure, and 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

The proposed activities (if undertaken during periods of streamflow), would be undertaken as to not impede low flows, therefore 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.

Therefore, a significant residual impact to fish passage is unlikely.

7.0 Appendices

Appendix A: Desktop Environmental Search Results

Queensland Government

Department of Environment and Science

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest

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.

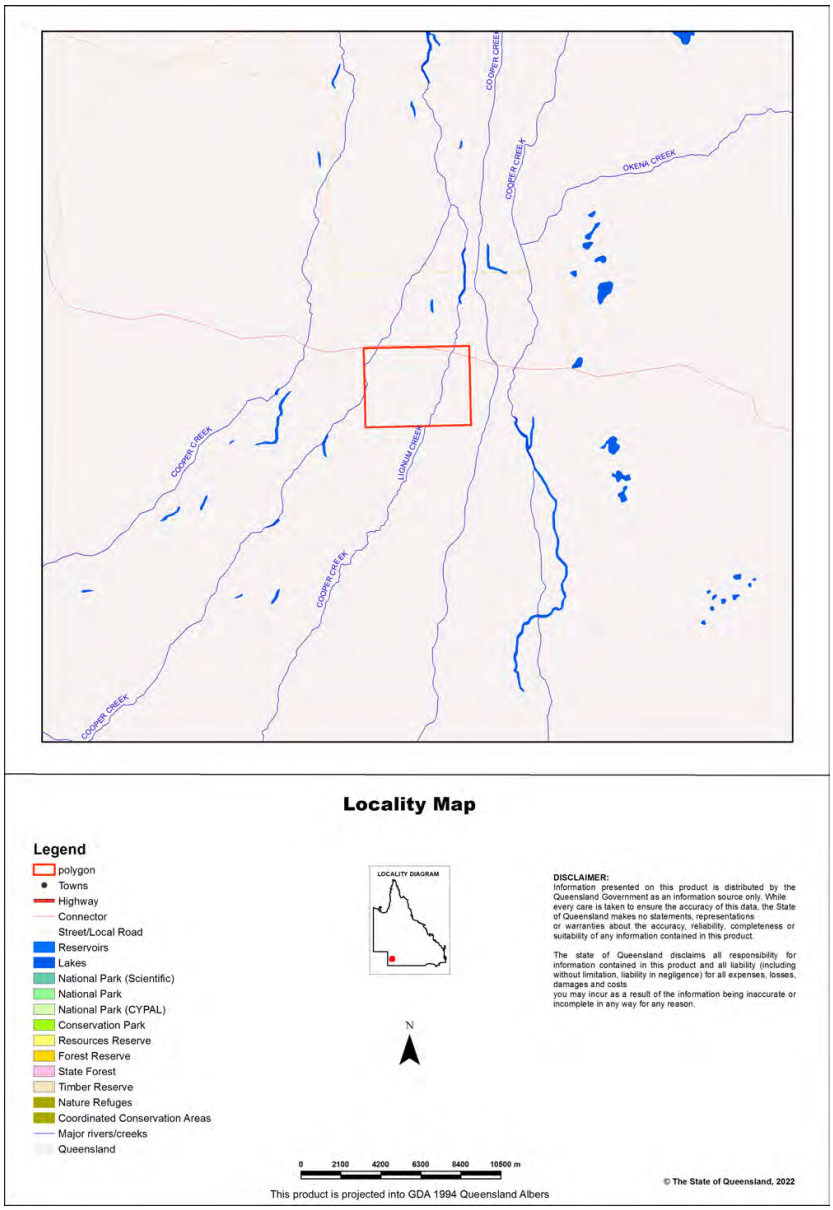
Table of Contents

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

Size (ha)	2,296.59
Local Government(s)	Bulloo Shire
Bioregion(s)	Channel Country
Subregion(s)	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 %
1c Protected Areas- special wildlife reserves	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)	2296.59 ha	100.0%
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	45.4 ha	2.0%
8e Regulated Vegetation - intersecting a watercourse **	46.1 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	546.74 ha	23.8%
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)

1c. Protected Areas - special wildlife reserves

(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

Values are present

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
B	7242

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

MSES - Offsets

9a. Legally secured offset areas - offset register areas

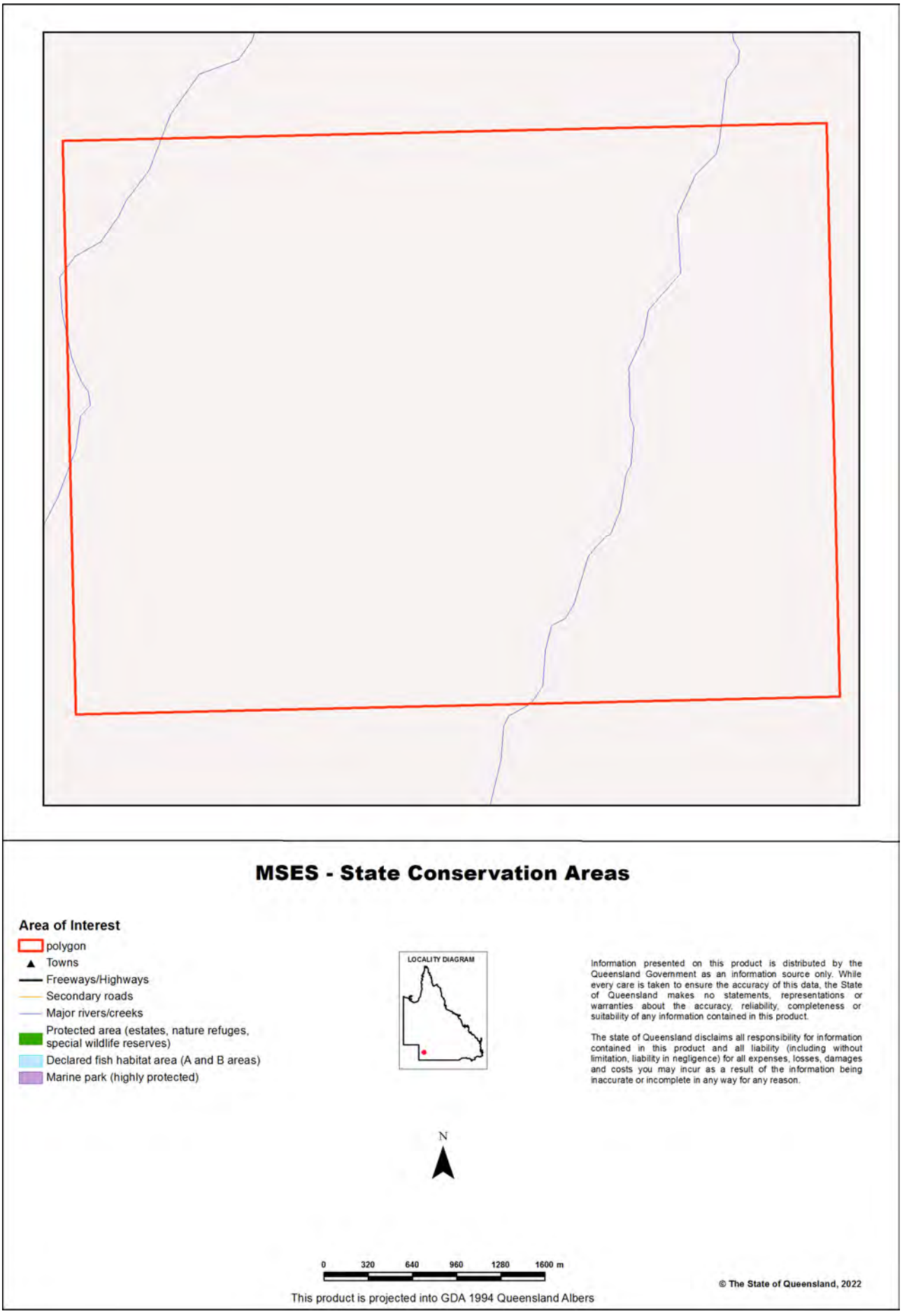
(no results)

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

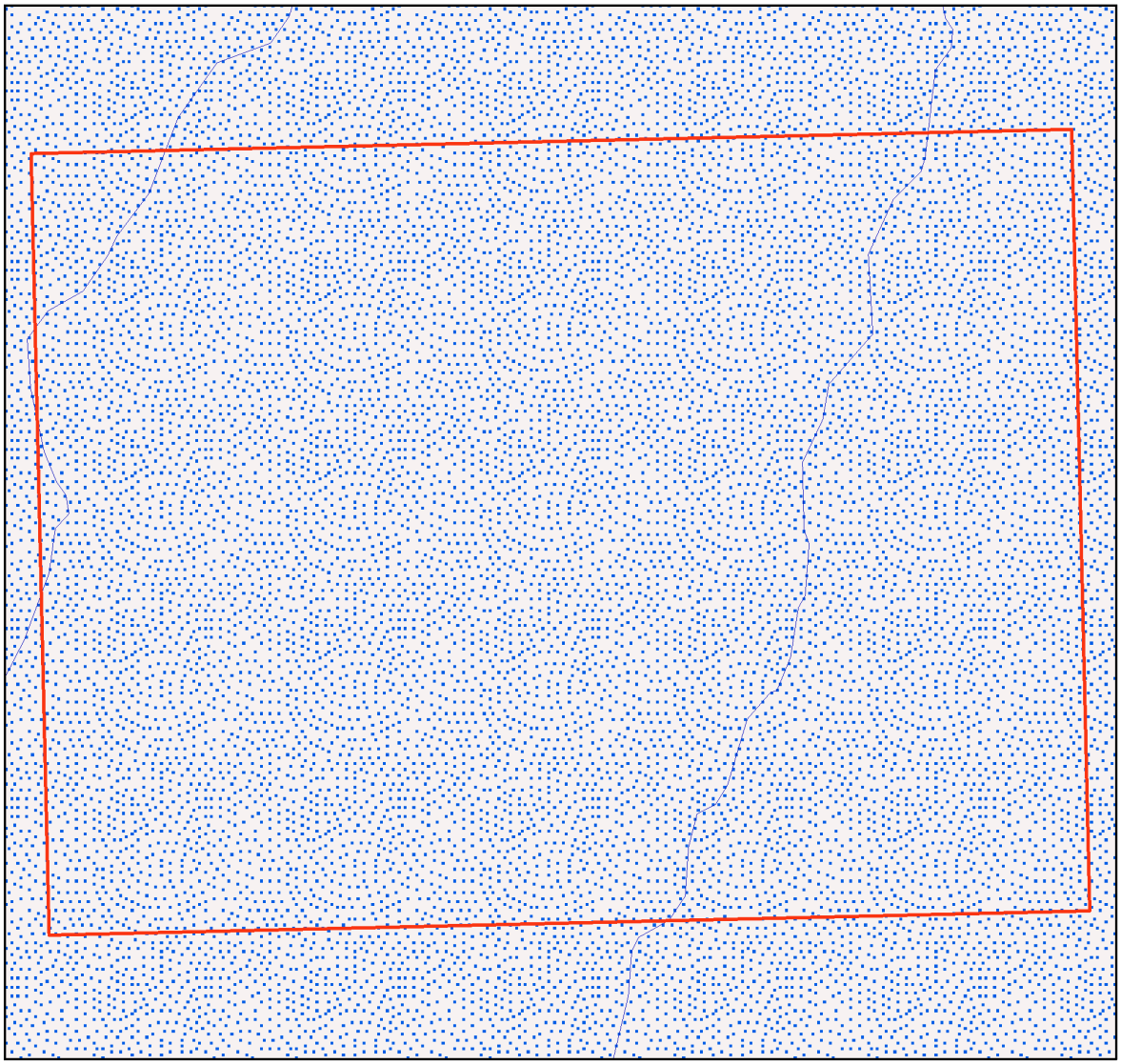
(no results)

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

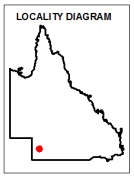


MSES - Wetlands and Waterways

Area of Interest

- polygon
- 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



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0 320 640 960 1280 1600 m

This product is projected into GDA 1994 Queensland Albers

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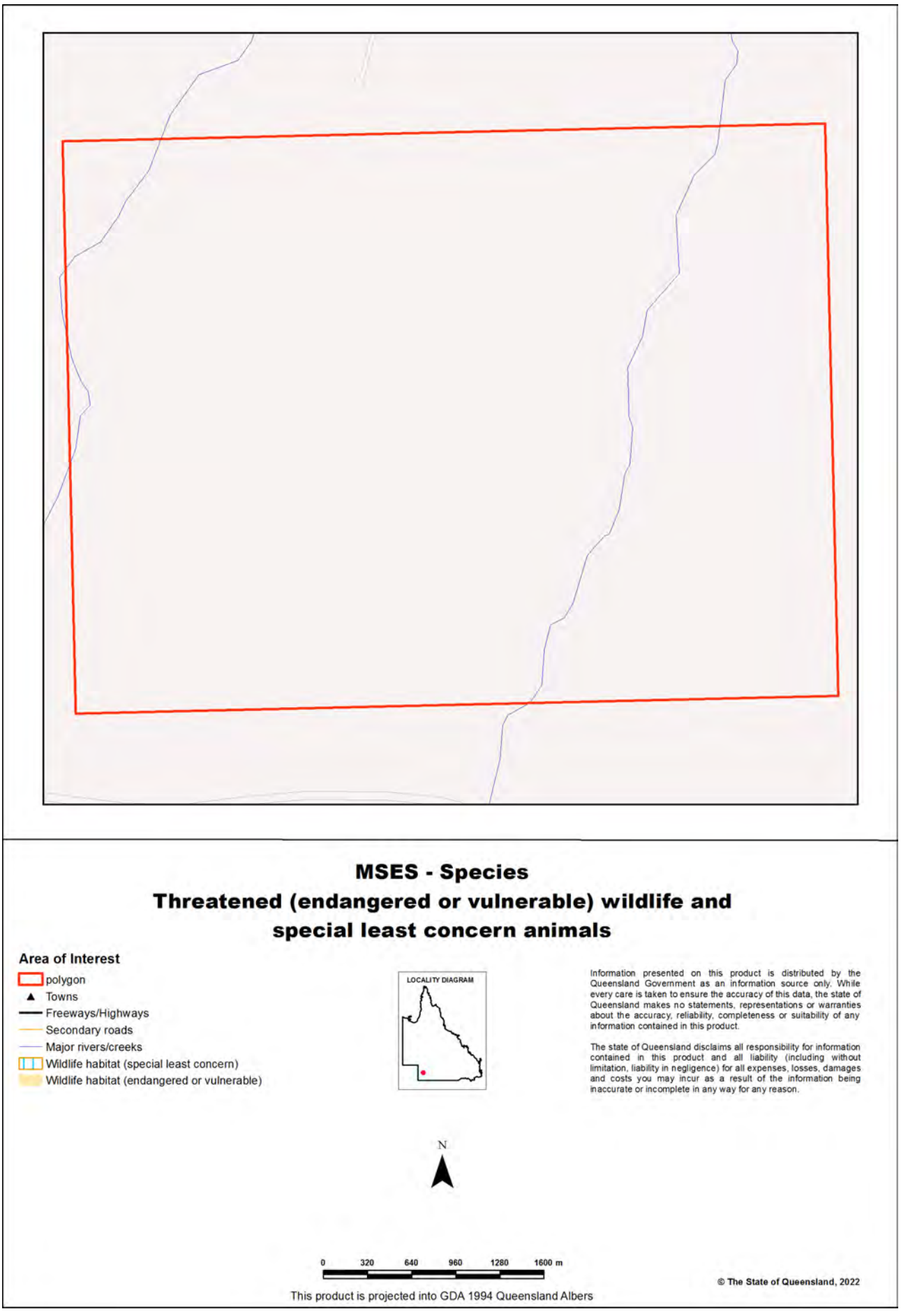
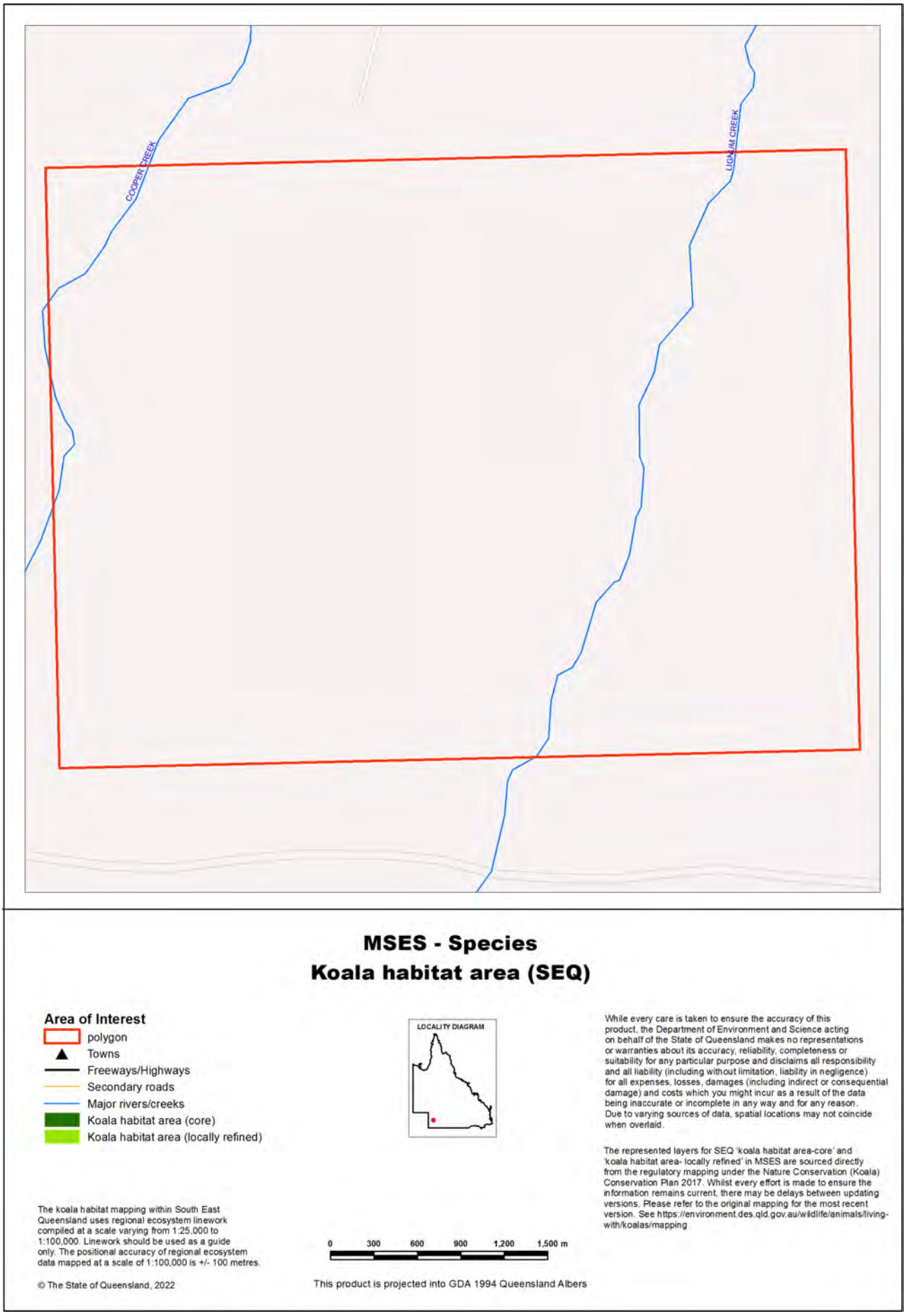
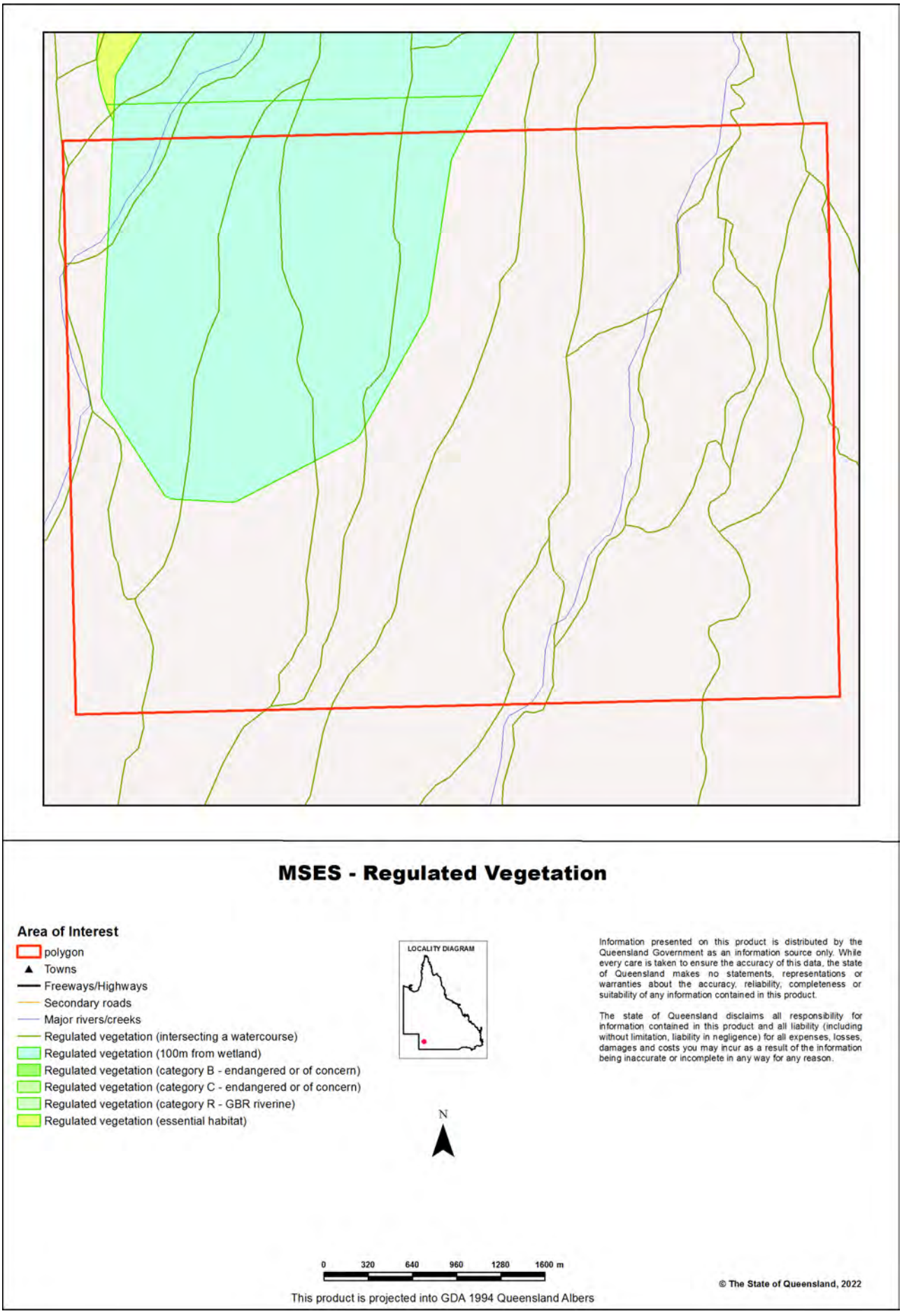
Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals



