



Environmental Authority Supporting Information Report

Comet Ridge Mahalo North Pty Ltd

Mahalo North Coal Seam Gas Project - Petroleum Lease

Emerald, Queensland

BAA220014.03

19 October 2023

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EXECUTIVE SUMMARY

Comet Ridge Mahalo North Pty Ltd (the Proponent) is seeking to construct and operate the Mahalo North coal seam gas (CSG) project, located approximately 45 Kilometres (km) north of Rolleston, within the Central Highlands Regional Council Local Government Area of Central Queensland (the project). This site-specific environmental authority (EA) application seeks to authorise the Proponent to conduct petroleum activities on a Petroleum Lease (PL).

The Proponent has lodged a resource authority application to the Department of Resources (DoR) for a PL tenure application for the project. The project is owned and managed by Comet Ridge Mahalo North Pty Ltd, a subsidiary of Comet Ridge Ltd. The Proponent is registered as a suitable operator (RSO003640).

Epic Environmental Pty Ltd (Epic) has prepared this Supporting Information Report (report) on behalf of the Proponent to accompany an application for a site-specific EA. The project does not meet the eligibility criteria and standard conditions (ERA Standards) for a standard application as the proposed activity for this EA application is not for petroleum exploration, petroleum survey, petroleum pipeline or geothermal exploration. Therefore, the project is considered to require a site-specific EA application as there are no ERA Standards that apply to the project.

The purpose of this EA application is to:

- Describe the site and project
- Describe all ERA's applicable to the project
- Describe the environmental values relevant to the project
- Identify the likely impact to environmental values from the project
- Provide details of emissions and releases likely to be generated by the project
- Provide details of the CSG water likely to be generated by the project
- Describe the risk and magnitude of the identified impacts on environmental values
- Propose management practices to prevent and minimise impacts
- Detail how the land associated with the project will be rehabilitated at the end of project life

This report has been prepared for the Department of Environment and Science (DES) as supporting information under section 125 of the *Environmental Protection Act 1994* (EP Act) and in accordance with the DES (formally Department of Environment and Heritage Protection (DEHP)) *Guideline Application requirements for petroleum activities* (DEHP 2013) to assist DES, the administering authority, in making a decision on this EA application.

The project is not considered to trigger an Environmental Impact Statement (EIS), based on an evaluation of the criteria contained within the DES *Guideline Criteria for environmental impact statements for resource Projects under the Environmental Protection Act 1994* (ESR/2016/2167, version 3.00, dated 04/11/2020).

1 INTRODUCTION

Epic Environmental Pty Ltd (Epic) has prepared this Supporting Information Report (report) on behalf of Comet Ridge Mahalo North Pty Ltd (the Proponent) to accompany an application for a site-specific environmental authority (EA) under section 125 of the *Environmental Protection Act 1994* (EP Act). This EA application seeks to authorise the Proponent to conduct petroleum activities on a Petroleum Lease (PL).

The Mahalo North Project (the project) involves a greenfield coal seam gas (CSG) development, including CSG wells, gas and water gathering pipelines, a gas compression facility (GCF) and ancillary infrastructure. The project is contained within PL1128, which represents 45 sub-blocks of approximately 14,000 hectares (ha). The project's life span is estimated to be 30 years and will supply the domestic Australian gas market.

The project is located approximately 45 kilometres (km) north of Rolleston, within the Central Highlands Regional Council (CHRC) Local Government Area (LGA) of Central Queensland. Refer to **Figure 1** for project location.

The Proponent has lodged a resource authority application to the Department of Resources (DoR) for the PL (acknowledgement letter received from DoR on 13 October 2023).

1.1 Purpose and Context

This report has been prepared to support an application for a new site-specific EA for a resource activity on PL1128 (EA application). The purpose of this EA application is to:

- Describe the site and the project
- Describe the related environmentally relevant activities (ERAs) associated with this EA application
- Describe the environmental values relevant to the project
- Describe the potential impacts to environmental values resulting from activities associated with the construction and operation of the ERAs within the PL
- Provide details of emissions and releases likely to be generated by the project
- Provide details of the CSG water likely to be generated by the project
- Describe the risk and magnitude of the identified impacts on environmental values
- Provide mitigation and management measures for the identified potential impacts to environmental values
- Detail how the land associated with the project will be rehabilitated at the end of project life

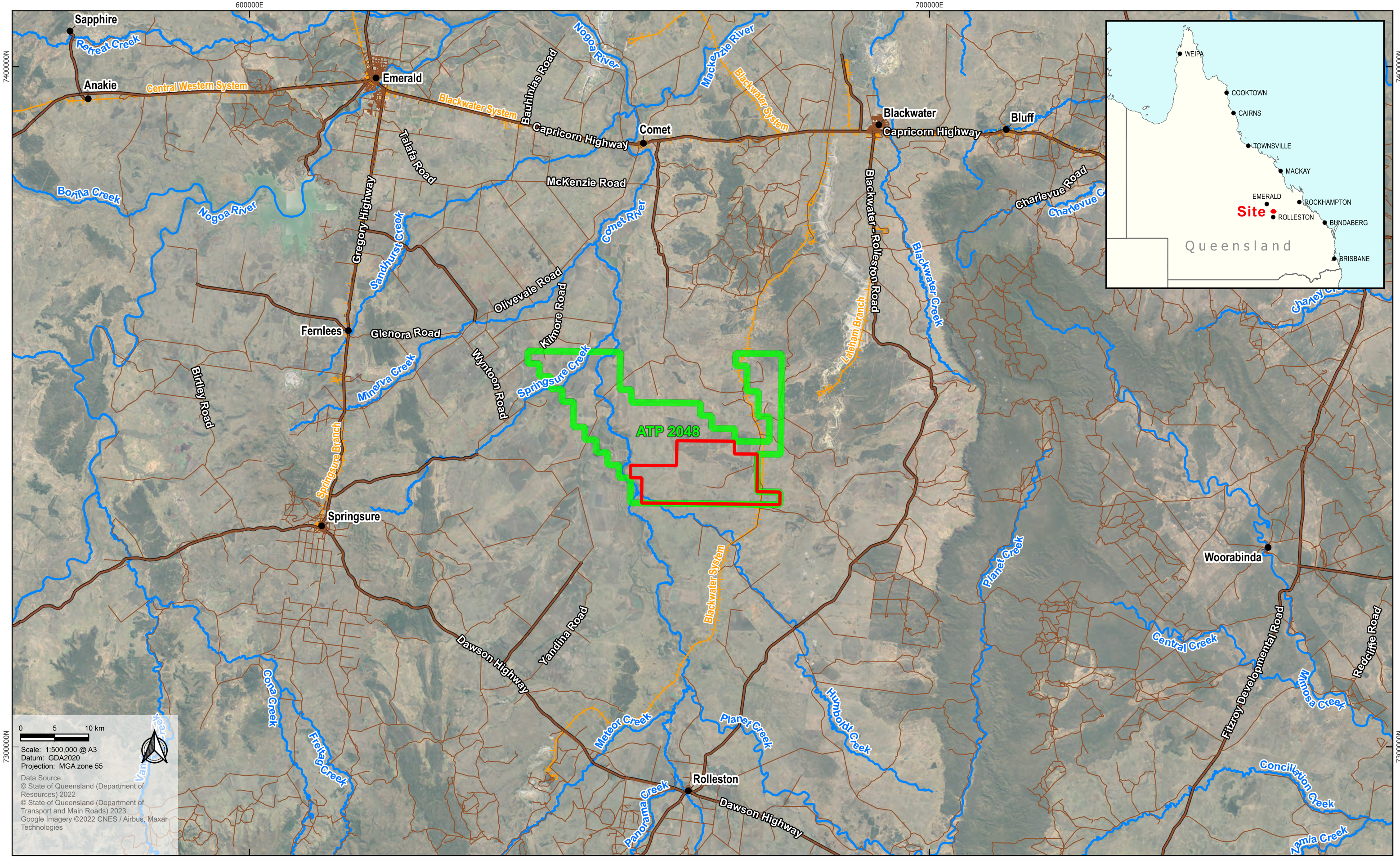
This report has been prepared for the Department of Environment and Science (DES) as supporting information under section 125 of the EP Act) and in accordance with the DES Guideline *Application requirements for petroleum activities* (DEHP 2013) to assist DES, the administering authority, in making a decision on this EA application.

1.2 Proponent Details

The project is owned and managed by Comet Ridge Mahalo North Pty Ltd, a subsidiary of Comet Ridge Ltd. The Proponent details are provided in **Table 1**.

Table 1. Proponent details

Details	Proponent
Entity	Comet Ridge Mahalo North Pty Ltd
ACN	608 540 496
ABN	54 608 540 496
Contact	Simon Garnett
Phone	07 3221 3661
Address	Level 3, 410 Queens Street, Brisbane QLD 4000
Email	notices@cometridge.com.au
Suitable operator	RSO003640



Legend

Petroleum Lease Boundary	Roads and tracks
Exploration permits for petroleum	Railways
State controlled roads	Major watercourses



**Comet Ridge
Mahalo North CSG Project
Environmental Authority
Supporting Information Report for a Petroleum Lease**

Figure 1
Project location

1.3 Pre-lodgement Meeting

A pre-lodgement meeting was held with DES to provide an overview of the project and discuss the components of the EA application prior to lodgement. The meeting was held on 11 May 2023 and included the following items of discussion:

- Project overview and description
- Project footprint and layout
- Summary of project approvals
- Summary of technical field studies and initial baseline and impact assessment findings
- EA application approach for a site-specific application
- Target approval timeframes

A subsequent pre-lodgement meeting was held with DES on 29 September 2023 to provide an update to DES on the project and discuss the final baseline and impact assessment findings. It is noted, DES requested that the subsequent pre-lodgement used the new pre-lodgement methodology being trialled by DES, where all the supporting documents were provided prior to the pre-lodgement meeting. This included the following supporting documents:

- Environmental Authority Supporting Information Report, Mahalo North Coal Seam Gas Project – Petroleum Lease, Rev0, dated 19 September 2023 prepared by Epic. This document serves as Rev1, prepared following the pre-lodgement meeting and supersedes the Rev0.
- Ecological Assessment Report, Mahalo North CSG Project, Rev1, dated 18 September 2023, prepared by Epic
- Aquatic Values Assessment, Mahalo North Coal Seam Gas Project, dated 14 July 2023, prepared by DPMEnviroSciences
- Air Quality Assessment, Mahalo North Coal Seam Gas Project, Rev2.0, dated 05 June 2023, prepared by Katestone Environmental (doc reference: D22067-3 Mahalo North CSG AQA.docx)
- Noise Impact Assessment, Mahalo North Coal Seam Gas Project, RevB, dated 20 July 2023, prepared by Matrix Acoustics
- Mahalo North Coal Seam Gas Water Management Plan, Final, 31 July 2023, prepared by RDMHydro
- Chemical Risk Assessment, Mahalo North Coal Seam Gas Project, Rev 0, dated 18 August 2023, prepared by Epic
- Groundwater Impact Assessment Report, Mahalo North CSG Development, Final, 14 September 2023, prepared by RDMHydro

Pre-lodgement advice was provided by DES on 16 May 2023 and 29 September 2023, refer to **Appendix A**.

1.4 Environmentally Relevant Activities

A petroleum activity is considered to be a resource activity under section 107 of the EP Act, and is defined under the *Petroleum and Gas (Production and Safety) Act 2004* (P&G Act) as an ‘authorised activity for a petroleum tenure’. The project is considered as a non-scheduled resource activity as none of the item within Schedule 3 of the *Environmental Protection Regulation 2019* (EP Regulation) is applicable to the project.

Schedule 2 of the EP Regulation lists prescribed ERAs (also known as ancillary ERA). During the pre-lodgement meeting with DES on 11 May 2023 (refer **Section 1.3**), it was noted that the thresholds for ‘ERA 63: Sewage treatment’, ‘ERA 64: Water treatment’ and ‘ERA 15: Fuel burning equipment’ should be explored to confirm if they are applicable to the project. Further review of the EP Regulation and project optimisation confirmed that none of these thresholds will be exceeded by the project activities.

2 APPLICATION REQUIREMENTS

In order to satisfactorily comply with the requirements for an EA application, the following DES guidelines and policies were reviewed as part of the adequacy assessment of this application:

- *Application requirements for petroleum activities* (130325 / EM705, version 4) (DEHP 2013)
- *Criteria for environmental impact statements for resource projects under the Environmental Protection Act 1994* (ESR/2016/2167, version 3.00)

The following sections detail the requirements set forth in the guidelines and polices, as well as provide responses to the requirements and their applicability to the project.

2.1 Application Requirements

The application requirements for a site-specific EA are outlined in Section 125, 126 and 126A of the EP Act. An assessment against the minimum mandatory requirements has been prepared to guide the assessing officers at DES to the relevant sections of the document (refer **Table 3**).

Table 2. Minimum mandatory application requirements for a site-specific EA under the EP Act

Section of EP Act	Requirement	Application assessment
125 Requirements for applications generally		
125 (1)	An application for an environmental authority must -	
	(a) be made to the administering authority	This EA application has been made to DES, which is the administering authority under the EP Act.
	(b) be made in the approved form	Application form submitted as part of the EA application.
	(c) describe all environmentally relevant activities for the activity	Refer to Section 1.4 .
	(d) describe the land on which each activity will be carried out	Refer to Section 4 .
	(e) be accompanied by the fee prescribed under a regulation	The prescribed fee will be paid at the time of submission, or as requested by DES.
	(f) If 2 or more entities (joint applicants) jointly make the application—nominate 1 joint applicant as the principal applicant	Not applicable. This is not an application with joint applicants.
	(g) State whether the application is— (i) a standard application; or (ii) a variation application; or (iii) a site-specific application.	This EA application is for a site-specific EA.
	(h) State whether the applicant is a registered suitable operator	The Proponent is registered as a suitable operator. Refer to Section 1.2
	(i) Describe if any development permits under the Planning Act, or an state development area (SDA) approval under the <i>State Development and Public Works Organisation Act 1971</i> , are required under either of those Acts for carrying out the environmentally relevant activities for the application	Not applicable. No development permits or SDA approvals are required for the project.
	(j) If the application is a standard or variation application—include a declaration that each relevant activity complies with the eligibility criteria	Not applicable. This EA application is not for a standard application.
(k) If the application is a variation application— i) for a variation application under section 123(1)—state the standard conditions for the activity or authority the applicant seeks to change; or	Not applicable. This EA application is not for a variation application.	