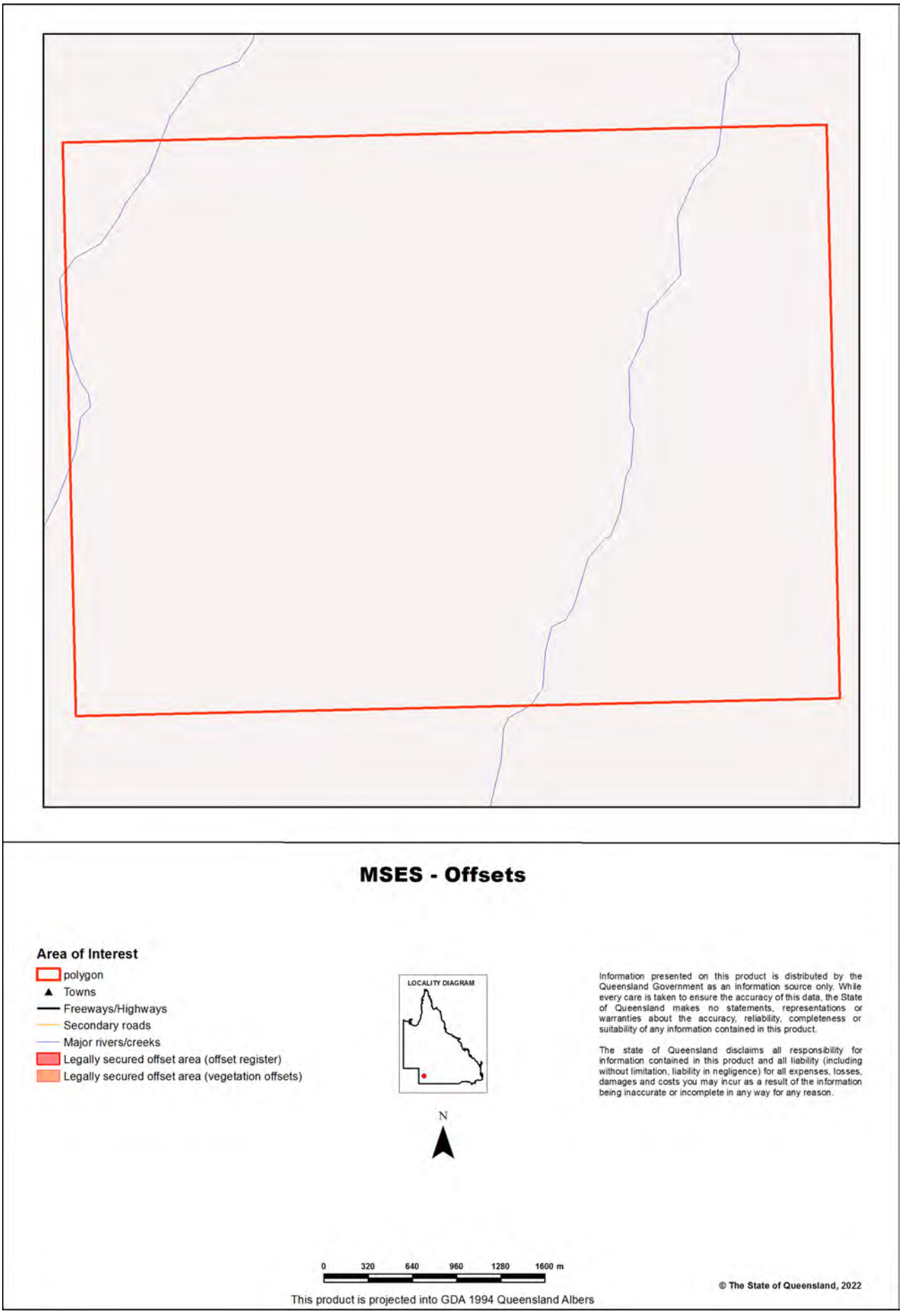
Map 3b - MSES - Species - Koala habitat area (SEQ)



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

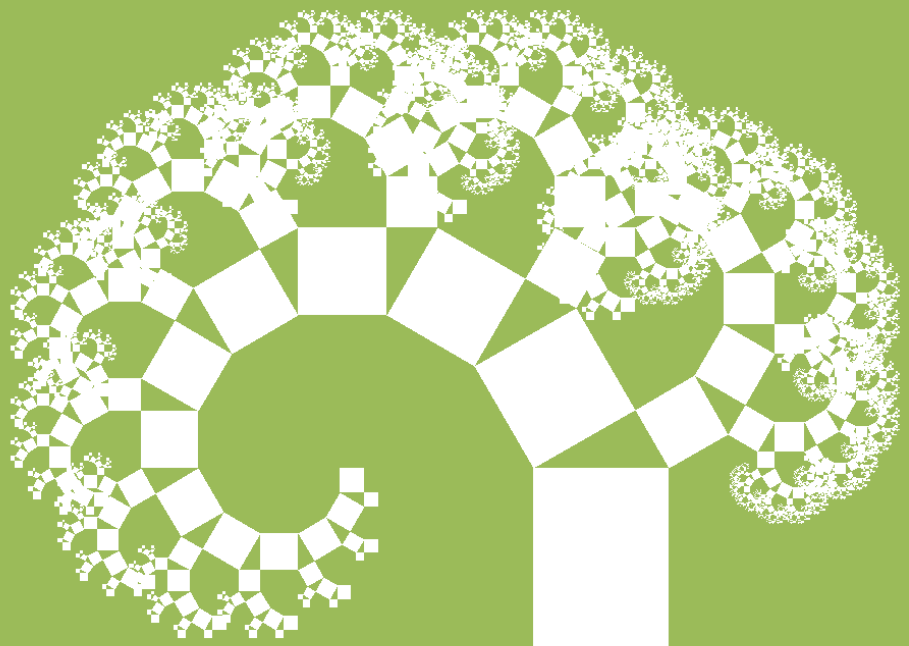
Note: MSES mapping is not based on new or unique data. The primary mapping product draws data from a number of underlying environment databases and geo-referenced information sources. MSES mapping is a versioned product that is updated generally on a twice-yearly basis to incorporate the changes to underlying 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, Nature Refuges, Special Wildlife Reserves	- Protected areas of Queensland - Nature Refuges - Queensland - Special Wildlife Reserves- 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 intent for waters Source Wetlands: - Queensland Wetland Mapping (Current version 5) 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*



Modelled potential habitat

For the selected area of interest 2296.59ha

Current as at 26/04/2022

Queensland Government

Introduction

Species lists in this report are derived from Maxent pre-clear potential habitat models and buffered point coverages produced by the Queensland Herbarium for NCA listed 'endangered' or 'vulnerable' species, EPBC listed 'critically endangered', 'endangered' or 'vulnerable' species and other priority species.

The models utilise records of fauna species occurrence compiled for the purpose of Biodiversity Assessment by the Queensland Department of Environment and Resource Management (EPA 2002) and specimen backed flora records compiled from the Queensland Herbarium's Herbrecs database. All records have a location precision of better than 2000 m, and all fauna records are less than 50 years old. Models were constrained within an occurrence mask for each species, defined by a buffer of 200 km around a convex hull that encompasses all records. All models were based on seven environmental layers, annual mean temperature, temperature seasonality (coefficient of variation), annual precipitation, mean moisture index of the lowest quarter moisture index, pre-clearing broad vegetation group (1:1M), land zone and taxonomic ruggedness. Climate layers were modelled using Anuclim software on an 83 m digital elevation model. A mask of Queensland's road network was used to down-weight species records collected along roads. Model performance was assessed by comparing the area under the ROC curve (AUC) with the 95th percentile AUC from 1000 null models for each species created by randomly selecting locations from within the minimum convex hull of species presence records. For species with very restricted ranges, model performance was further tested using randomly selected locations from within the species mask. Thresholds were applied (either equal training sensitivity and specificity logistic threshold or 10th percentile training presence logistic threshold, whichever was highest) in order to convert model output to a prediction of potential habitat. Any presence records excluded by the threshold applied were incorporated into the output with a 1km buffer. The output was clipped to the species mask and simplified using a majority filter algorithm to remove outlying orphan cells in the model output. The resulting shapefile defines the modelled pre-clear potential habitat for selected threatened and priority species.

If a species is not listed in the report, it does not indicate that its habitat is absent from the queried location and conversely, species listed may not currently inhabit the area.

Threatened fauna species

Threatened fauna species modelled to have pre-clear potential habitat within the area of interest , with an area of 2296.59ha hectares

Threatened Species animals

Class	Scientific name	Common name	NCA Status	EPBC Status	Area (ha)
birds	*Epthianura crocea crocea*	yellow chat (gulf)	V	None	492.12
birds	*Amytornis barbatus barbatus*	grey grasswren (Bulloo)	E	E	47.38
mammals	*Notomys fuscus*	dusky hopping-mouse	E	V	1809.84

Threatened flora species

Threatened flora species modelled to have pre-clear potential habitat within the selected area

Threatened Species plants

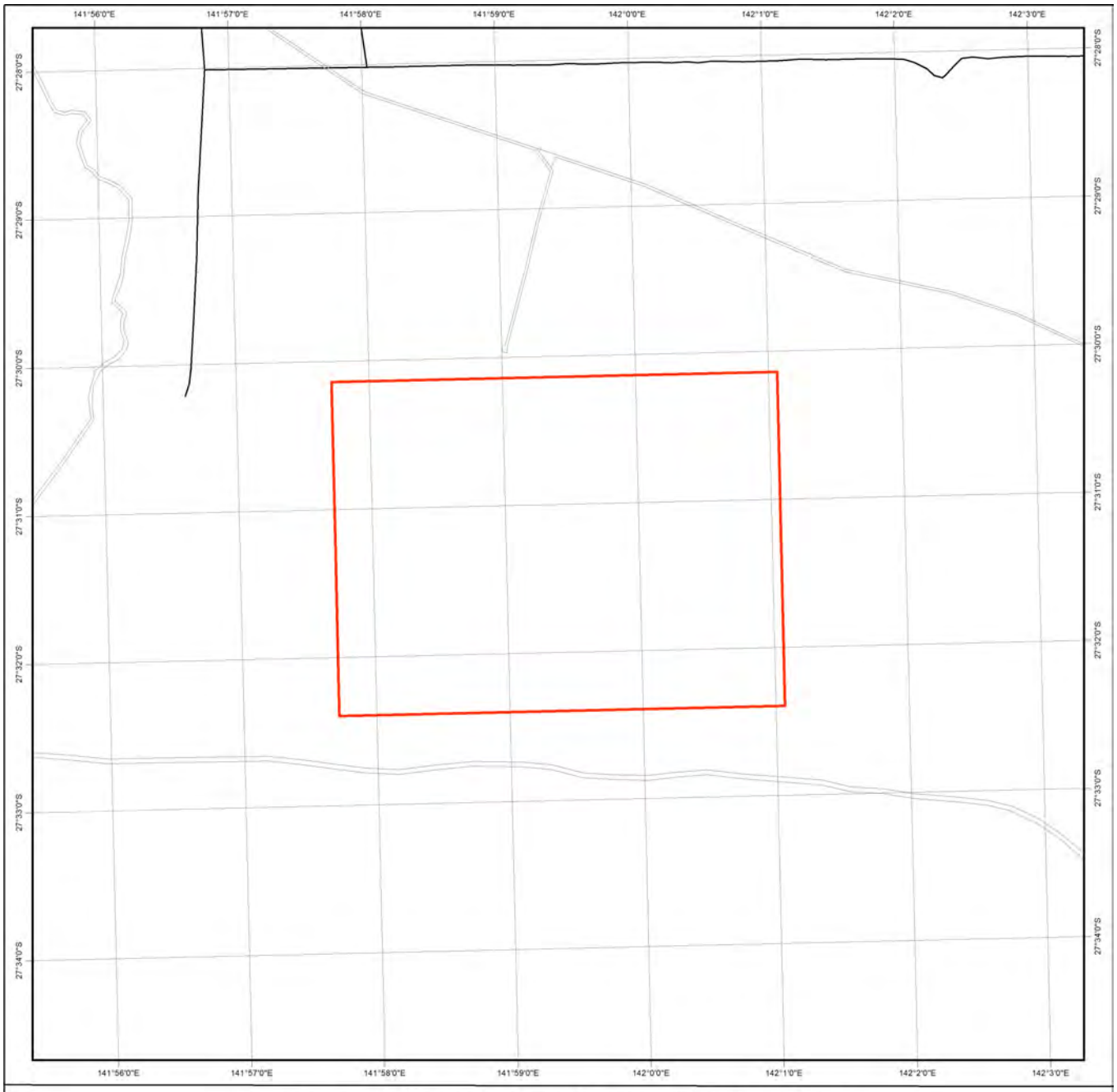
Class	Scientific name	Common name	NCA Status	EPBC Status	Area (ha)
higher dicots	*Xerothamnella parvifolia*	None	C	V	105.63
higher dicots	*Sclerolaena walkeri*	None	C	V	2296.65

Links and support

Modelled potential habitat for selected threatened and priority species in Queensland - access the geodatabase of modelled potential habitat for Queensland's threatened species.

Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government, to the maximum extent permitted by law, 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.



Protected Plants Flora Survey Trigger Map

Legend

- polygon
- High risk area
- Other land parcel boundaries
- Freeways / motorways / highways
- Secondary roads / streets

LOCALITY DIAGRAM

N

0 480 960 1,440 1,920 2,400 m

This product is projected into:
GDA 1994 Queensland Albers

This map shows areas where particular provisions of the Nature Conservation Act 1992 apply to the clearing of protected plants.

Land parcel boundaries are provided as locational aid only.

This map is produced at a scale relevant to the size of the area selected and should be printed as A4 size in portrait orientation.

For further information or assistance with interpretation of this product, please contact the Department of Environment and Science at palm@des.qld.gov.au

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Protected plants flora survey trigger map

The protected plants flora survey trigger map identifies 'high risk areas' where endangered, vulnerable or near threatened plants are known to exist or are likely to exist. Under the *Nature Conservation Act 1992* (the Act) it is an offence to clear protected plants that are 'in the wild' unless you are authorised or the clearing is exempt, for more information see section 89 of the Act.

Please see the Department of Environment and Science webpage on the clearing of protected plants for information on what exemptions may apply in your circumstances, whether you may need to undertake a flora survey, and whether you may need a protected plants clearing permit.

Updates to the data informing the flora survey trigger map

The flora survey trigger map will be reviewed, and updated if necessary, at least every 12 months to ensure the map reflects the most up-to-date and accurate data available.

Species information

Please note that flora survey trigger maps do not identify species associated with 'high risk areas'. While some species information may be publicly available, for example via the Queensland Spatial Catalogue, the Department of Environment and Science does not provide species information on request. Regardless of whether species information is available for a particular high risk area, clearing plants in a high risk area may require a flora survey and/or clearing permit. Please see the Department of Environment and Science webpage on the clearing of protected plants for more information.

Queensland Government

Department of Environment and Science

Environmental Reports

Regional Ecosystems

Biodiversity Status

For the selected area of interest

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 input coordinates.

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 matters of interest 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.