Section of EP Act	Requirement	Application assessment
	<ul style="list-style-type: none"> ii) for a variation application under section 123(2)—state the standard conditions that are not the same as the Coordinator-General’s conditions 	
	<ul style="list-style-type: none"> (l) If the application is a variation or site-specific application— (i) include an assessment of the likely impact of each relevant activity on the environmental values, including— <ul style="list-style-type: none"> a) a description of the environmental values likely to be affected by each relevant activity; b) details of any emissions or releases likely to be generated by each relevant activity; c) a description of the risk and likely magnitude of impacts on the environmental values; d) details of the management practices proposed to be implemented to prevent or minimise adverse impacts; e) details of how the land the subject of the application will be rehabilitated after each relevant activity ceases; <ul style="list-style-type: none"> (i) include a description of the proposed measures for minimising and managing waste generated by each relevant activity; (ii) include details of any site management plan that relates to the land the subject of the application 	Refer to Section 7 .
	<ul style="list-style-type: none"> (m) If the application is for a prescribed ERA—state whether the applicant wants any environmental authority granted for the application to take effect on a day nominated by the applicant 	Not applicable. This EA application is for a resource ERA.
	<ul style="list-style-type: none"> (n) If the application is a site-specific application for a mining activity relating to a mining lease—be accompanied by a proposed PRC plan that complies with this division 	Not applicable. This EA application is not for a mining lease.
	<ul style="list-style-type: none"> (o) Include any other document relating to the application prescribed under a regulation 	All necessary documents have been provided in the application.
125 (2)	Despite subsection (1)(l), if the application is a variation application under section 123(1), it need only include the matters mentioned in that subsection to the extent it seeks to change the standard conditions for the activity or authority	Not applicable. This EA application is not for a variation application.
125 (3)	Subsection (1)(l) does not apply for an application if— <ul style="list-style-type: none"> (a) either— <ul style="list-style-type: none"> i) the EIS process for an EIS for each relevant activity the subject of the application has been completed; or ii) the Coordinator-General has evaluated an EIS for each relevant activity the subject of the application and there are Coordinator-General’s conditions that relate to each relevant activity; and (b) an assessment of the environmental risks of each relevant activity would be the same as the assessment in the EIS mentioned in paragraph (a)(i), or the evaluation mentioned in paragraph (a)(ii), if completed 	Subsection (1)(l) does apply to this EA application as it is for a site-specific application.
125 (4)	Also, subsection (1)(l) does not apply for a variation application under section 123(2) if the application seeks only to apply the Coordinator-General’s conditions	Not applicable. This EA application is not for a variation application.
125 (5)	Despite subsection (1), if the application is a variation or site-specific application for the prescribed ERA mentioned in the Environmental Protection Regulation 2019, schedule 2, section 13A— <ul style="list-style-type: none"> (a) it need only include the matters mentioned in subsection (1)(l)(i)(A) to (D), (ii) and (iii) to the extent the matters relate to fine sediment, or dissolved inorganic nitrogen, entering the water of the Great Barrier Reef or Great Barrier Reef catchment waters; and (b) subsection (1)(l)(i)(E) does not apply for the application. 	Not applicable. This EA application is not associated with a prescribed ERA under Schedule 2, section 13A of the EP Regulation.