Important Note to User

Information presented in this report is based upon the Queensland Herbarium's Regional Ecosystem framework. The Biodiversity Status has been used to depict the extent of "Endangered", "Of Concern" and "No Concern at Present" regional ecosystems in all cases, rather than the classes used for the purposes of the *Vegetation Management Act 1999* (VMA). Mapping and figures presented in this document reflect the Queensland Herbarium's Remnant and Pre-clearing Regional Ecosystem Datasets, and not the certified mapping used for the purpose of the VMA.

For matters relevant to vegetation management under the VMA, please refer to the Department of Resources website https://www.dnrme.qld.gov.au/

Please direct queries about these reports to: Queensland.Herbarium@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

Summary Information

The following table provides an overview of the AOI with respect to selected topographic and environmental themes. Refer to **Map 1** for locality information.

Table 1: Area of interest details:

Size (ha)	2,296.59
Local Government(s)	Bulloo Shire
Bioregion(s)	Channel Country
Subregion(s)	Cooper - Diamantina Plains
Catchment(s)	Cooper Creek

The table below summarizes the extent of remnant vegetation classed as "Endangered", "Of concern" and "No concern at present" regional ecosystems classified by Biodiversity Status within the area of interest (AOI).

Table 2: Summary table, biodiversity status of regional ecosystems within the AOI

Biodiversity Status	Area (Ha)	% of AOI
Endangered	0.0	0.0
Of concern	0.0	0.0
No concern at present	2,296.59	100.0
Total remnant vegetation	2,296.59	100.0

Refer to **Map 2** for further information.

Regional Ecosystems

1. Introduction

Regional ecosystems are vegetation communities in a bioregion that are consistently associated with particular combinations of geology, landform and soil (Sattler and Williams 1999). Descriptions of Queensland's Regional ecosystems are available online from the Regional Ecosystem Description Database (REDD). Descriptions are compiled from a broad range of information sources including vegetation, land system and geology survey and mapping and detailed vegetation site data. The regional ecosystem classification and descriptions are reviewed as new information becomes available. A number of vegetation communities may form a single regional ecosystem and are usually distinguished by differences in dominant species, frequently in the shrub or ground layers and are denoted by a letter following the regional ecosystem code (e.g. a, b, c). Vegetation communities and regional ecosystems are amalgamated into a higher level classification of broad vegetation groups (BVGs).

A published methodology for survey and mapping of regional ecosystems across Queensland (Neldner et al 2020) provides further details on regional ecosystem concepts and terminology.

This report provides information on the type, status, and extent of vegetation communities, regional ecosystems and broad vegetation groups present within a user specified area of interest. Please note, for the purpose of this report, the Biodiversity Status is used. This report has not been developed for application of the *Vegetation Management Act 1999* (VMA). Additionally, information generated in this report has been derived from the Queensland Herbarium's Regional Ecosystem Mapping, and not the regulated mapping certified for the purposes of the VMA. If your interest/matter relates to regional ecosystems and the VMA, users should refer to the Department of Resources website.

https://www.dnrme.qld.gov.au/

With respect to the Queensland Biodiversity Status,

"Endangered" regional ecosystems are described as those where:

- remnant vegetation is less than 10 per cent of its pre-clearing extent across the bioregion; or 10-30% of its pre-clearing extent remains and the remnant vegetation is less than 10,000 hectares, or
- less than 10 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss*, or
- 10-30 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss and the remnant vegetation is less than 10,000 hectares; or
- it is a rare** regional ecosystem subject to a threatening process.***

"Of concern" regional ecosystems are described as those where:

- the degradation criteria listed above for 'Endangered' regional ecosystems are not met and,
- remnant vegetation is 10-30 per cent of its pre-clearing extent across the bioregion; or more than 20 per cent of its pre-clearing extent remains and the remnant extent is less than 10,000 hectares, or
- 10-30 percent of its pre-clearing extent remains unaffected by moderate degradation and/or biodiversity loss.****

and "No concern at present" regional ecosystems are described as those where:

- remnant vegetation is over 30 per cent of its pre-clearing extent across the bioregion, and the remnant area is greater than 10,000 hectares, and
- the degradation criteria listed above for 'Endangered' or 'Of concern' regional ecosystems are not met.

**Severe degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 50 years even with the removal of threatening processes; or soil surface is severely degraded, for example, by loss of A horizon, surface expression of salinity; surface compaction, loss of organic matter or sheet erosion.*

***Rare regional ecosystem: pre-clearing extent (1000 ha); or patch size (100 ha and of limited total extent across its range).*

****Threatening processes are those that are reducing or will reduce the biodiversity and ecological integrity of a regional ecosystem. For example, clearing, weed invasion, fragmentation, inappropriate fire regime or grazing pressure, or infrastructure development.*

*****Moderate degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 20 years even with the removal of threatening processes; or soil surface is moderately degraded.*

2. Remnant Regional Ecosystems

The following table identifies the remnant regional ecosystems and vegetation communities mapped within the AOI and provides their short descriptions, Biodiversity Status, and remnant extent within the selected AOI. Please note, where heterogeneous vegetated patches (mixed patches of remnant vegetation mapped as containing multiple regional ecosystems) occur within the AOI, they have been split and listed as individual regional ecosystems (or vegetation communities where present) for the purposes of the table below. In such instances, associated area figures have been generated based upon the estimated proportion of each regional ecosystem (or vegetation community) predicted to be present within the larger mixed patch.

Table 3: Remnant regional ecosystems, description and status within the AOI

Regional Ecosystem	Short Description	BD Status	Area (Ha)	% of AOI
5.3.18a	Braided channel complex of major alluvial plains, includes Chenopodium auricomum open shrubland and variable sparse to open-herbland	No concern at present	688.98	30.0
5.3.18b	Braided channel complex of major alluvial plains, includes Chenopodium auricomum open shrubland and variable sparse to open-herbland	No concern at present	1,377.96	60.0
5.3.8a	Eucalyptus coolabah low open woodland +/- Duma florulenta on braided channels, drainage lines, flood plain lakes and claypans	No concern at present	229.66	10.0

Refer to **Map 2** for further information. **Map 3** also provides a visual estimate of the distribution of regional ecosystems present before clearing.

Table 4 provides further information in regards to the remnant regional ecosystems present within the AOI. Specifically, the extent of remnant vegetation remaining within the bioregion, the 1:1,000,000 broad vegetation group (BVG) classification, whether the regional ecosystem is identified as a wetland, and extent of representation in Queensland's Protected Area Estate. For a description of the vegetation communities within the AOI and classified according to the 1:1,000,000 BVG, refer to **Table 6**.

Table 4: Remnant regional ecosystems within the AOI, additional information

Regional Ecosystem	Remnant Extent	BVG (1 Million)	Wetland	Representation in protected estate
5.3.18a	Pre-clearing 1867000 ha; Remnant 2019 1866000 ha	34g	Palustrine	Low
5.3.18b	Pre-clearing 1867000 ha; Remnant 2019 1866000 ha	31a	Not a Wetland	Low
5.3.8a	Pre-clearing 385000 ha; Remnant 2019 384000 ha	16a	Riverine	Medium

Representation in Protected Area Estate: High greater than 10% of pre-clearing extent is represented; Medium 4 - 10% is represented; Low less than 4% is represented, No representation.

The distribution of mapped wetland systems within the area of interest is displayed in **Map 6**.

The following table lists known special values associated with a regional ecosystem type.

Table 5: Remnant regional ecosystems within the AOI, special values

Regional Ecosystem	Special Values
5.3.18a	Potential habitat for threatened fauna species including plains-wanderer Pedionomus torquatus and fierce snake (western taipan) Oxyuranus microlepidotus. Provides wetland habitat for a wide range of water birds and other flora and fauna. 5.3.18a: Potential habitat for threatened fauna species including plains-wanderer Pedionomus torquatus and fierce snake (western taipan) Oxyuranus microlepidotus. Provides wetland habitat for a wide range of water birds and other flora and fauna. 5.3.18b: Potential habitat for threatened fauna species including plains-wanderer Pedionomus torquatus and fierce snake (western taipan) Oxyuranus microlepidotus. Provides wetland habitat for a wide range of water birds and other flora and fauna.
5.3.18b	Potential habitat for threatened fauna species including plains-wanderer Pedionomus torquatus and fierce snake (western taipan) Oxyuranus microlepidotus. Provides wetland habitat for a wide range of water birds and other flora and fauna. 5.3.18a: Potential habitat for threatened fauna species including plains-wanderer Pedionomus torquatus and fierce snake (western taipan) Oxyuranus microlepidotus. Provides wetland habitat for a wide range of water birds and other flora and fauna. 5.3.18b: Potential habitat for threatened fauna species including plains-wanderer Pedionomus torquatus and fierce snake (western taipan) Oxyuranus microlepidotus. Provides wetland habitat for a wide range of water birds and other flora and fauna.
5.3.8a	None

3. Remnant Regional Ecosystems by Broad Vegetation Group

BVGs are a higher-level grouping of vegetation communities. Queensland encompasses a wide variety of landscapes across temperate, wet and dry tropics and semi-arid climatic zones. BVGs provide an overview of vegetation communities across the state or a bioregion and allow comparison with other states. There are three levels of BVGs which reflect the approximate scale at which they are designed to be used: the 1:5,000,000 (national), 1:2,000,000 (state) and 1:1,000,000 (regional) scales.

A comprehensive description of BVGs is available at:

https://publications.qld.gov.au/dataset/redd/resource/

The following table provides a description of the 1:1,000,000 BVGs present and their associated extent within the AOI.

Table 6: Broad vegetation groups (1 million) within the AOI

BVG (1 Million)	Description	Area (Ha)	% of AOI
16a	Open forest and woodlands dominated by Eucalyptus camaldulensis (river red gum) (or E. tereticornis (blue gum)) and/or E. coolabah (coolabah) (or E. microtheca (coolabah)) fringing drainage lines. Associated species may include Melaleuca spp., Corymbia tessellaris (carbeen), Angophora spp., Casuarina cunninghamiana (riveroak). Does not include alluvial areas dominated by herb and grasslands or alluvial plains that are not flooded. (land zone 3) (MGD, BRB, GUP, CHC, MUL, DEU, EIU, NWH, SEQ, [NET, WET]) (All bioregions except CYP and CQC)	229.66	10.0
31a	Open forblands to open tussock grasslands which may be composed of Atriplex spp. (saltbush), Sclerolaena spp. (burr), Asteraceae spp. and/or short grasses on alluvial plains. (land zone 3) (CHC, MGD, MUL, GUP, [BRB, DEU])	1,377.96	60.0

BVG (1 Million)	Description	Area (Ha)	% of AOI
34g	Palustrine wetlands. Generally intermittent swamps/claypans on floodplains in inland areas dominated by chenopods e.g. Chenopodium auricomum (Queensland blue bush) or Tecticornia spp. (samphire) or herbs. (land zone 3) (CHC, DEU)	688.98	30.0

Refer to **Map 4** for further information. **Map 5** also provides a representation of the distribution of vegetation communities as per the 1:5,000,000 BVG believed to be present prior to European settlement.

4. Technical and BioCondition Benchmark Descriptions

Technical descriptions provide a detailed description of the full range in structure and floristic composition of regional ecosystems (e.g. 11.3.1) and their component vegetation communities (e.g. 11.3.1a, 11.3.1b). See:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

The descriptions are compiled using site survey data from the Queensland Herbarium's CORVEG database. Distribution maps, representative images (if available) and the pre-clearing and remnant extent (hectares) of each vegetation community derived from the regional ecosystem mapping data are included. The technical descriptions should be used in conjunction with the fields from the regional ecosystem description database (REDD) for a full description of the regional ecosystem.

Technical descriptions include data on canopy height, canopy cover and native plant species composition of the predominant layer, which are attributes relevant to assessment of the remnant status of vegetation under the *Vegetation Management Act 1999*. However, as technical descriptions reflect the full range in structure and floristic composition across the climatic, natural disturbance and geographic range of the regional ecosystem, local reference sites should be used for remnant assessment where possible (Neldner et al. 2020 (PDF)* section 3.3 of:

https://publications.qld.gov.au/dataset/redd/resource/

The technical descriptions are subject to review and are updated as additional data becomes available.

When conducting a BioCondition assessment, these technical descriptions should be used in conjunction with BioCondition benchmarks for the specific regional ecosystem, or component vegetation community.

http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

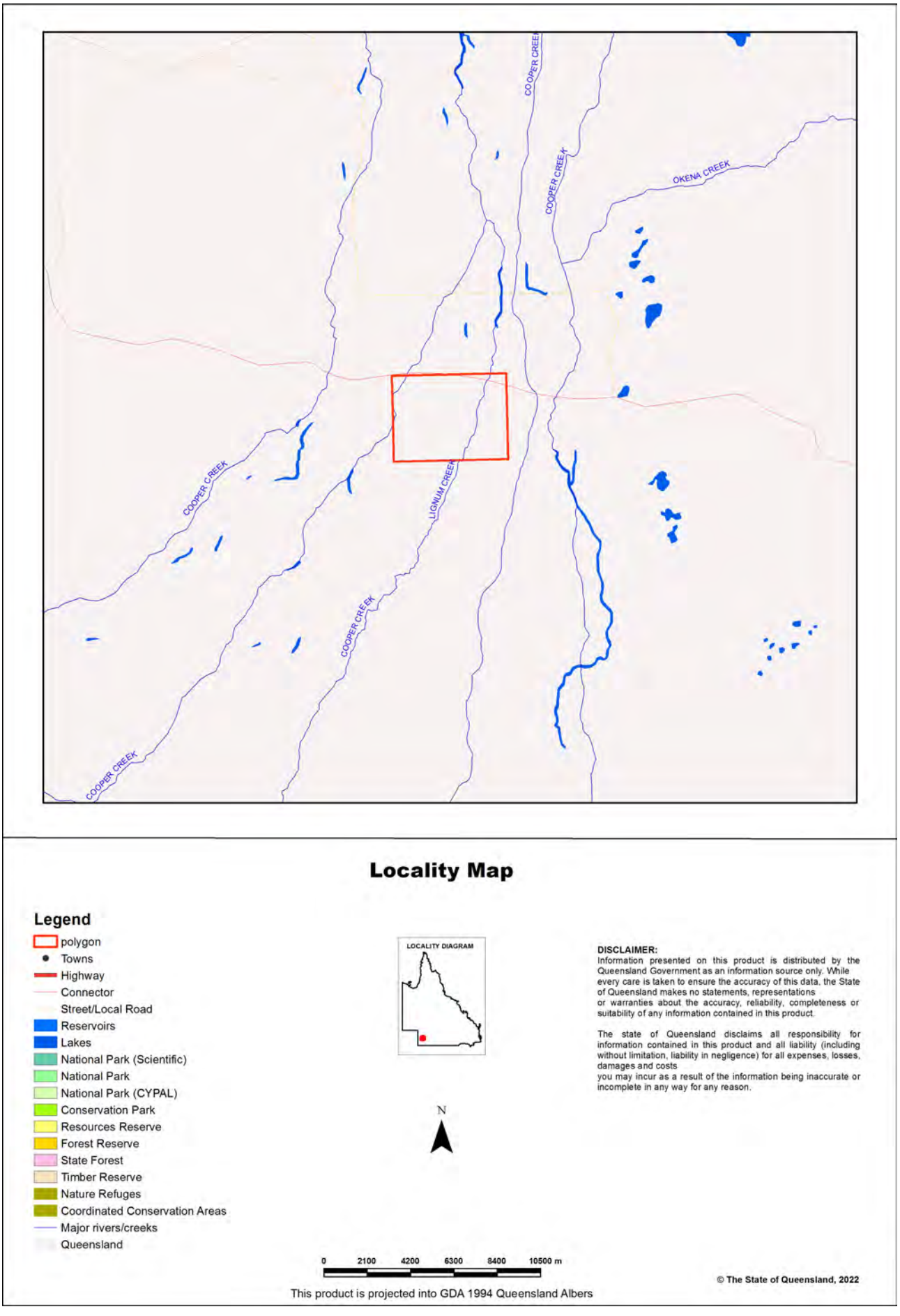
Benchmarks are based on a combination of quantitative and qualitative information and should be used as a guide only. Benchmarks are specific to one regional ecosystem vegetation community, however, the natural variability in structure and floristic composition under a range of climatic and natural disturbance regimes has been considered throughout the geographic extent of the regional ecosystem. Local reference sites should be used for this spatial and temporal (seasonal and annual) variability.