Section of EP Act	Requirement	Application assessment
125 (6)	<p>Subsection (1)(l) does not apply for a variation application or site-specific application, and subsection (1)(n) does not apply for a site-specific application for a mining activity relating to a mining lease, if—</p> <p>(a) the chief executive has, under chapter 3, part 2 or 3, approved the voluntary preparation of an EIS for the Project the subject of the application and the applicant has—</p> <p>(i) started the EIS process for the application; or</p> <p>(ii) stated in the application that the applicant will prepare an EIS under chapter 3, part 1; or</p> <p>(b) the chief executive has, under chapter 3, part 3, decided that an EIS is required for the application; or</p> <p>(c) the Coordinator-General has, under the State Development Act, section 26(1)(a), declared that the Project the subject of the application is a coordinated project for which an EIS under that Act is required.</p>	Not applicable. This EA application is not for a mining activity relating to a mining lease.
126 (1)	<p>A site-specific application for a CSG activity must also state the following—</p> <p>(a) the quantity of CSG water the applicant reasonably expects will be generated in connection with carrying out each relevant CSG activity;</p> <p>(b) the flow rate at which the applicant reasonably expects the water will be generated;</p> <p>(c) 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;</p> <p>(d) the proposed management of the water including, for example, the use, treatment, storage or disposal of the water;</p> <p>(e) the measurable criteria (the management criteria) against which the applicant will monitor and assess the effectiveness of the management of the water, including, for example, criteria for each of the following—</p> <p>(i) the quantity and quality of the water used, treated, stored or disposed of</p> <p>(ii) protection of the environmental values affected by each relevant CSG activity</p> <p>(iii) the disposal of waste, including, for example, salt, generated from the management of the water;</p> <p>(f) the action proposed to be taken if any of the management criteria are not complied with, to ensure the criteria will be able to be complied with in the future.</p>	Refer to the CSG Water Management Plan provided in Appendix B .
126 (2)	<p>The proposed management of the water cannot provide for using a CSG evaporation dam in connection with carrying out a relevant CSG activity unless</p> <p>(a) the application includes an evaluation of—</p> <p>(i) best practice environmental management for managing the CSG water; and</p> <p>(ii) alternative ways for managing the water; and</p> <p>(b) the evaluation shows there is no feasible alternative to a CSG evaporation dam for managing the water.</p>	CSG evaporation dams are not proposed for the project.
126 (3)	<p>This section does not apply for a site-specific application for a CSG activity if—</p> <p>(a) the Coordinator-General has evaluated an EIS for the CSG activity under the State Development Act; and</p> <p>(b) there are Coordinator-General's conditions for each relevant activity the subject of the application; and</p> <p>(c) an assessment of the environmental risks of the activity would be the same as the evaluation mentioned in paragraph(a), if completed.</p>	None of (a) to (c) have been undertaken for the project.
126A (1)	<p>This section applies to a site-specific application, involving the exercise of underground water rights, for—</p> <p>(a) a resource project that includes a resource tenure that is a mineral development licence, mining lease or petroleum lease; or</p>	This EA application is for a resource project that includes

Section of EP Act	Requirement	Application assessment
		a resource tenure that is a petroleum lease.
	(b) a resource activity for which the relevant tenure is a mineral development licence, mining lease or petroleum lease.	This EA application includes a resource activity proposed to be carried out on a resource tenure for a petroleum lease.
126A (2)	The application must also state the following—	
	(a) any proposed exercise of underground water rights during the period in which resource activities will be carried out under the relevant tenure;	Refer to the Groundwater Impact Assessment Report provided in Appendix C (Section 1.1, Section 7.6.3.5)
	(b) the areas in which underground water rights are proposed to be exercised;	Refer to the Groundwater Impact Assessment Report provided in Appendix C (Section 1.1; Section 7.6.3.5; Figure 3)
	(c) for each aquifer affected, or likely to be affected, by the exercise of underground water rights—	Refer to the Groundwater Impact Assessment Report provided in Appendix C (Section 7.6.5)
	(i) a description of the aquifer; and	Refer to the Groundwater Impact Assessment Report provided in Appendix C (Section 7.6.3)
	(ii) an analysis of the movement of underground water to and from the aquifer, including how the aquifer interacts with other aquifers and surface water; and	Refer to the Groundwater Impact Assessment Report provided in Appendix C (Section 7.6.3)
	(iii) a description of the area of the aquifer where the water level is predicted to decline because of the exercise of underground water rights; and	Refer to the Groundwater Impact Assessment Report provided in Appendix C (Section 7.6.3)
	(iv) the predicted quantities of water to be taken or interfered with because of the exercise of underground water rights during the period in which resource activities are carried out;	Refer to the Groundwater Impact Assessment Report provided in Appendix C (Section 7.6.5)
	(d) the environmental values that will, or may, be affected by the exercise of underground water rights and the nature and extent of the impacts on the environmental values;	Refer to the Groundwater Impact Assessment Report provided in Appendix C (Section 7.6.5)
	(e) any impacts on the quality of groundwater that will, or may, happen because of the exercise of underground water rights during or after the period in which resource activities are carried out;	Refer to the Groundwater Impact Assessment Report provided in Appendix C (Section 7.6.5)
	(f) strategies for avoiding, mitigating or managing the predicted impacts on the environmental values stated for paragraph(d) or the impacts on the quality of groundwater mentioned in paragraph (e).	Refer to the Groundwater Impact Assessment Report provided in Appendix C (Section 7.6.6)

2.2 Notifiable Activities

Notifiable activities are described in Schedule 3 of the EP Act and include activities identified as likely to cause environmental harm through contamination of land. No notifiable activity is proposed to be carried out on the land associated with this EA application.