Table 7: List of remnant regional ecosystems within the AOI for which technical and biocondition benchmark descriptions are available

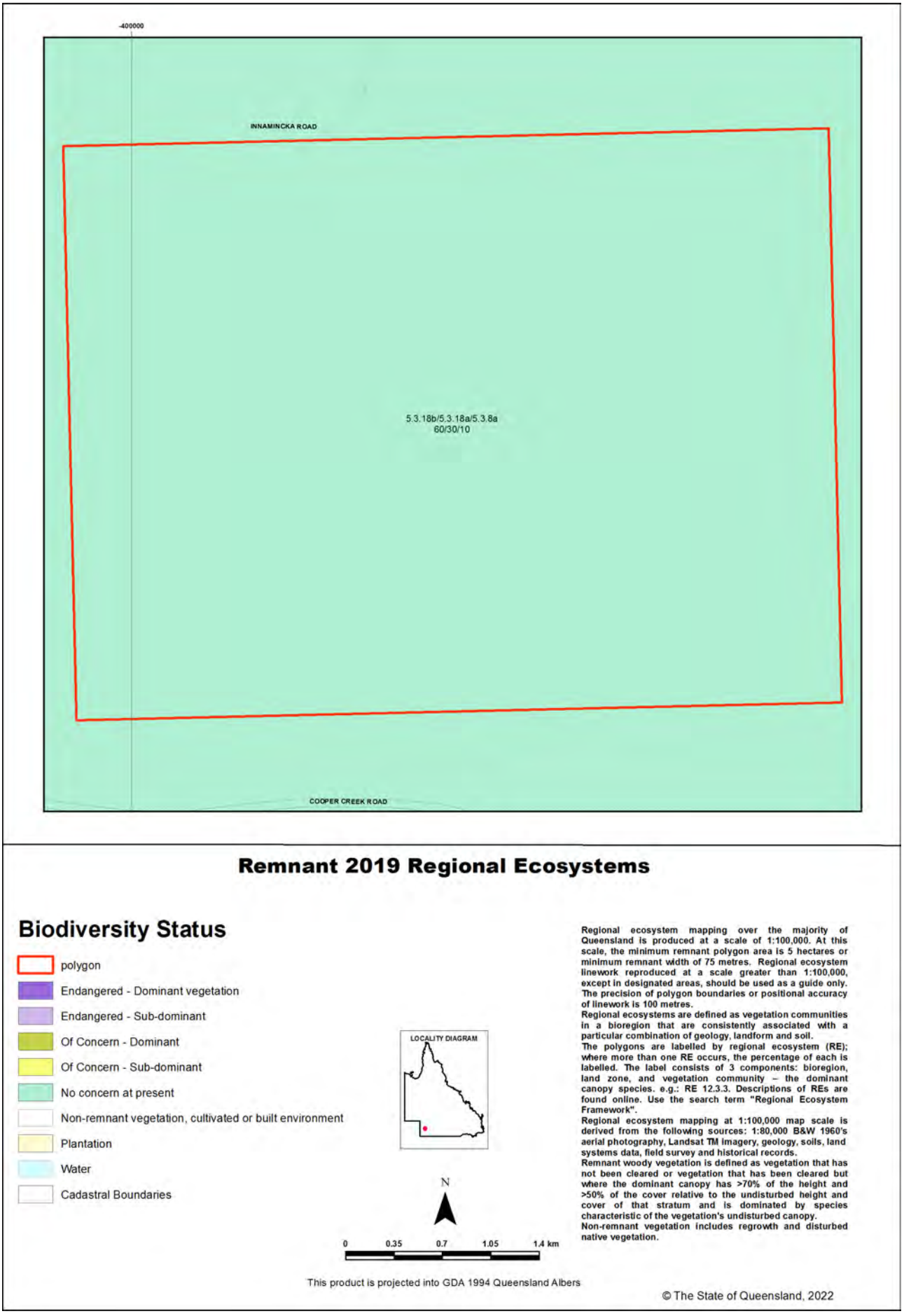
Regional ecosystems mapped as within the AOI	Technical Descriptions	Biocondition Benchmarks
5.3.18a	Not currently available	Not currently available
5.3.18b	Not currently available	Not currently available
5.3.8a	Not currently available	Not currently available

Maps

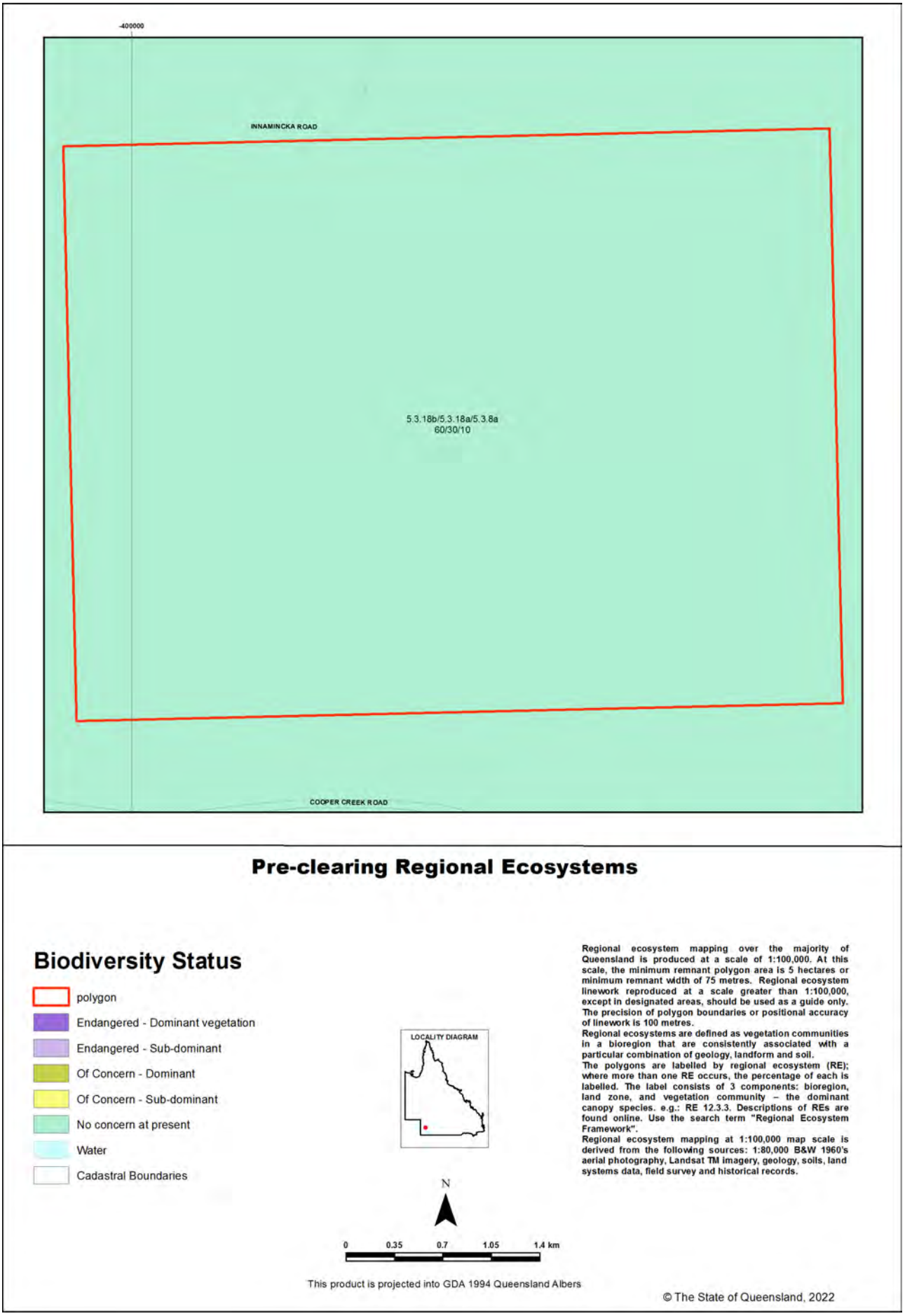
Map 1 - Location



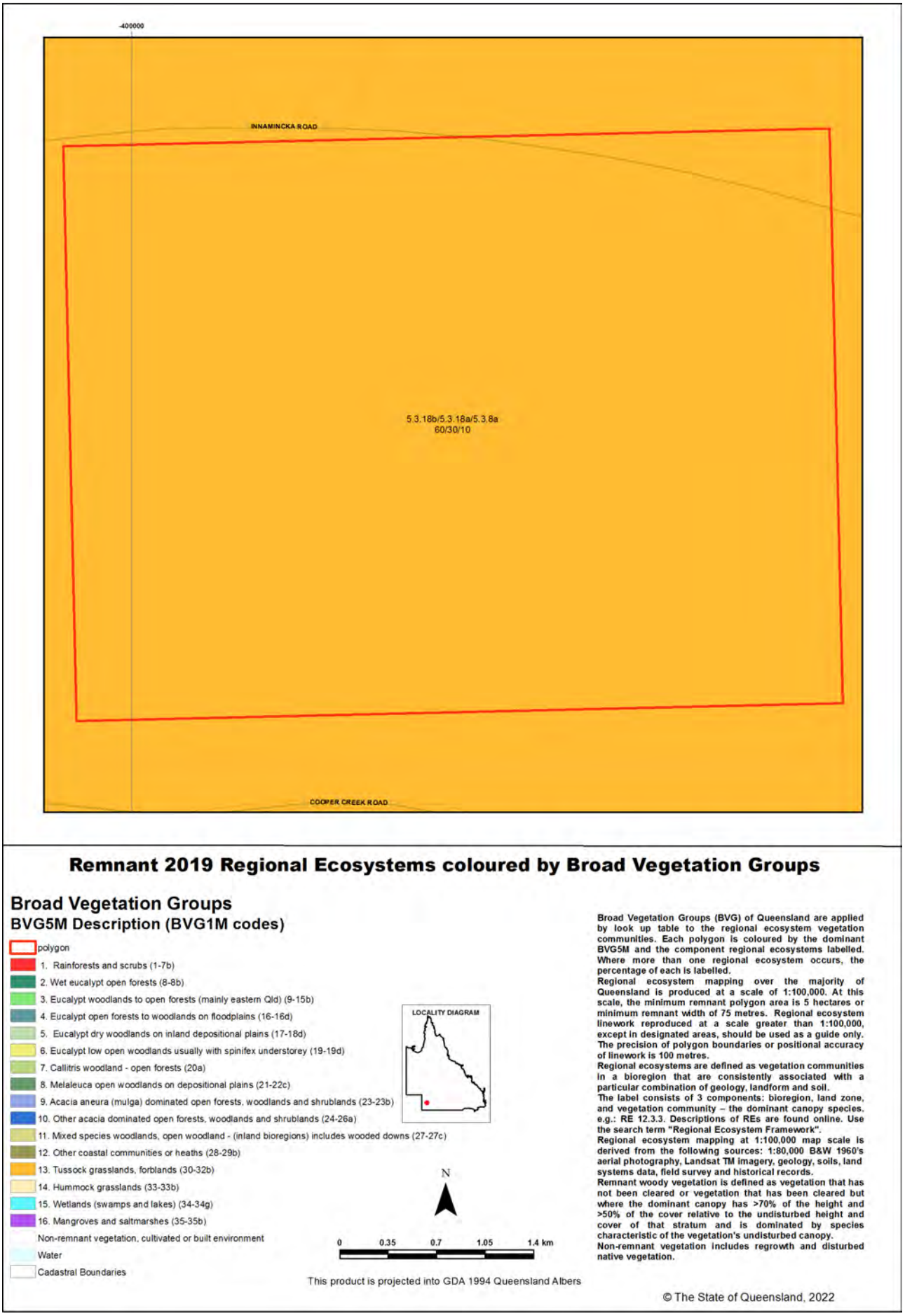
Map 2 - Remnant 2019 regional ecosystems



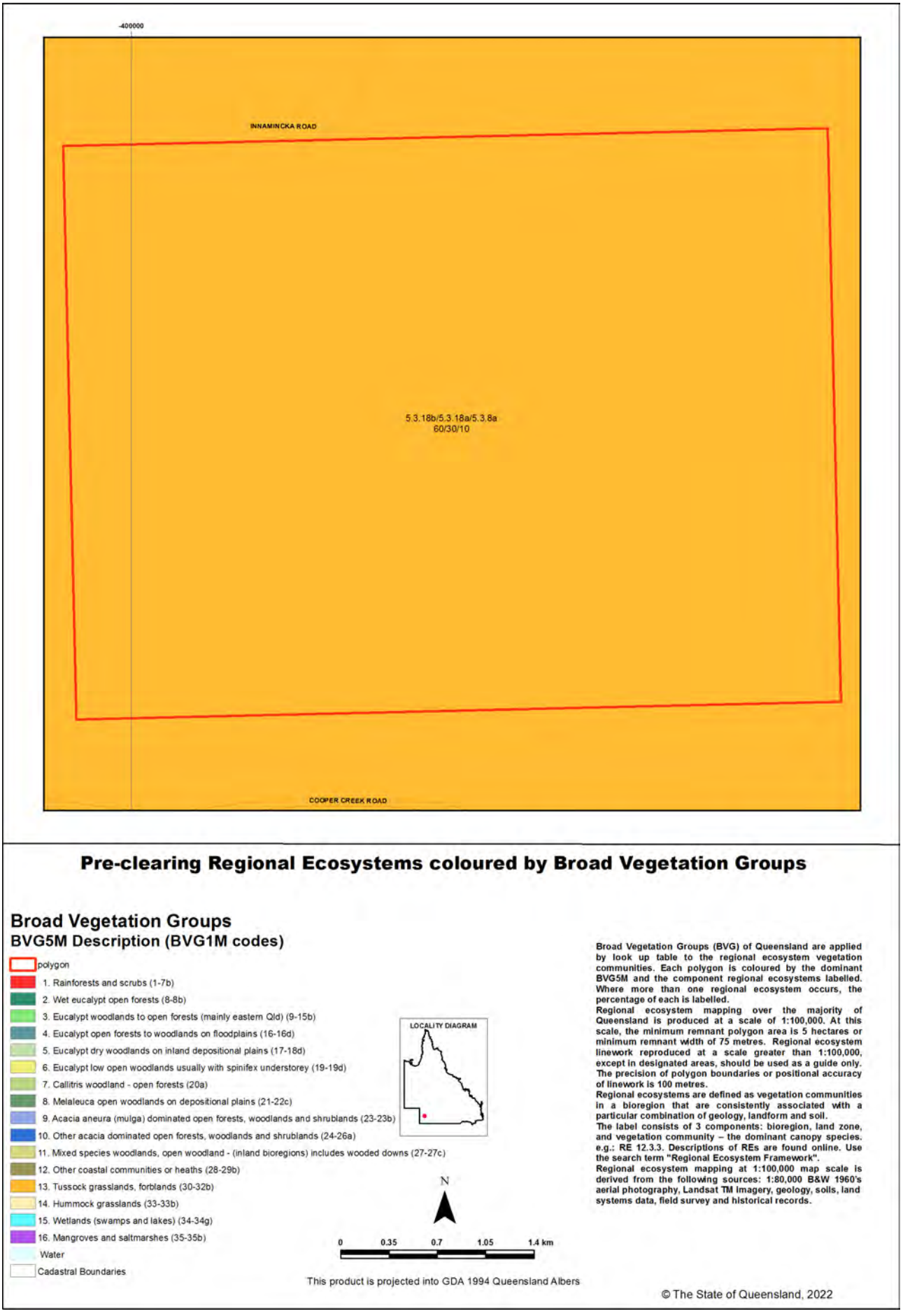
Map 3 - Pre-clearing regional ecosystems



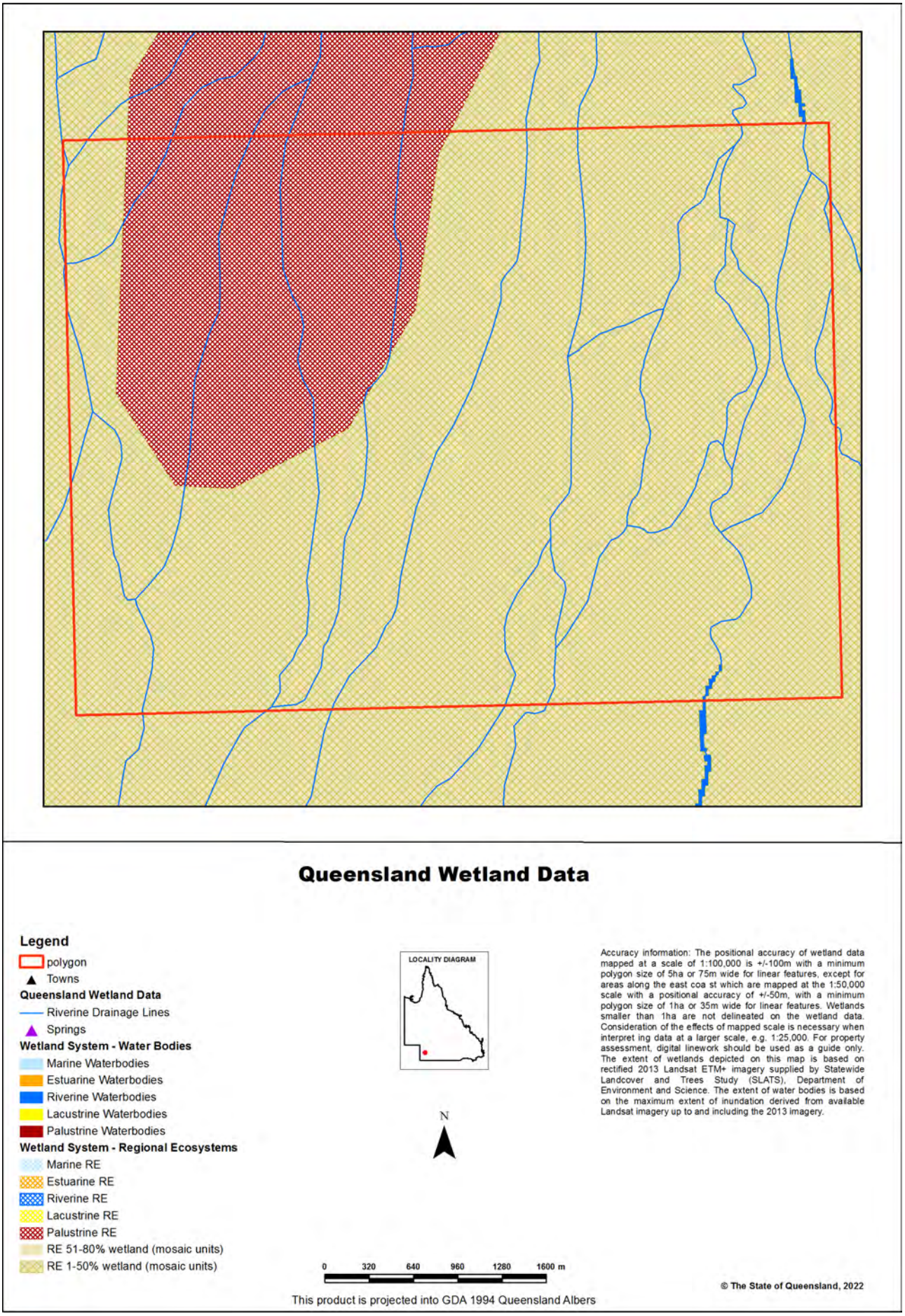
Map 4 - Remnant 2019 regional ecosystems by BVG (5M)



Map 5 - Pre-clearing regional ecosystems by BVG (5M)



Map 6 - Wetlands and waterways



Links and Other Information Sources

The Department of Environment and Science's Website -

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/

provides further information on the regional ecosystem framework, including access to links to the Regional Ecosystem Database, Broad Vegetation Group Definitions, Regional Ecosystem and Land zone descriptions.

Descriptions of the broad vegetation groups of Queensland can be downloaded from:

https://publications.qld.gov.au/dataset/redd/resource/

The methodology for mapping regional ecosystems can be downloaded from:

https://publications.qld.gov.au/dataset/redd/resource/

Technical descriptions for regional ecosystems can be obtained from:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

Benchmarks can be obtained from:

http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

For further information associated with the remnant regional ecosystem dataset used by this report, refer to the metadata associated with the Biodiversity status of pre-clearing and Remnant Regional Ecosystems of Queensland dataset (version listed in **Appendix 1**) which is available through the Queensland Government Information System portal,

http://dds.information.qld.gov.au/dds/

The Queensland Globe is a mapping and data application. As an interactive online tool, Queensland Globe allows you to view and explore Queensland maps, imagery (including up-to-date satellite images) and other spatial data, including regional ecosystem mapping. To further view and explore regional ecosystems over an area of interest, access the Biota Globe (a component of the Queensland Globe). The Queensland Globe can be accessed via the following link:

http://www.dnrm.qld.gov.au/mapping-data/queensland-globe

References

Neldner, V.J., Niehus, R.E., Wilson, B.A., McDonald, W.J.F., Ford, A.J. and Accad, A. (2019). The Vegetation of Queensland. Descriptions of Broad Vegetation Groups. Version 4.0. Queensland Herbarium, Department of Environment and Science.

(https://publications.qld.gov.au/dataset/redd/resource/78209e74-c7f2-4589-90c1-c33188359086)

Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S., Butler, D.W., McDonald, W.J.F, Addicott, E.P. and Appelman, C.N. (2020). Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland. Version 5.1. Updated March 2020. Queensland Herbarium, Queensland Department of Environment and Science, Brisbane.

(https://publications.qld.gov.au/dataset/redd/resource/6dee78ab-c12c-4692-9842-b7257c2511e4)

Sattler, P.S. and Williams, R.D. (eds) (1999). *The Conservation Status of Queensland's Bioregional Ecosystems*. Environmental Protection Agency, Brisbane.

Appendices

Appendix 1 - Source Data

The dataset listed below is available for download from:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/download/

- Regional Ecosystem Description Database

The datasets listed below are available for download from:

http://dds.information.qld.gov.au/dds/

- Biodiversity status of pre-clearing and 2019 remnant regional ecosystems of Queensland
- Pre-clearing Vegetation Communities and Regional Ecosystems of Queensland
- Queensland Wetland Data Version - Wetland lines
- Queensland Wetland Data Version - Wetland points
- Queensland Wetland Data Version - Wetland areas

Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
GDA94	- Geocentric Datum of Australia 1994
GIS	- Geographic Information System
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
VMA	- *Vegetation Management Act 1999*

Queensland Government

Department of Environment and Science

Environmental Reports

Biodiversity and Conservation Values

Biodiversity Planning Assessments and Aquatic Conservation Assessments

For the selected area of interest

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 co-ordinates" option, the resulting assessment area encompasses an area extending from 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: biodiversity.planning@des.qld.gov.au

Disclaimer

Table of Contents

Summary Information

Tables 1 to 8 provide an overview of the AOI with respect to selected topographic and environmental values.

Table 1: Area of interest details:

Size (ha)	2,296.59
Local Government(s)	Bulloo Shire
Bioregion(s)	Channel Country
Subregion(s)	Cooper - Diamantina Plains
Catchment(s)	Cooper Creek

The following table identifies available Biodiversity Planning Assessments (BPAs) and Aquatic Conservation Assessments (ACAs) with respect to the AOI.

Table 2: Available Biodiversity Planning and Aquatic Conservation Assessments

Assessment Type	Assessment Area and Version
Biodiversity Planning Assessment(s)	Channel Country v1.1
Aquatic Conservation Assessment(s) (riverine)	Lake Eyre and Bulloo Basins v1.1
Aquatic Conservation Assessment(s) (non-riverine)	Lake Eyre and Bulloo Basins v1.1

Table 3: Remnant regional ecosystems within the AOI as per the Qld Herbarium's 'biodiversity status'

Biodiversity Status	Area (Ha)	% of AOI
Endangered	0.0	0.0
Of concern	0.0	0.0
No concern at present	2,296.59	100.0

The following table identifies the extent and proportion of the user specified area of interest (AOI) which is mapped as being of "State", "Regional" or "Local" significance via application of the Queensland Department of Environment and Science's *Biodiversity Assessment and Mapping Methodology* (BAMM).

Table 4: Summary table, biodiversity significance

Biodiversity significance	Area (Ha)	% of AOI
State Habitat for EVNT taxa	0.0	0.0
State	2,296.60	100.0
Regional	0.0	0.0
Local or Other Values	0.0	0.0

Table 5: Non-riverine wetlands intersecting the AOI

Non-riverine wetland types intersecting the area of interest	#
Number of Palustrine wetlands	1
Number of Lacustrine wetlands	0

Non-riverine wetland types intersecting the area of interest	#
Total number of non-riverine wetlands	1

NB. The figures presented in the table above are derived from the relevant non-riverine Aquatic Conservation Assessment(s). Later releases of wetland mapping produced via the Queensland Wetland Mapping Program may provide more recent information in regards to wetland extent.

Table 6: Named waterways intersecting the AOI

Name	Permanency
COOPER CREEK	Non-perennial
LIGNUM CREEK	Non-perennial

Refer to **Map 1** for general locality information.

The following two tables identify the extent and proportion of the user specified AOI which is mapped as being of "Very High", "High", "Medium", "Low", or "Very Low" aquatic conservation value for riverine and non-riverine wetlands via application of the Queensland Department of Environment and Science's *Aquatic Biodiversity Assessment and Mapping Method* (AquaBAMM).

Table 7: Summary table, aquatic conservation significance (riverine)

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
Very High	2,296.60	100.0
High	0.0	0.0
Medium	0.0	0.0
Low	0.0	0.0
Very Low	0.0	0.0

Table 8: Summary table, aquatic conservation significance (non-riverine)

Aquatic conservation significance (non-riverine wetlands)	Area (Ha)	% of AOI
Very High	482.09	20.99
High	0.0	0.0
Medium	0.0	0.0
Low	0.0	0.0
Very Low	0.0	0.0

Biodiversity Planning Assessments

Introduction

The Department of Environment and Science (DES) attributes biodiversity significance on a bioregional scale through a Biodiversity Planning Assessment (BPA). A BPA involves the integration of ecological criteria using the *Biodiversity assessment and Mapping Methodology* (BAMM) and is developed in two stages: 1) **diagnostic criteria**, and 2) **expert panel criteria**. The diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion, while the expert panel criteria allows for the refinement of the mapped information from the diagnostic output by incorporating local knowledge and expert opinion.

The BAMM methodology has application for identifying areas with various levels of significance solely for biodiversity reasons. These include threatened ecosystems or taxa, large tracts of habitat in good condition, ecosystem diversity, landscape context and connection, and buffers to wetlands or other types of habitat important for the maintenance of biodiversity or ecological processes. While natural resource values such as dryland salinity, soil erosion potential or land capability are not dealt with explicitly, they are included to some extent within the biodiversity status of regional ecosystems recognised by the DES.

Biodiversity Planning Assessments (BPAs) assign three levels of overall biodiversity significance.

- **State significance** - areas assessed as being significant for biodiversity at the bioregional or state scales. They also include areas assessed by other studies/processes as being significant at national or international scales. In addition, areas flagged as being of State significance due to the presence of endangered, vulnerable and/or near threatened taxa, are identified as "State Habitat for EVNT taxa".
- **Regional significance** - areas assessed as being significant for biodiversity at the subregional scale. These areas have lower significance for biodiversity than areas assessed as being of State significance.
- **Local significance and/or other values** - areas assessed as not being significant for biodiversity at state or regional scales. Local values are of significance at the local government scale.

For further information on released BPAs and a copy of the underlying methodology, go to:

http://www.qld.gov.au/environment/plants-animals/biodiversity/planning/

The GIS results can be downloaded from the Queensland Spatial Catalogue at:

http://qspatial.information.qld.gov.au/geoportal/

The following table identifies the extent and proportion of the user specified AOI which is mapped as being of "State", "Regional" or "Local" significance via application of the BAMM.

Table 9: Summary table, biodiversity significance

Biodiversity significance	Area (Ha)	% of AOI
State Habitat for EVNT taxa	0.0	0.0
State	2,296.60	100.0
Regional	0.0	0.0
Local or Other Values	0.0	0.0

Refer to **Map 2** for further information.

Diagnostic Criteria

Diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion. These criteria are diagnostic in that they are used to filter the available data and provide a "first-cut" or initial determination of biodiversity significance. This initial assessment is then combined through a second group of other essential criteria.

A description of the individual diagnostic criteria is provided in the following sections.

Criteria A. Habitat for EVNT taxa: Classifies areas according to their significance based on the presence of endangered, vulnerable and/or rare (EVNT) taxa. EVNT taxa are those scheduled under the *Nature Conservation Act 1992* and/or the

Environment Protection and Biodiversity Conservation Act 1999. It excludes highly mobile fauna taxa which are instead considered in Criterion H and brings together information on EVNT taxa using buffering of recorded sites or habitat suitability models (HSM) where available.

Criteria B. Ecosystem value: Classifies on the basis of biodiversity status of regional ecosystems, their extent in protected areas (presence of poorly conserved regional ecosystems), the presence of significant wetlands; and areas of national importance such as the presence of Threatened Ecological Communities, World Heritage areas and Ramsar sites. Ecosystem value is applied at a bioregional (**B1**) and regional (**B2**) scale.

Criteria C. Tract size: Measures the relative size of tracts of vegetation in the landscape. The size of any tract is a major indicator of ecological significance, and is also strongly correlated with the long-term viability of biodiversity values. Larger tracts are less susceptible to ecological edge effects and are more likely to sustain viable populations of native flora and fauna than smaller tracts.

Criteria D. Relative size of regional ecosystems: Classifies the relative size of each regional ecosystem unit within its bioregion (**D1**) and its subregion (**D2**). Remnant units are compared with all other occurrences with the same regional ecosystem. Large examples of a regional ecosystem are more significant than smaller examples of the same regional ecosystem because they are more representative of the biodiversity values particular to the regional ecosystem, are more resilient to the effects of disturbance, and constitute a significant proportion of the total area of the regional ecosystem.

Criteria F. Ecosystem diversity: Is an indicator of the number of regional ecosystems occurring within an area. An area with high ecosystem diversity will have many regional ecosystems and ecotones relative to other areas within the bioregion.

Criteria G. Context and connection: Represents the extent to which a remnant unit incorporates, borders or buffers areas such as significant wetlands, endangered ecosystems; and the degree to which it is connected to other vegetation.

A summary of the biodiversity status based upon the diagnostic criteria is provided in the following table.

Table 10: Summary of biodiversity significance based upon diagnostic criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
State	Remnant contains an RE that is one of the largest of its type in the bioregion (D1) & Remnant has high connectivity or buffers an endangered RE or Sig. Wetland (G)	1,814.50	79.01
Local or Other Values	Refer to diagnostic data for additional information	482.1	20.99

Assessment of diagnostic criteria with respect to the AOI

The following table reflects an assessment of the individual diagnostic criteria noted above in regards to the AOI.

Table 11: Assessment of individual diagnostic criteria with respect to the AOI

Diagnostic Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
A: Habitat for EVNT Taxa					2,296.60	100.0		
B1: Ecosystem Value (Bioregion)					2,296.60	100.0		
B2: Ecosystem Value (Subregion)					2,296.60	100.0		
C: Tract Size			2,296.60	100.0				
D1: Relative RE Size (Bioregion)	1,814.50	79.0					482.1	21.0
D2: Relative RE Size (Subregion)	1,814.50	79.0					482.1	21.0
F: Ecosystem Diversity			2,296.60	100.0				
G: Context and Connection	2,296.60	100.0						

Other Essential Criteria

Other essential criteria (also known as expert panel criteria) are based on non-uniform information sources and which may rely more upon expert opinion than on quantitative data. These criteria are used to provide a "second-cut" determination of biodiversity significance, which is then combined with the diagnostic criteria for an overall assessment of relative biodiversity significance. A summary of the biodiversity status based upon the other essential criteria is provided in the following table.

Table 12: Summary of biodiversity significance based upon other essential criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
State	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I)	1,075.88	46.85

Biodiversity significance	Description	Area (Ha)	% of AOI
State	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I) & Remnant forms part of a bioregional corridor (J)	1,220.72	53.15

A description of each of the other essential criteria and associated assessment in regards to the AOI is provided in the following sections.

Criteria H. Essential and general habitat for priority taxa: Priority taxa are those which are at risk or of management concern, taxa of scientific interest as relictual (ancient or primitive), endemic taxa or locally significant populations (such as a flying fox camp or heronry), highly specialised taxa whose habitat requirements are complex and distributions are not well correlated with any particular regional ecosystem, taxa important for maintaining genetic diversity (such as complex spatial patterns of genetic variation, geographic range limits, highly disjunct populations), taxa critical for management or monitoring of biodiversity (functionally important or ecological indicators), or economic and culturally important taxa.

Criteria I. Special biodiversity values: areas with special biodiversity values are important because they contain multiple taxa in a unique ecological and often highly biodiverse environment. Areas with special biodiversity values can include the following:

- Ia - centres of endemism - areas where concentrations of taxa are endemic to a bioregion or subregion are found.
- Ib - wildlife refugia (Morton *et al*. 1995), for example, islands, mound springs, caves, wetlands, gorges, mountain ranges and topographic isolates, ecological refuges, refuges from exotic animals, and refuges from clearing. The latter may include large areas that are not suitable for clearing because of land suitability/capability.
- Ic - areas with concentrations of disjunct populations.
- Id - areas with concentrations of taxa at the limits of their geographic ranges.
- Ie - areas with high species richness.
- If - areas with concentrations of relictual populations (ancient and primitive taxa).
- Ig - areas containing REs with distinct variation in species composition associated with geomorphology and other environmental variables.
- Ih - an artificial waterbody or managed/manipulated wetland considered by the panel/s to be of ecological significance.
- Ii - areas with a high density of hollow-bearing trees that provide habitat for animals.
- Ij - breeding or roosting sites used by a significant number of individuals.
- Ik - climate change refuge.

The following table identifies the value and extent area of the Other Essential Criteria H and I within the AOI.

Table 13: Relative importance of expert panel criteria (H and I) used to access overall biodiversity significance with respect to the AOI

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
H: Core Habitat Priority Taxa								
Ia: Centres of Endemism	482.88	21.0						
Ib: Wildlife Refugia	2,296.60	100.0						
Ic: Disjunct Populations			482.88	21.0				
Id: Limits of Geographic Ranges	2,296.60	100.0						

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
Ie: High Species Richness	2,296.60	100.0						
If: Relictual Populations			482.88	21.0				
Ig: Variation in Species Composition	2,296.60	100.0						
Ih: Artificial Wetland								
Ii: Hollow Bearing Trees								
Ij: Breeding or Roosting Site	2,296.60	100.0						
Ik: Climate Refugia								

NB. Whilst biodiversity values associated with Criteria I may be present within the site (refer to tables 12 and 15), for the New England Tableland and Central Queensland Coast BPAs, area and % area figures associated with Criteria Ia through to Ij cannot be listed in the table above (due to slight variations in data formats between BPAs).

Criteria J. Corridors: areas identified under this criterion qualify either because they are existing vegetated corridors important for contiguity, or cleared areas that could serve this purpose if revegetated. Some examples of corridors include riparian habitats, transport corridors and "stepping stones".

Bioregional and subregional conservation corridors have been identified in the more developed bioregions of Queensland through the BPAs, using an intensive process involving expert panels. Map 3 displays the location of corridors as identified under the Statewide Corridor network. The Statewide Corridor network incorporates BPA derived corridors and for bioregions where no BPA has been assessed yet, corridors derived under other planning processes. *Note: as a result of updating and developing a statewide network, the alignment of corridors may differ slightly in some instances when compared to those used in individual BPAs.*

The functions of these corridors are:

- **Terrestrial** Bioregional corridors, in conjunction with large tracts of remnant vegetation, maintain ecological and evolutionary processes at a landscape scale, by:

  • Maintaining long term evolutionary/genetic processes that allow the natural change in distributions of species and connectivity between populations of species over long periods of time;

  • Maintaining landscape/ecosystems processes associated with geological, altitudinal and climatic gradients, to allow for ecological responses to climate change;

  • Maintaining large scale seasonal/migratory species processes and movement of fauna;

  • Maximising connectivity between large tracts/patches of remnant vegetation;

  • Identifying key areas for rehabilitation and offsets; and

- **Riparian** Bioregional Corridors also maintain and encourage connectivity of riparian and associated ecosystems.

The location of the corridors is determined by the following principles:

- Terrestrial

  • Complement riparian landscape corridors (i.e. minimise overlap and maximise connectivity);

  • Follow major watershed/catchment and/or coastal boundaries;

  • Incorporate major altitudinal/geological/climatic gradients;

  • Include and maximise connectivity between large tracts/patches of remnant vegetation;

  • Include and maximise connectivity between remnant vegetation in good condition; and

- Riparian

• Located on the major river or creek systems within the bioregion in question.

The total extent of remnant vegetation triggered as being of "State", "Regional" or "Local" significance due to the presence of an overlying BPA derived terrestrial or riparian corridor within the AOI, is provided in the following table. For further information on how remnant vegetation is triggered due to the presence of an overlying BPA derived corridor, refer to the relevant landscape BPA expert panel report(s).

Table 14: Extent of triggered remnant vegetation due to the presence of BPA derived corridors with respect to the AOI

Biodiversity Significance	Area (Ha)	% of AOI
State	1,220.72	53.15
Regional	0.0	0.0
Local	0.0	0.0

NB: area figures associated with the extent of corridor triggered remnant vegetation are only available for those bioregions where a BPA has been undertaken.

Refer to **Map 3** for further information.

Threatening process/condition (Criteria K) - areas identified by experts under this criterion may be used to amend (upgrade or downgrade) biodiversity significance arising from the "first-cut" analysis. The condition of remnant vegetation is affected by threatening processes such as weeds, ferals, grazing and burning regime, selective timber harvesting/removal, salinity, soil erosion, and climate change.

Assessment of Criteria K with respect to the AOI is not currently included in the "Biodiversity and Conservation Values" report, as it has not been applied to the majority of Queensland due to data/information limitations and availability.

Special Area Decisions

Expert panel derived "Special Area Decisions" are used to assign values to Other Essential Criteria. The specific decisions which relate to the AOI in question are listed in the table below.

Table 15: Expert panel decisions for assigning levels of biodiversity significance with respect to the AOI

Decision Number	Description	Panel Recommended Significance	Criteria Values
chc_l_16	Ephemeral wetlands	State	Ia (centre of endemism): VERY HIGH Ib (wildlife refugia): VERY HIGH Ic (disjunct populations): HIGH Id (geographic range limit): HIGH Ie (high species diversity): VERY HIGH If (relictual populations): HIGH Ig (RE's show distinct variation in species composition): VERY HIGH Ij (breeding or roosting sites): VERY HIGH
chc_l_17	Floodplain linkages	State	Ib (wildlife refugia): VERY HIGH Id (geographic range limit): VERY HIGH Ie (high species diversity): VERY HIGH Ig (RE's show distinct variation in species composition): VERY HIGH Ij (breeding or roosting sites): VERY HIGH
chc_l_19	Riparian Corridors	State	J (Corridors): State

Expert panel decision descriptions:

chc_l_16

Habitat for a wider range of invertebrates and algae than permanent and semi-permanent waterholes, including species such as fairy shrimp and shield shrimp which do not occur in more permanent waterholes where fish predation is higher. Support waterbird populations estimated systematically to be in the millions of individuals and breeding colonies or dispersed waterbird breeding numbering tens of thousands of pairs (for multiple species) (Reid and Jaensch in Costelloe et al 2004);

among the most important recruitment areas for waterbirds in Australia (Jaensch 2009); include the most important sites in Australia for a suite of waterbird species in terms of numbers (supporting >1% of total population size). Many of the wetlands, at several scales, can be demonstrated to meet criteria for international importance.

Includes areas outside of floodplains that may fill from local runoff. Includes salt pan systems which have their own unique suit of species.

These wetlands go dry every year or nearly every year. They will go dry by end of the year in average seasons but last during good seasons or after very large floods and when clusters of good flood seasons occur.

chc_l_17

Links wetland type ecosystems. Provides all ecosystem services associated with flood events. These biodiversity values are defined using the greatest flood event.

Good Flood (above Major). All channels, gutters and floodways are activated, with overland flows across the tops of channels banks and levees; sand dunes become isolated islands; 80 - 100% of the floodplain inundated

Handy Flood (Major). Braid gutters activated as sheets of water spread out from the main channels, most downstream water flow is via the floodways formed by braid gutters; 50 - 60% of the floodplain inundated

Gutter Flood (Moderate). Water escaping from primary and secondary channels into channel and braid gutters but generally contained within gutter channels; 5 - 15% of the floodplain inundated

Channel Flood (Minor). Water just escaping from primary channels and into channel gutters; <5% of the floodplain inundated

River flow (below Minor). Water contained within river banks; no floodplain inundation

chc_l_19

Riparian corridors in the Channel Country are significant for biodiversity both as a climatic refuge and as a major element of habitat continuity including connecting permanent waterholes.