2.3 Environmental Impact Statement Triggers

The DES Guideline *Criteria for environmental impact statements for resource Projects* under the EP Act (ESR/2016/2167, version 3.00, dated 04/11/2020) details Environmental Impact Statement (EIS) triggers. Criteria and responses are provided in **Table 4**. Based on the evaluation, the project is not considered to trigger an EIS.

Table 3. EIS Triggers - for petroleum and gas activities

EIS trigger	Response
Would the application involve a total disturbance area of greater than 2000 hectares (ha) 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?	No, the overall disturbance footprint is estimated to be approximately 185 ha, refer to Section 5.1 .
Would the application involve the construction of a high-pressure pipeline over a distance of 300 kilometre (km) or greater?	No, this EA application does not involve the construction of a high-pressure pipeline.
Would the application involve the construction of a liquefied natural gas plant?	No, the application does not involve the construction of a liquefied natural gas plant.

3 LEGISLATIVE CONTEXT

3.1 Commonwealth Legislation

3.1.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the key piece of Commonwealth legislation governing environmental protection in Australia. Administered by the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW), the EPBC Act defines and protects nine Matters of National Environmental Significance (MNES) including:

- World heritage properties
- National heritage places
- Wetlands of international importance (often called 'Ramsar' wetlands after the international treaty under which such wetlands are listed)
- Listed threatened species and ecological communities
- Migratory species protected under international agreements
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mines)
- A water resource in relation to coal seam gas development and large coal mining development

Under Part 3 of the EPBC Act, a person must not undertake an action that will have, or is likely to have, a significant impact on a protected matter, without approval from the Minister for DCCEEW.

If after all reasonable avoidance and mitigation measures have been taken, there is still a residual impact on a protected matter, an offset may be required where the impact is, or is likely to be, significant.

An assessment of significant residual impact has been undertaken for the project. Further details are provided in **Section 7.2.5**.

3.1.2 EPBC Act Environmental Offsets Policy 2012

The EPBC Act *Environmental Offsets Policy 2012* (EOP) provides upfront guidance on the role of offsets in environmental impact assessments, and how the DCCEEW considers the suitability of a proposed offset. The EOP aims to improve environmental outcomes through the consistent application of best practice offset principles, provide more certainty and transparency, and encourage advanced planning of offsets.

This report identifies if a significant residual impact to MNES will need to be offset in accordance with the EOP in **Section 7.2.5.4**.

3.1.3 Significant Impact Guidelines 1.1: Matters of National Environmental Significance

The Matters of National Environmental Significance - Significant impact guidelines 1.1 (SIG1.1) identify the following aspects of a critically endangered or endangered ecological communities which would be considered a likely significant impact if it were to occur:

- The extent of an ecological community was reduced
- Fragmentation, or increased fragmentation, of an ecological community
- The habitat critical to the survival of an ecological community was adversely affected
- The modification or destruction of non-living factors necessary for the survival of an ecological community, including the reduction in groundwater levels
- A substantial change in the species composition of an occurrence of the community
- A substantial reduction in the quality or integrity of an occurrence of an ecological community, including:
 - The establishment of invasive species
 - The mobilisation of fertiliser, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the community

- Interfere with the recovery of an ecological community

An assessment of significant residual impact in accordance with the requirements of SIG1.1 is summarised in **Section 7.2.5**.

3.1.4 Significant Impact Guideline 1.3: Coal Seam Gas and Large Coal Mining Developments

The stated core purpose of the *Significant Impact Guidelines 1.3: Coal Seam Gas and Large Coal Mining Developments* (SIG1.3) is to assist with deciding whether a CSG development or large coal mining development is likely to have a significant impact on a water resource. If a significant impact is considered possible, the Project should be referred to the DCCEEW for assessment of whether Ministerial approval is required under the EPBC Act. The guidelines provide detailed criteria for assessing a project.

The SIG1.3 define a significant impact as *“an impact which is important, notable, or of consequence, having regard to its context or intensity”*. The assessment of significance is dependent on the *“sensitivity, value and quality of the water resource which is impacted, and upon the duration, magnitude and geographic extent of the impacts.”* The likelihood of a significant impact occurring is assessed on the potential for real or non-remote chance of the event occurring, thus incorporating the precautionary principle in the decision.

An assessment of significant residual impact in accordance with the requirements of SIG1.3 is summarised in **Section 7.6**.