Includes major channels (250k geodata hierarchy 1) plus minor channels (250k geodata hierarchy 2 3) necessary to capture permanent waterholes, buffered by 1km either side and clipped to land zone 3.

Aquatic Conservation Assessments

Introduction

The Aquatic Biodiversity Assessment and Mapping Method or AquaBAMM (Clayton *et al.* 2006), was developed to assess conservation values of wetlands in queensland, and may also have application in broader geographical contexts. It is a comprehensive method that uses available data, including data resulting from expert opinion, to identify relative wetland conservation/ecological values within a specified study area (usually a catchment). The product of applying this method is an Aquatic Conservation Assessment (ACA) for the study area.

An ACA using AquaBAMM is non-social, non-economic and identifies the conservation/ecological values of wetlands at a user-defined scale. It provides a robust and objective conservation assessment using criteria, indicators and measures that are founded upon a large body of national and international literature. The criteria, each of which may have variable numbers of indicators and measures, are naturalness (aquatic), naturalness (catchment), diversity and richness, threatened species and ecosystems, priority species and ecosystems, special features, connectivity and representativeness. An ACA using AquaBAMM is a powerful decision support tool that is easily updated and simply interrogated through a geographic information system (GIS).

Where they have been conducted, ACAs can provide a source of baseline wetland conservation/ecological information to support natural resource management and planning processes. They are useful as an independent product or as an important foundation upon which a variety of additional environmental and socio-economic elements can be added and considered (i.e. an early input to broader 'triple-bottom-line' decision-making processes). An ACA can have application in:

- determining priorities for protection, regulation or rehabilitation of wetlands and other aquatic ecosystems
- on-ground investment in wetlands and other aquatic ecosystems
- contributing to impact assessment of large-scale development (e.g. dams)
- water resource and strategic regional planning prcesses

For a detailed explanation of the methodology please refer to the summary and expert panel reports relevant to the ACA utilised in this assessment. These reports can be accessed at Wetland *Info*:

http://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca

The GIS results can be downloaded from the Queensland Spatial Catalogue at:

http://qspatial.information.qld.gov.au/geoportal/

Explanation of Criteria

Under the AquaBAMM, eight criteria are assessed to derive an overall conservation value. Similar to the Biodiversity Assessment and Mapping Methodology, the criteria may be primarily diagnostic (quantitative) or primarily expert opinion (qualitative) in nature. The following sections provide a brief description of each of the 8 criteria.

Criteria 1. Naturalness - Aquatic: This attribute reflects the extent to which a wetland's (riverine, non-riverine, estuarine) aquatic state of naturalness is affected through relevant influencing indicators which include: presence of exotic flora and fauna; presence of aquatic communities; degree of habitat modification and degree of hydrological modification.

Criteria 2. Naturalness - Catchment: The naturalness of the terrestrial systems of a catchment can have an influence on many wetland characteristics including: natural ecological processes e.g. nutrient cycling, riparian vegetation, water chemistry, and flow. The indicators utilised to assess this criterion include: presence of exotic flora and/or fauna; riparian, catchment and flow modification.

Criteria 3. Naturalness - Diversity and Richness: This criterion is common to many ecological assessment methods and can include both physical and biological features. It includes such indicators as species richness, riparian ecosystem richness and geomorphological diversity.

Criteria 4. Threatened Species and Ecosystems: This criterion evaluates ecological rarity characteristics of a wetland. This includes both species rarity and rarity of communities / assemblages. The communities and assemblages are best represented by regional ecosystems. Species rarity is determined by NCA and EPBC status with Endangered, Vulnerable or Near-threatened species being included in the evaluation. Ecosystem rarity is determined by regional ecosystem biodiversity status i.e. Endangered, Of Concern, or Not of Concern.

Criteria 5. Priority Species and Ecosystems: Priority flora and fauna species lists are expert panel derived. These are aquatic, semi-aquatic and riparian species which exhibit at least 1 particular trait in order to be eligible for consideration. For

flora species the traits included:

- It forms significant macrophyte beds (in shallow or deep water).
- It is an important food source.
- It is important/critical habitat.
- It is implicated in spawning or reproduction for other fauna and/or flora species.
- It is at its distributional limit or is a disjunct population.
- It provides stream bank or bed stabilisation or has soil binding properties.
- It is a small population and subject to threatening processes.

Fauna species are included if they meet at least one of the following traits:

- It is endemic to the study area (>75 per cent of its distribution is in the study area/catchment).
- It has experienced, or is suspected of experiencing, a serious population decline.
- It has experienced a significant reduction in its distribution and has a naturally restricted distribution in the study area/catchment.
- It is currently a small population and threatened by loss of habitat.
- It is a significant disjunct population.
- It is a migratory species (other than birds).
- A significant proportion of the breeding population (>one per cent for waterbirds, >75 per cent other species) occurs in the waterbody (see Ramsar criterion 6 for waterbirds).
- Limit of species range.

See the individual expert panel reports for the priority species traits specific to an ACA.

Criteria 6. Special Features: Special features are areas identified by flora, fauna and ecology expert panels which exhibit characteristics beyond those identified in other criteria and which the expert panels consider to be of the highest ecological importance. Special feature traits can relate to, but are not solely restricted to geomorphic features, unique ecological processes, presence of unique or distinct habitat, presence of unique or special hydrological regimes e.g. spring-fed streams. Special features are rated on a 1 - 4 scale (4 being the highest).

Criteria 7. Connectivity: This criterion is based on the concept that appropriately connected aquatic ecosystems are healthy and resilient, with maximum potential biodiversity and delivery of ecosystem services.

Criteria 8. Representativeness: This criterion applies primarily to non-riverine assessments, evaluates the rarity and uniqueness of a wetland type in relation to specific geographic areas. Rarity is determined by the degree of wetland protection within "protected Areas" estate or within an area subject to the *Fisheries Act 1994*, *Coastal Protection and Management Act 1995*, or *Marine Parks Act 2004*. Wetland uniqueness evaluates the relative abundance and size of a wetland or wetland management group within geographic areas such as catchment and subcatchment.

Riverine Wetlands

Riverine wetlands are all wetlands and deepwater habitats within a channel. The channels are naturally or artificially created, periodically or continuously contain moving water, or connecting two bodies of standing water. AquaBAMM, when applied to riverine wetlands uses a discrete spatial unit termed subsections. A subsection can be considered as an area which encompasses discrete homogeneous stream sections in terms of their natural attributes (i.e. physical, chemical, biological and utilitarian values) and natural resources. Thus in an ACA, an aquatic conservation significance score is calculated for each subsection and applies to all streams within a subsection, rather than individual streams as such.

Please note, the area figures provided in Tables 16 and 17, are derived using the extent of riverine subsections within the AOI. Refer to **Map 5** for further information. A summary of the conservation significance of riverine wetlands within the AOI is provided in the following table.

Table 16: Overall level/s of riverine aquatic conservation significance

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
Very High	2,296.60	100.0

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	0.0	0.0
Medium	0.0	0.0
Low	0.0	0.0
Very Low	0.0	0.0

The individual aquatic conservation criteria ratings for riverine wetlands within the AOI are listed below.

Table 17: Level/s of riverine aquatic conservation significance based on selected criteria

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic			1,402.70	61.1	893.9	38.9		
2. Naturalness catchment	2,296.60	100.0						
3. Diversity and richness					2,296.60	100.0		
4. Threatened species and ecosystems			2,296.60	100.0				
5. Priority species and ecosystems	2,296.60	100.0						
6. Special features	2,296.60	100.0						
7. Connectivity	2,296.60	100.0						
8. Representative-ness								

The table below lists and describes the relevant expert panel decisions used to assign conservation significance values to riverine wetlands within the AOI.

Table 18: Expert panel decisions for assigning overall levels of riverine aquatic conservation significance

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
cp_r_ec_02	Wilson's Swamp, Tanbar and Eulbertie waterholes	Cooper	6.1.1	3
cp_r_fa_05	Lower Cooper waterbird - Tooley Wooley Water Hole and Naryilco Complex	Cooper	5.1.4	4
cp_r_fa_07	Permanent waterholes - long term	Cooper	6.3.1	4
cp_r_fl_01	Lignum swamps along channels	Cooper	5.2.1	3

4 is the highest rating/value

Expert panel decision descriptions:

cp_r_ec_02

The unique geomorphology of the sand dunes has created permanent water holes (Wilson's Swamp, Tanbar and Eulbertie waterholes).

cp_r_fa_05

Large accumulations of waterbirds. Ten to 15 colonial nesting waterbird breeding species, large numbers of each. The permanent waterholes provide a significant resource in an otherwise arid region (Blackman et al. 1999). The Bilpa-Baryulah ('Nappa Merrie') to Tooley Wooley's Water Holes area is a significant waterbird breeding floodplain on the lower Cooper in Qld, but poorly researched (DERM 2009a). AridFlo was not granted permission to survey the Nappa Merrie portion in 2000, but historical accounts (Chenery 1921) attest to the large ibis-egret colonies there, and we (R. Jaensch and J. Reid) have observed colonial nesting waterbirds breeding there and on the Tooley Woolies in smaller flood years on the Cooper. This tract could be drawn to include the southern portions of the 'Big Bend', e.g. Yetally Waterhole, to capture all of the important waterbird breeding habitat in this district.

cp_r_fa_07

Ecological processes in the LEBB work over vast timeframes of centuries or 1000's of years. The permanent waterholes (100% permanent >100 years) that never go dry over these longer timeframes are critically important to aquatic species persistence in these arid landscapes. They have a major influence on the genetic diversity and gene flow between river catchments. These waterholes act as refugia (Hamilton et al. 2005), e.g. metapopulation and genetics of the Cooper Creek turtle requires long time frames of persistence to sustain populations and species. However, the panel cautioned that care is required for broad application of this decision as some wetlands have been modified through water extraction (Bunn et al. 2006).

cp_r_fl_01

Large lignum swamps provide important habitat for waterbirds, including breeding and feeding habitat especially for colonial waterbird species, e.g. egrets, herons, ibis, and for other fauna. These swamps are associated with river channels lined with river coolabahs. etc. 5.3.13a: Palustrine wetland of **Muehlenbeckia florulenta** open-shrubland sometimes with scattered low trees such as **Acacia stenophylla, A. victoriae, Eremophila bignoniiflora, Eucalyptus coolabah**. Occurs on floodplains in depressions or fringing channels.

Non-riverine Wetlands

Non-riverine wetlands include both lacustrine and palustrine wetlands, however, do not currently incorporate estuarine, marine or subterranean wetland types. A summary of the conservation significance of non-riverine wetlands within the AOI is provided in the following table. Refer to **Map 6** for further information.

Table 19: Overall level/s of non-riverine aquatic conservation significance

Aquatic conservation significance (non-riverine wetlands)	Area (Ha)	% of AOI
Very High	482.09	20.99
High	0.0	0.0
Medium	0.0	0.0
Low	0.0	0.0
Very Low	0.0	0.0

The following table provides an assessment of non-riverine wetlands within the AOI and associated aquatic conservation criteria values.

Table 20: Level/s of non-riverine aquatic conservation significance based on selected criteria

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic	482.09	21.0						
2. Naturalness catchment	482.09	21.0						
3. Diversity and richness	482.09	21.0						
4. Threatened species and ecosystems	482.09	21.0						
5. Priority species and ecosystems					482.09	21.0		
6. Special features								
7. Connectivity								
8. Representative-ness	482.09	21.0						

The table below lists and describes the relevant expert panel decisions used to assign conservation significance values to non-riverine wetlands within the AOI.

Table 21: Expert panel decisions for assigning overall levels of non-riverine aquatic conservation significance.

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
cp_nr_ec_02	Temporary claypan wetlands	Cooper	5.2.1	3
cp_nr_fl_01	Bluebush with or without lignum swamps	Cooper	5.2.1	2
cp_nr_fl_02	Lignum swamps	Cooper	5.2.1	3

4 is the highest rating/value

Expert panel decision descriptions:

cp_nr_ec_02

A number of temporary claypan wetlands not fed by rivers have different biota adapted to different desiccation cycles e.g. fairy shrimp. For the majority of their time they are dry and are susceptible to cattle damage and woody debris removal. The REs associated with this decision are: 4.3.12b, d; 5.3.13b; 5.3.15a, b; 5.3.16a; 5.3.22a; 5.3.8b; 6.3.11; 6.3.11b.

cp_nr_fl_01

Bluebush with or without lignum swamps were identified as having significant flora and fauna values (though lesser value than wetlands of 5.3.13a\b and 5.3.16b). 5.3.12a/b: Palustrine wetland of **Chenopodium auricomum** open-shrubland sometimes with scattered **Eucalyptus coolabah** low trees and **Eremophila bignoniiflora** tall shrubs. Occurs in swampy depressions on alluvial plains and on frequently flooded inter-dune flats and clay pans. Soils very deep, grey cracking clays of light to medium texture, and contain varying amounts of silt and sand. RE 4.3.24: **Chenopodium auricomum** +\- **Muehlenbeckia florulenta** open shrubland in swampy depressions within floodplains with braided channels.

cp_nr_fl_02

Large lignum swamps provide important habitat for waterbirds, including breeding and feeding habitat especially for colonial waterbird species (e.g. egrets, herons, ibis), and for other fauna. These swamps are associated with river channels lined with river coolabahs. etc. 5.3.13a/b: Palustrine wetland of **Muehlenbeckia florulenta** open-shrubland sometimes with scattered low trees such as **Acacia stenophylla, A. victoriae, Eremophila bignoniiflora, Eucalyptus coolabah**. Occurs on floodplains in depressions or fringing channels or in depressions, lakes or larger claypans in dune systems.

Threatened and Priority Species

Introduction

This chapter contains a list of threatened and priority flora and/or fauna species that have been recorded on, or within 4km of the Assessment Area.

The information presented in this chapter with respect to species presence is derived from compiled databases developed primarily for the purpose of BPAs and ACAs. Data is collated from a number of sources and is updated periodically.

It is important to note that the list of species provided in this report, may differ when compared to other reports generated from other sources such as the State government's WildNet, Herbrecs or the federal government's EPBC database for a number of reasons.

Records for threatened and priority species are filtered and checked based on a number of rules including:

- Taxonomic nomenclature - current scientific names and status,
- Location - cross-check co-ordinates with location description,
- Taxon by location - requires good knowledge of the taxon and history of the record,
- Duplicate records - identify and remove,
- Expert panels - check records and provide new records,
- Flora cultivated records excluded,
- Use precise records less than or equal to 2000m,
- Use recent records greater than or equal to 1975 animals, greater than or equal to 1950 plants.

Threatened Species

Threatened species are those species classified as "Endangered" or "Vulnerable" under the *Environment Protection and Biodiversity Conservation Act 1999* or "Endangered", "Vulnerable" or "Near threatened" under the *Nature Conservation Act 1992*.

The following threatened species have been recorded on, or within approximately 4km of the AOI.

Table 22: Threatened species recorded on, or within 4km of the AOI

Species	Common name	NCA status	EPBC status	Back on Track rank	Migratory species*	Wetland species**	Identified flora/fauna
Amytornis barbatus barbatus	grey grasswren (Bulloo)	E	E	High			FA
Amytornis barbatus diamantina	grey grasswren (Lake Eyre basin)	NT		High			FA

NB. Please note that the threatened species listed in this section are based upon the most recently compiled DES internal state-wide threatened species dataset. This dataset may contain additional records that were not originally available for inclusion in the relevant individual BPAs and ACAs.

**JAMBA - Japan-Australia Migratory Bird Agreement; CAMBA - China-Australia Migratory Bird Agreement; ROKAMBA - Republic of Korea-Australia Migratory Bird Agreement; CMS - Convention on the Conservation of Migratory Species*.

***I - wetland indicator species; D - wetland dependent species*.

BPA Priority Species

A list of BPA priority species that have been recorded on, or within approximately 4km of the AOI is contained in the following table.

Table 23: Priority species recorded on, or within 4km of the AOI

(no results)

NB. Please note that the list of priority species is based on those species identified in the BPAs, however records for these species may be more recent than the originals used. furthermore, the BPA priority species databases are updated from time to time. At each update, the taxonomic details for all species are amended as necessary to reflect current taxonomic name and/or status changes.

ACA Priority Species

A list of ACA priority species used in riverine and non-riverine ACAs that have been recorded on, or within approximately 4km of the AOI are contained in the following tables.

Table 24: Priority species recorded on, or within 4 km of the AOI - riverine

Species	Common name	Back on Track rank	Identified flora/fauna
Chlidonias hybrida	Whiskered Tern	Low	FA
Erythrogonys cinctus	Red-kneed Dotterel	Low	FA
Ninox connivens	Barking Owl	Low	FA
Porzana fluminea	Australian Spotted Crake	Low	FA
Tribonyx ventralis	Black-tailed Native-hen	Low	FA

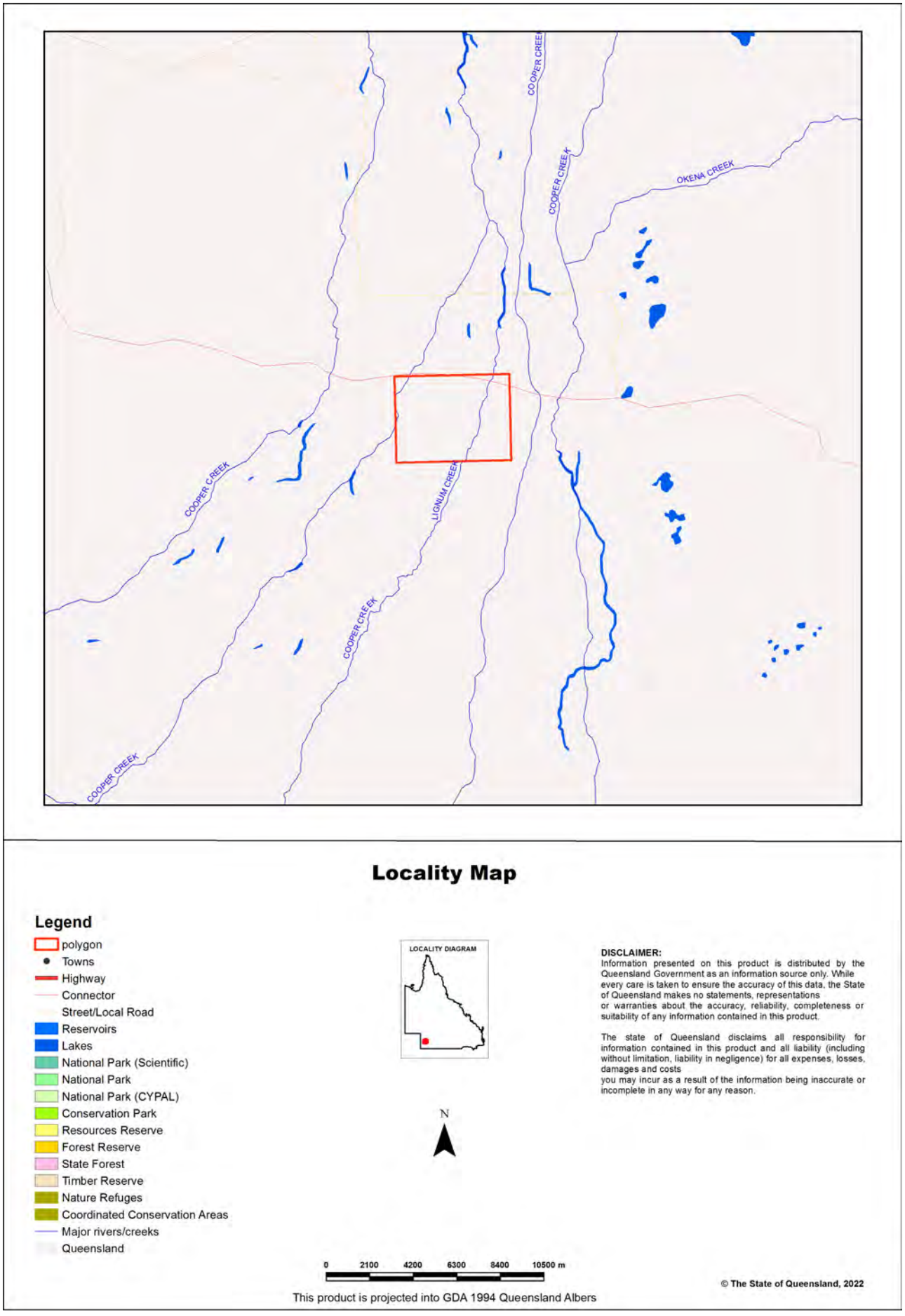
Table 25: Priority species recorded on, or within 4 km of the AOI - non-riverine

Species	Common name	Back on Track rank	Identified flora/fauna
Chlidonias hybrida	Whiskered Tern	Low	FA
Erythrogonys cinctus	Red-kneed Dotterel	Low	FA
Ninox connivens	Barking Owl	Low	FA
Porzana fluminea	Australian Spotted Crake	Low	FA
Tribonyx ventralis	Black-tailed Native-hen	Low	FA

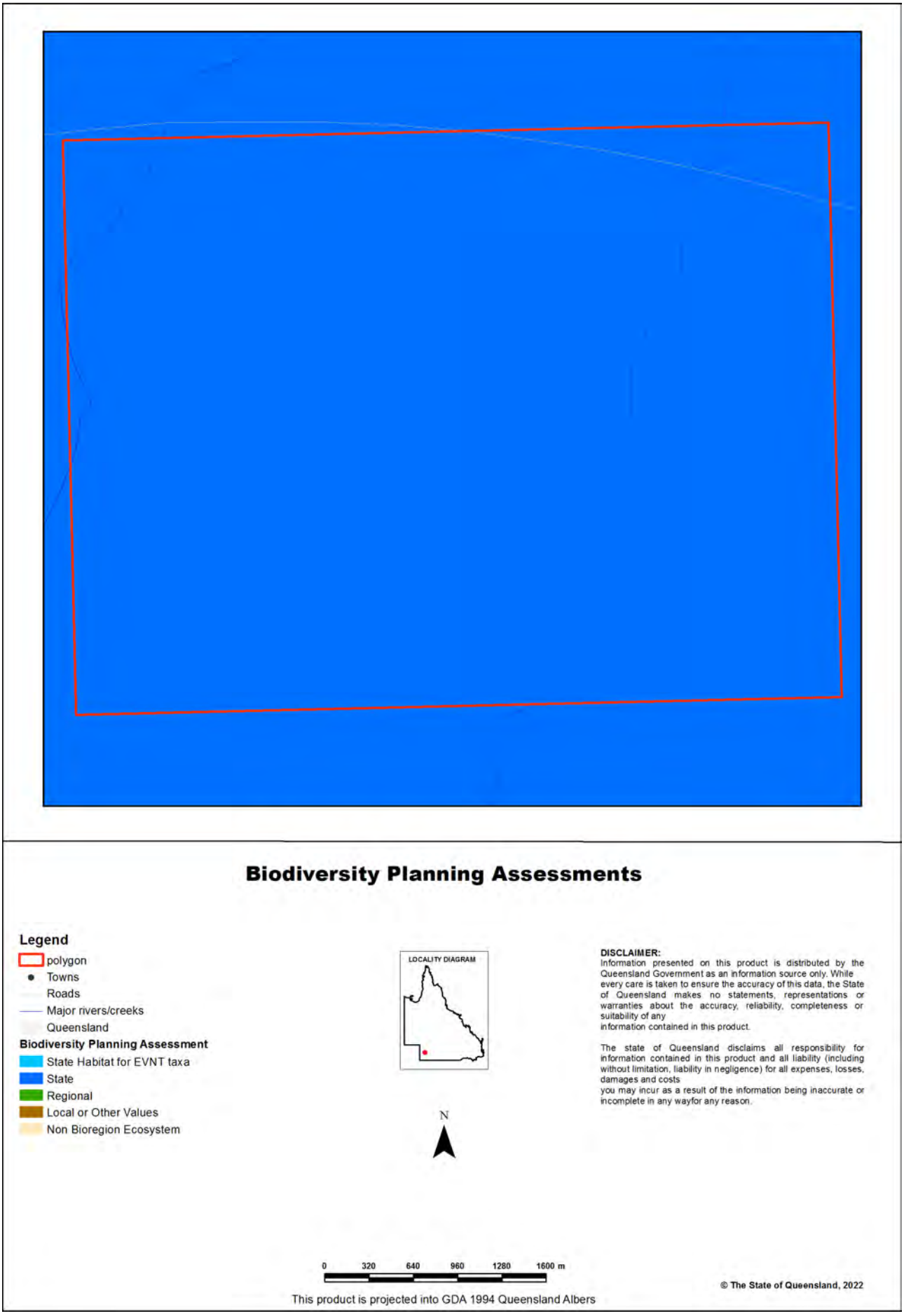
NB. Please note that the priority species records used in the above two tables are comprised of those adopted for the released individual ACAs. The ACA riverine and non-riverine priority species databases are updated from time to time to reflect new release of ACAs. At each update, the taxonomic details for all ACAs records are amended as necessary to reflect current taxonomic name and/or status changes.

Maps

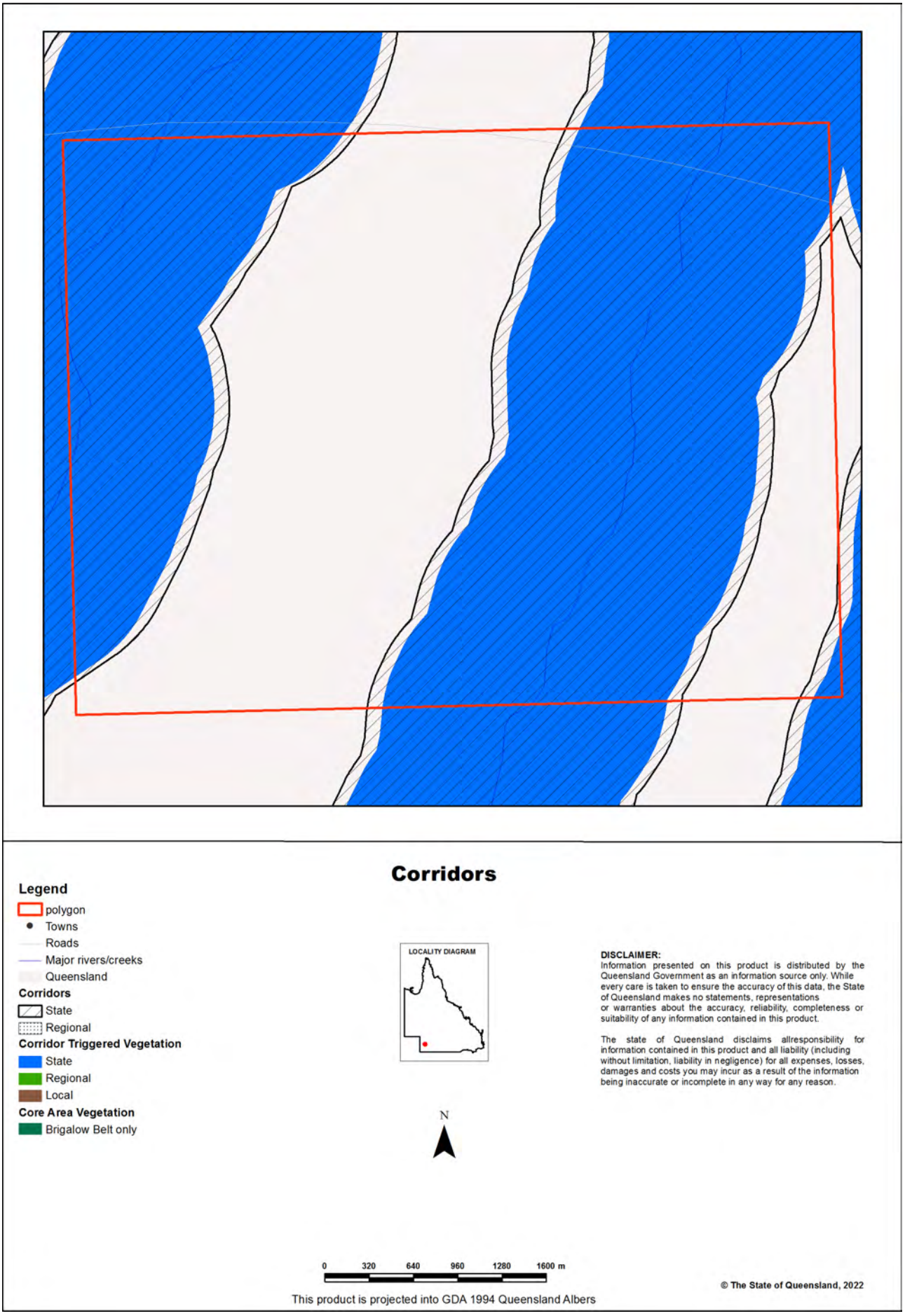
Map 1 - Locality Map



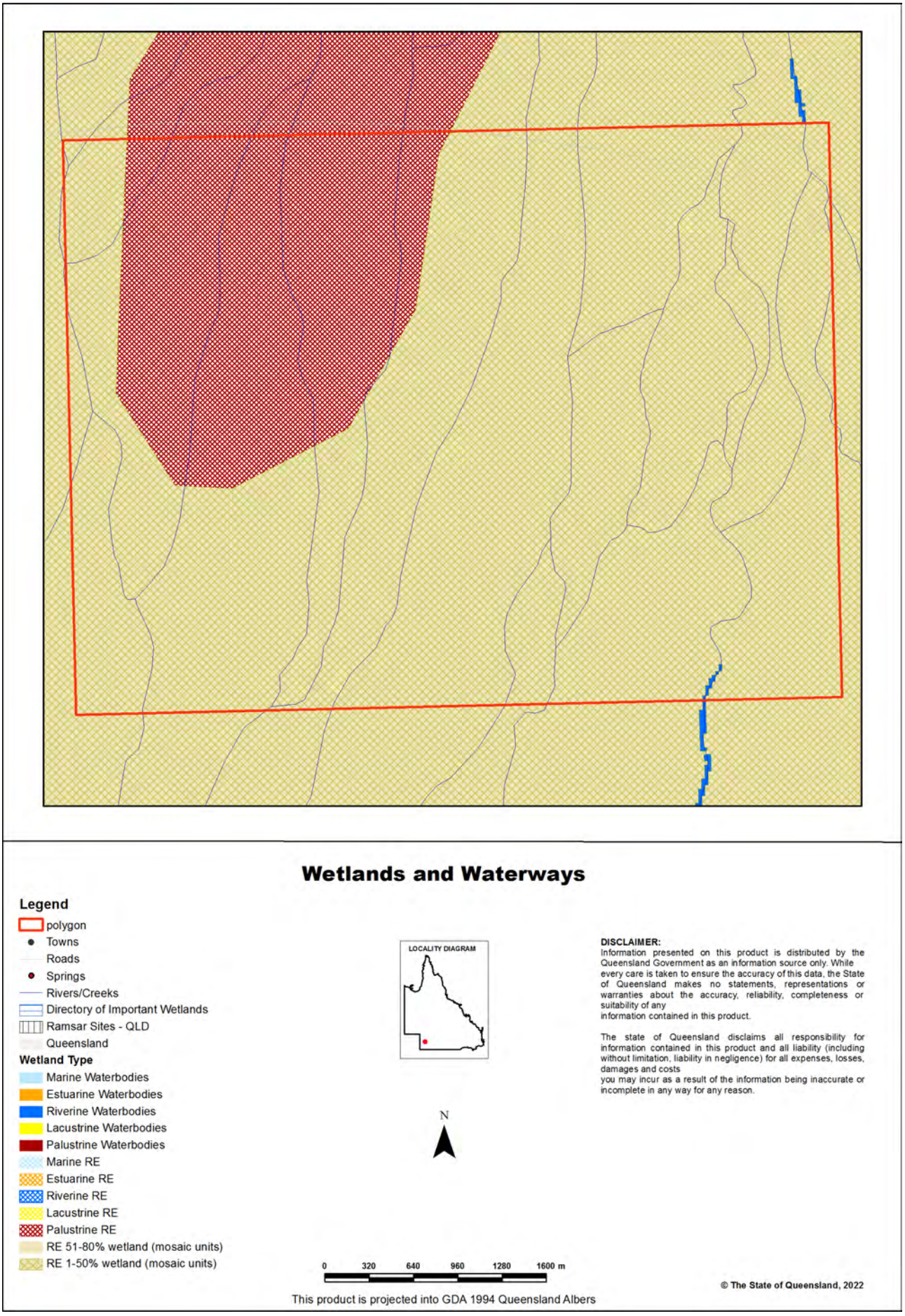
Map 2 - Biodiversity Planning Assessment (BPA)



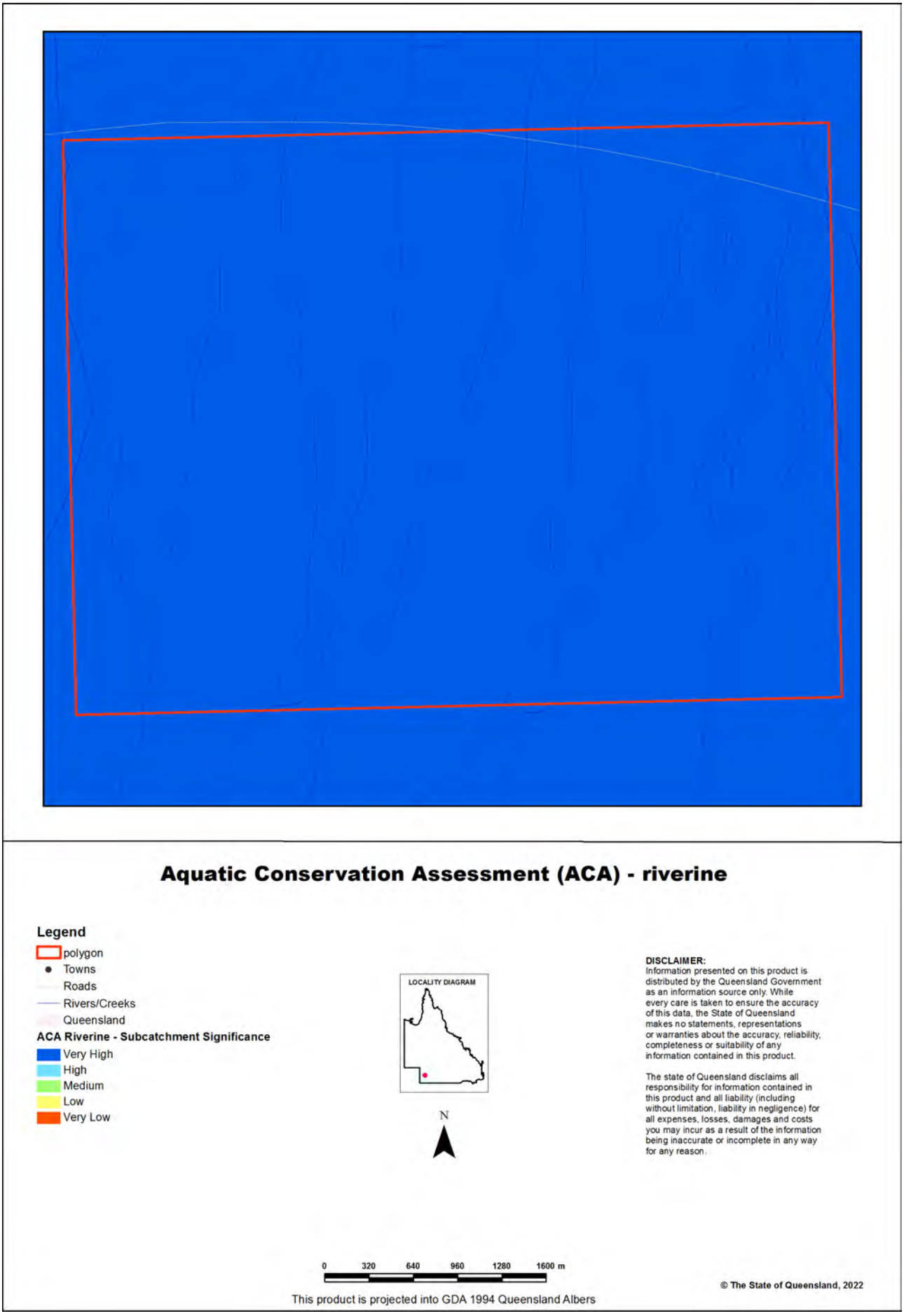
Map 3 - Corridors



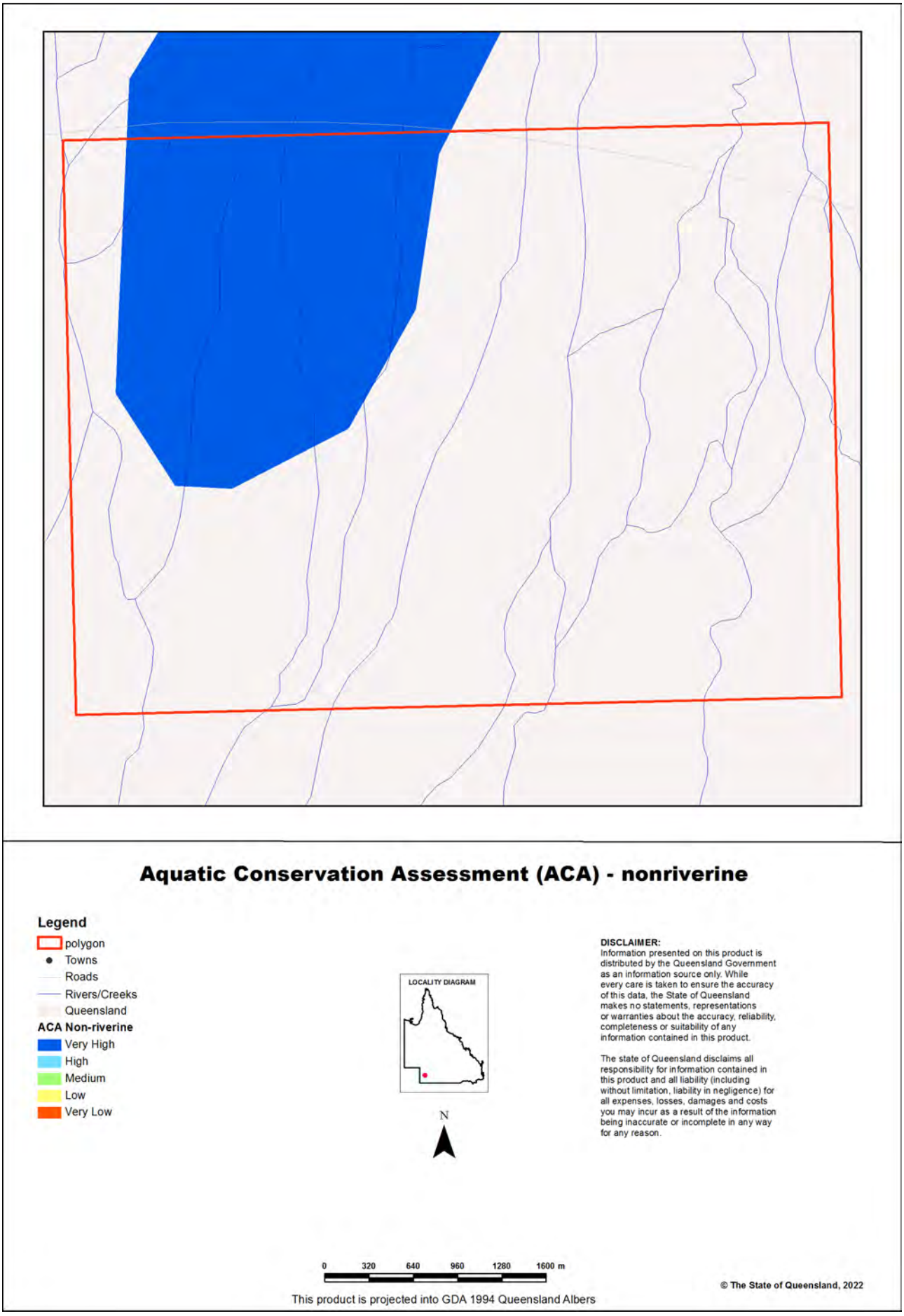
Map 4 - Wetlands and waterways



Map 5 - Aquatic Conservation Assessment (ACA) - riverine



Map 6 - Aquatic Conservation Assessment (ACA) - non-riverine



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http://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca/

Environmental Protection Agency (2002) *Biodiversity Assessment and Mapping Methodology. Version 2.1, July 2002.* (Environmental Protection Agency, Brisbane).