3.2 State Legislation

3.2.1 Environmental Protection Act 1994

The EP Act provides the key legislative framework for environmental management and protection in Queensland. The objective of the EP Act is to: *“Protect Queensland’s environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains ecological processes on which life depends”* (Section 3 of the EP Act).

Under the EP Act, the Proponent must comply with the general environmental duty not to undertake an: *“Activity that causes, or is likely to cause, environmental harm unless all reasonable and practicable measures to prevent or minimise the harm are taken”* (Section 319 of the EP Act).

This report provides supporting information for the site-specific application under sections 125, 126 and 126A of the EP Act.

3.2.2 Environmental Offsets Act 2014

The *Environmental Offsets Act 2014* (EO Act), *Environmental Offsets Regulation 2014* and the *Queensland Government Environmental Offsets Policy* provide a streamlined framework for State environmental offset requirements for significant residual impact to matter of state environmental significance (MSES).

Environmental offsets provide the flexibility to approve development in one place on the basis of a requirement to make an equivalent environmental gain in another place where there is not the same value to industry. An environmental offset may be required as a condition of approval where the activity is likely to result in a significant residual impact on prescribed environmental matters as identified through the following guidelines:

- The State guideline that provides guidance on what constitutes a significant residual impact for a MSES
- The Commonwealth Significant Impact Guidelines for what constitutes a significant residual impact on a MNES
- Any relevant local government significant impact guideline for matters of local environmental significance

Offsets may be delivered through a variety of manners, including financial settlement offsets, proponent driven offsets and a combination of these approaches. To avoid duplication of offset conditions between jurisdictions, State and local governments can only impose an offset condition in relation to a prescribed activity, if the same, or substantially the same impact and the same, or substantially the same matter has not been subject to assessment under the EPBC Act.

This report identifies if a significant residual impact will need to be offset in accordance with the EO Act in **Section 7.2.5.4**.

3.2.3 Nature Conservation Act 1992

The *Nature Conservation Act 1992* (NC Act) and subordinate documents (*Nature Conservation (Animals) Regulation 2020* (NC Animals Regulation) and *Nature Conservation (Plants) Regulation 2020* (NC Plants Regulation) are in place to protect Queensland's native flora and fauna from potential environmental impacts of various activities through the requirement for protected plant clearing permits, species management programs and other permits.

No protected plant clearing permit will be triggered by the project. Where the project will involve tampering with animal breeding places, a species management plan will be obtained to authorise the potential tampering of the animal breeding place.

3.2.4 Vegetation Management Act 1999

The *Vegetation Management Act 1999* (VM Act) regulates the clearing of vegetation in Queensland in a way that conserves remnant vegetation, ensures clearing does not cause land degradation, prevents loss of biodiversity, maintains ecological processes, reduces greenhouse gas emissions and allows for sustainable land use.

The clearing of native vegetation for the project will be exempt from the provisions of the VM Act under Schedule 21 (Part 1, section 1, item 6) of the *Planning Regulation 2017* where clearing occurs for a resource activity, defined under section 107 of the EP Act, which includes petroleum activities.

3.2.5 Water Act 2000

The *Water Act 2000* (Water Act) provides a structured system for the planning, protection, allocation and use of Queensland's surface waters and groundwater. Under the Water Act, a person must not take, supply, or interfere with water unless authorised for the taking of water from overland flow, groundwater, a watercourse, lake, or spring.

Chapter 3 of the Water Act provides for the management of impacts on underground water (groundwater) due to the exercise of underground water rights by resource tenure holders. It provides a regulatory framework that requires a resource tenure holder to:

- Monitor and assess the impacts of groundwater extraction associated with resources extraction on water bores and springs
- Prepare underground water impact reports (UWIR) that establish obligations to monitor and manage impacts on aquifers and springs
- Manage the cumulative impacts due to the exercise of two or more resource tenure holders' underground water rights
- Enter into good agreements with owners of bores impacted by the exercise of underground water rights

In areas of concentrated development, a cumulative management area (CMA) can be declared. The project is located within the Surat CMA, which was declared in 2011. The Office of Groundwater Impact Assessment (OGIA) was established under the Water Act and is responsible for preparing the UWIR and for establishing obligations to monitor and manage impacts on aquifers and spring. OGIA assigns responsibility to individual petroleum tenure holders for implementing specific parts of the strategies within CMAs. These predictions, strategies and responsibilities are set out in the Surat CMA UWIR, prepared and maintained by the OGIA.

The most recent Surat CMA UWIR was published by OGIA in 2021.

The OGIA has provided the Proponent with data from the Surat CMA UWIR regional scale groundwater flow model to inform the groundwater impact assessment which supports this EA application, refer to **Section 7.6** for a summary of the groundwater impact assessment.