Morton, S. R., Short, J. and Barker, R. D. with an Appendix by G.F. Griffin and G. Pearce (1995). *Refugia for Biological Diversity in Arid and Semi-arid Australia. Biodiversity Series* , Paper No. 4, Biodiversity Unit, Environment Australia.

Sattler, P.S. and Williams, R.D. (eds) (1999). *The Conservation Status of Queensland's Bioregional Ecosystems*. Environmental Protection Agency, Brisbane.

Appendices

Appendix 1 - Source Data

Theme	Datasets
Aquatic Conservation Assessments Non-riverine*	Combination of the following datasets: Cape York Peninsula Non-riverine v1.1 Eastern Gulf of Carpentaria v1.1 Great Barrier Reef Catchment Non-riverine v1.3 Lake Eyre and Bulloo Basins v1.1 QMDB Non-riverine ACA v1.4 Southeast Queensland ACA v1.1 WBB Non-riverine ACA v1.1 Southern Gulf Catchments Non-riverine ACA v1.1
Aquatic Conservation Assessments Riverine*	Combination of the following datasets: Cape York Peninsula Riverine v1.1 Eastern Gulf of Carpentaria v1.1 Great Barrier Reef Catchment Riverine v1.1 Lake Eyre and Bulloo Basins v1.1 QMDB Riverine ACA v1.4 Southeast Queensland ACA v1.1 WBB Riverine ACA v1.1 Southern Gulf Catchments Riverine ACA v1.1
Biodiversity Planning Assessments*	Combination of the following datasets: Brigalow Belt BPA v2.1 Cape York Peninsula BPA v1.1 Central Queensland Coast BPA v1.3 Channel Country BPA v1.1 Desert Uplands BPA v1.3 Einasleigh Uplands BPA v1.1 Gulf Plains BPA v1.1 Mitchell Grass Downs BPA v1.1 Mulga Lands BPA v1.4 New England Tableland v2.3 Northwest Highlands v1.1 Southeast Queensland v4.1 Wet Tropics v1.1
Statewide BPA Corridors*	Statewide corridors v1.6
Threatened Species	An internal DES database compiled from Wildnet, Herbrecs, Corveg, the QLD Museum, as well as other incidental sources.
BPA Priority Species	An internal DES database compiled from Wildnet, Herbrecs, Corveg, the QLD Museum, as well as other incidental sources.
ACA Priority Species	An internal DES database compiled from Wildnet, Herbrecs, Corveg, the QLD Museum, as well as other incidental sources.

***These datasets are available at:**

http://dds.information.qld.gov.au/DDS

Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
ACA	- Aquatic Conservation Assessment
AQUABAMM	- Aquatic Biodiversity Assessment and Mapping Methodology
BAMM	- Biodiversity Assessment and Mapping Methodology
BoT	- Back on Track
BPA	- Biodiversity Planning Assessment
CAMBA	- China-Australia Migratory Bird Agreement
DES	- Department of Environment and Science
EPBC	- *Environment Protection and Biodiversity Conservation Act 1999*
EVNT	- Endangered, Vulnerable, Near Threatened
GDA94	- Geocentric Datum of Australia 1994
GIS	- Geographic Information System
JAMBA	- Japan-Australia Migratory Bird Agreement
NCA	- *Nature Conservation Act 1992*
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
ROKAMBA	- Republic of Korea-Australia Migratory Bird Agreement

WildNet Records
Species List

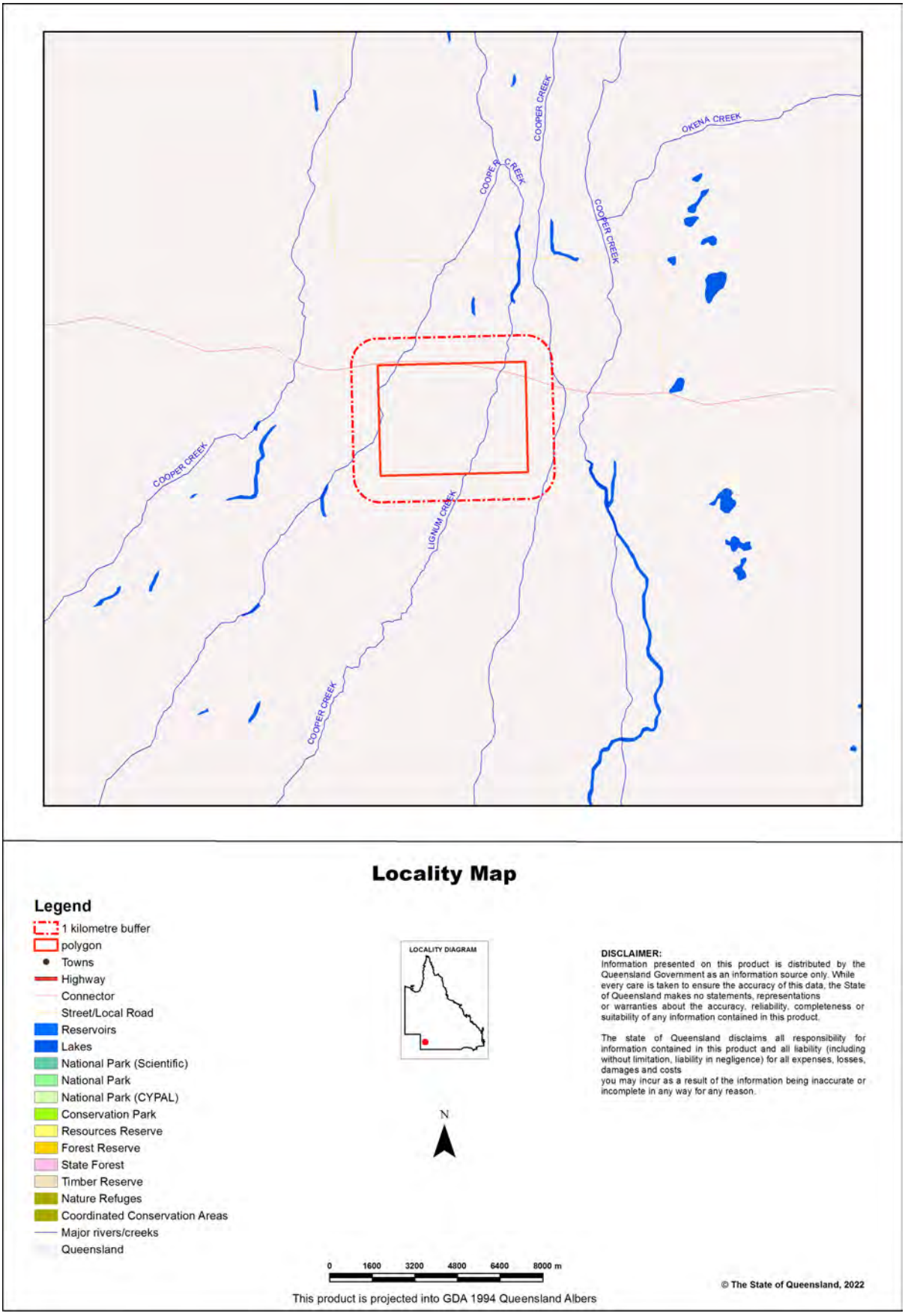
For the selected area of interest 2296.59ha

Current as at 26/04/2022

Wackett

Queensland Government

Map 1. Locality Map



Summary Information

The following table provides an overview of the area of interest .

Table 1. Area of interest details

Size (ha)	2,296.59
Local Government(s)	Bulloo Shire
Bioregion(s)	Channel Country
Subregion(s)	Cooper - Diamantina Plains
Catchment(s)	Cooper Creek

Protected Area(s)
No estates or reserves are located within the area of interest.

World Heritage Area(s)
No World Heritage Areas are located within the area of interest.

Ramsar Area(s)
No Ramsar Areas are located within the area of interest.

Species List

Introduction

This report is derived from a spatial layer generated from the WildNet database managed by the Department of Environment and Science. The layer which is generated weekly contains the WildNet wildlife records that are not classed as erroneous or duplicate, that have a location precision equal to or less than 10000 metres and do not have a count of zero.

The WildNet dataset is constantly being enhanced and the taxonomic and status information revised. If a species is not listed in this report, it does not mean it doesn't occur there and listed species may also no longer inhabit the area. It is recommended that you also access other internal and external data sources for species information in your area of interest (Refer Links and Support).

Table 2 lists the animals recorded within the area of interest and its one kilometre buffer.

Table 3 lists the plants recorded within the area of interest and its one kilometre buffer.

Table 4 lists the fungi recorded within the area of interest and its one kilometre buffer.

Table 5 lists the other species recorded within the area of interest and its one kilometre buffer.

Table 2. Animals recorded within the area of interest and its one kilometre buffer

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
1732	Aves	Accipitridae	*Aquila audax*	wedge-tailed eagle	C	None	0	1	12/12/2001
1722	Aves	Accipitridae	*Circus approximans*	swamp harrier	C	None	0	1	22/08/2000
1723	Aves	Accipitridae	*Circus assimilis*	spotted harrier	C	None	0	1	29/10/2012
1707	Aves	Accipitridae	*Haliastur sphenurus*	whistling kite	C	None	0	1	24/08/2006
1714	Aves	Accipitridae	*Milvus migrans*	black kite	C	None	0	3	24/08/2006
1305	Aves	Acrocephalidae	*Acrocephalus australis*	Australian reed-warbler	C	None	0	1	07/07/2000
1652	Aves	Alaudidae	*Mirafra javanica*	Horsfield's bushlark	C	None	0	1	13/12/2001

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
1993	Aves	Anatidae	*Anas gracilis*	grey teal	C	None	0	1	22/08/2000
1998	Aves	Anatidae	*Anas superciliosa*	Pacific black duck	C	None	0	1	22/08/2000
1999	Aves	Anatidae	*Aythya australis*	hardhead	C	None	0	1	07/07/2000
1279	Aves	Anhingidae	*Anhinga novaehollandiae*	Australasian darter	C	None	0	1	22/08/2000
1829	Aves	Ardeidae	*Ardea alba modesta*	eastern great egret	C	None	0	2	22/08/2000
1840	Aves	Ardeidae	*Egretta garzetta*	little egret	C	None	0	1	01/06/1976
1826	Aves	Ardeidae	*Egretta novaehollandiae*	white-faced heron	C	None	0	1	22/08/2000
1173	Aves	Cacatuidae	*Nymphicus hollandicus*	cockatiel	C	None	0	1	24/08/2006
1642	Aves	Campephagidae	*Lalage tricolor*	white-winged triller	C	None	0	1	24/08/2006
1809	Aves	Columbidae	*Geopelia cuneata*	diamond dove	C	None	0	1	12/12/2001
1608	Aves	Corvidae	*Corvus coronoides*	Australian raven	C	None	0	2	13/12/2001
1716	Aves	Falconidae	*Falco berigora*	brown falcon	C	None	0	1	22/08/2000
1761	Aves	Halcyonidae	*Todiramphus pyrrhopygius*	red-backed kingfisher	C	None	0	1	24/08/2006
1585	Aves	Hirundinidae	*Petrochelidon ariel*	fairy martin	C	None	0	4	24/08/2006
1563	Aves	Maluridae	*Amytornis barbatus*	grey grasswren	NT	None	0	1	24/08/2006
1557	Aves	Maluridae	*Malurus leucopterus*	white-winged fairy-wren	C	None	0	3	13/12/2001
1291	Aves	Megaluridae	*Cincloramphus cruralis*	brown songlark	C	None	0	1	24/08/2006
1287	Aves	Megaluridae	*Poodytes gramineus*	little grassbird	C	None	0	1	07/07/2000
1527	Aves	Meliphagidae	*Epthianura aurifrons*	orange chat	C	None	0	1	24/08/2006
1518	Aves	Meliphagidae	*Ptilotula penicillata*	white-plumed honeyeater	C	None	0	1	22/08/2000
1589	Aves	Monarchidae	*Grallina cyanoleuca*	magpie-lark	C	None	0	1	22/08/2000
1455	Aves	Motacillidae	*Anthus novaeseelandiae*	Australasian pipit	C	None	0	3	13/12/2001
1680	Aves	Otididae	*Ardeotis australis*	Australian bustard	C	None	0	2	13/12/2001
1264	Aves	Phalacrocoracidae	*Phalacrocorax varius*	pied cormorant	C	None	0	1	22/08/2000
1699	Aves	Phasianidae	*Coturnix pectoralis*	stubble quail	C	None	0	1	07/07/2000
1249	Aves	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian grebe	C	None	0	2	22/08/2000
1151	Aves	Psittacidae	*Melopsittacus undulatus*	budgerigar	C	None	0	1	24/08/2006
1686	Aves	Rallidae	*Fulica atra*	Eurasian coot	C	None	0	1	22/08/2000

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
1662	Aves	Rallidae	*Porphyrio melanotus*	purple swamphen	C	None	0	2	07/07/2000
1664	Aves	Rallidae	*Porzana fluminea*	Australian spotted crake	C	None	0	1	07/07/2000
1576	Aves	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail	C	None	0	2	22/08/2000
1822	Aves	Threskiornithidae	*Platalea flavipes*	yellow-billed spoonbill	C	None	0	2	22/08/2000
1823	Aves	Threskiornithidae	*Platalea regia*	royal spoonbill	C	None	0	2	22/08/2000
1825	Aves	Threskiornithidae	*Plegadis falcinellus*	glossy ibis	SL	None	0	1	07/07/2000
1800	Aves	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis	C	None	0	2	22/08/2000

Table 3. Plants recorded within the area of interest and its one kilometre buffer

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
30175	Equisetopsida	Asteraceae	*Senecio depressicola*	None	C	None	1	1	29/09/2005
15039	Equisetopsida	Asteraceae	*Sonchus oleraceus*	common sowthistle	None	None	1	1	29/09/2005
5309	Equisetopsida	Euphorbiaceae	*Euphorbia dallachyana*	None	C	None	1	1	29/09/2005
12156	Equisetopsida	Haloragaceae	*Haloragis glauca forma glauca*	None	C	None	1	1	29/09/2005

Table 4. Fungi recorded within the area of interest and its one kilometre buffer

No species found within the area of interest and its one kilometre buffer.

Table 5. Other species recorded within the area of interest and its one kilometre buffer

No species found within the area of interest and its one kilometre buffer.

Species table headings and codes

Taxon Id: Unique identifier of the taxon from the WildNet database.

NCA: Queensland conservation status of the taxon under the *Nature Conservation Act 1992* (Least Concern (C), Critically Endangered (CR), Endangered (E), Extinct (EX), Near Threatened (NT), Extinct in the Wild (PE), Special Least Concern (SL), and Vulnerable (V)).

EPBC: Australian conservation status of the taxon under the *Environment Protection and Biodiversity Conservation Act 1999* (Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Vulnerable (V), and Extinct in the Wild (XW)).

Specimens: The number of specimen-backed records of the taxon.

Records: The total number of records of the taxon.

Last record: Date of latest record of the taxon.

Links and Support

Other sites that deliver species information from the WildNet database include:

- Species profile search - access species information approved for publication including species names, statuses, notes, images, distribution maps and records

- Species lists - generate species lists for Queensland protected areas, forestry areas, local governments and areas defined using coordinates
- Biomaps - view biodiversity information, including WildNet records approved for publication, and generate reports
- Queensland Globe - view spatial information, including WildNet records approved for publication
- Qld wildlife data API - access WildNet species information approved for publication such as notes, images and records etc.
- Wetland*Maps* - view species records, survey locations etc. approved for publication
- Wetland*Summary* - view wildlife statistics, species lists for a range of area types, and access WildNet species profiles
- WildNet wildlife records - published - Queensland - spatial layer of WildNet records approved for publication generated weekly
- Generalised distribution and densities of Queensland wildlife - Queensland species distributions and densities generalised to a 10 km grid resolution
- Conservation status of Queensland wildlife - access current lists of priority species for Queensland including nomenclature and status information
- Queensland Confidential Species - the list of species flagged as confidential in the WildNet database.

Please direct queries about this report to the WildNet Team.

Other useful sites for accessing Queensland biodiversity data include:

- Useful wildlife resources
- Queensland Government Data
- Atlas of Living Australia (ALA)
- Online Zoological Collections of Australian Museums (OZCAM)
- Australia's Virtual Herbarium (AVH)
- Protected Matters Search Tool

Disclaimer

Appendix B: 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 1).

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 1) 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 1).

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 1). 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 1) to plot the consequence and likelihood to determine the level of risk.

Figure 1: Santos Risk Matrix

Santos Risk Matrix

Santos

Consequence	Negligible Harm	Minor Harm	Moderate Harm	Severe Harm	Single Fatality OR Critical Life Threatening Injuries	Multiple Fatalities
Safety	+ No bodily damage or minimal harm or impairment (hours to days)	+ Short term impairment (days to weeks)	+ Temporary disablement or medium term impairment (weeks to months)	+ Long term/life altering disablement or impairment		
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