3.2.6 Fisheries Act 1994

The *Fisheries Act 1994* (Fisheries Act) provides for the management, use, development and protection of fish habitats and resources. This includes waterways potentially used for 'fish passage' (considered as a MSES) as mapped within waterways for waterway barrier works mapping administered by the Department of Agriculture and Fisheries (DAF). Environmental offsets may be required where significant residual impact to waterways for fish passage are identified (including permanent, partial, and temporary barriers).

The project requires the crossing of some mapped waterways, which each create the potential for barriers to fish passage. Waterway crossings for the project will have consideration to the '*Accepted development requirements for operational work that is constructing or raising waterway barrier works*' (DAF 2018).

3.2.7 Petroleum and Gas (Production and Safety) Act 2004

The object of the P&G Act is to facilitate and regulate the carrying out of responsible petroleum activities and the development of a safe, efficient, and viable petroleum and fuel gas industry. PLs may be granted under Chapter 2 of the P&G Act. Under a PL, a proponent is authorised to construct and operate a petroleum activity, including a petroleum facility (i.e. GCF).

The Proponent has lodged a resource authority application to DoR under the P&G Act for a PL.

3.2.8 Coal Seam Gas Water Management Policy 2012

The objective of the DES (formally DEHP) Guideline *Coal Seam Gas Water Management Policy 2012* (CSG Water Policy) (DEHP 2012) is to encourage the beneficial use of CSG water in a way that protects the environment and maximises its production use. The policy focuses on the management and use of CSG water under the EP Act and does not vary the requirements of the Water Act.

The policy provides the State government's preferred approach to managing CSG water in Queensland and guides CSG operators in managing CSG water under their EA. A management hierarchy is defined to facilitate compliance with the objective of the policy and its management under the EP Act. The hierarchy is as follows:

- **Priority 1** – CSG water is used for a purpose that is beneficial to one or more of the following: the environment, existing or new water users, and existing or new water dependent industries. This could be achieved through:
 - Injection into depleted aquifers for recharge purposes
 - Substitution for an existing water entitlement
 - Supplementary water for existing irrigation schemes
 - New irrigation use, with a focus on sustainable irrigation projects
 - Livestock watering
 - Urban and industrial water supplies
 - Coal washing and dust suppression
 - Release to the environment in a manner that improves local environmental values
- **Priority 2** – after feasible beneficial use options have been considered, treating, and disposing CSG water in a way that firstly avoids, and then minimises and mitigates, impacts on environmental values. Disposal to watercourses will only be approved for residual water where there is no feasible beneficial use, and disposal options will not adversely affect environmental values.

The water management strategy for the project has been developed with consideration of the CSG Water Policy and will be addressed as part of future applications relating to the project activities.

3.2.9 Regional Planning Interests Act 2014

Where resource or regulated activities impact on an area of regional interest and exemptions do not apply, a Regional Interests Development Approval (RIDA) is required under the *Regional Planning Interests Act 2014* (RPI Act). If this applies to the project (which initial assessments shows it does not), a RIDA will be lodged for approval, which is expected to be post-EA approval.

3.2.10 Waste Reduction and Recycling Act 2011

The *Waste Reduction and Recycling Act 2011* (WRR Act) contains a suite of measures to reduce waste generation, landfill disposal and encourage recycling. The purposes of the WRR Act are to:

- Promote waste avoidance and reduction, and resource recovery and efficiency actions
- Reduce the consumption of natural resources and minimise the disposal of waste by encouraging waste avoidance and the recovery, re-use, and recycling of waste
- Minimise the overall impact of waste generation and disposal
- Ensure a shared responsibility between government, business and industry and the community in waste management and resource recovery
- Support and implement national frameworks, objectives and priorities for waste management and resource recovery

The waste management hierarchy described in the WRR Act, from most desirable to least, is as follows:

- AVOID unnecessary resource consumption
- REDUCE waste generation and disposal
- RE-USE waste resources without further manufacturing
- RECYCLE waste resource to make the same or different products
- RECOVER waste resources, including the recovery of energy
- TREAT waste before disposal, including reducing the hazardous nature of waste
- DISPOSE of waste only if there is no viable alternative

The waste management hierarchy has been addressed in the planning for the proposed activities for the project. Further details about waste management for the project are provided in **Section 7.7**.

4 SITE DESCRIPTION

4.1 Project Location

The project is located approximately 45 km north of Rolleston, in the CHRC LGA of Central Queensland (**Figure 1**). The project area is approximately 14,000 ha in size and subject to extensive previous disturbance as a result of broad scale clearing and ongoing agricultural operations.

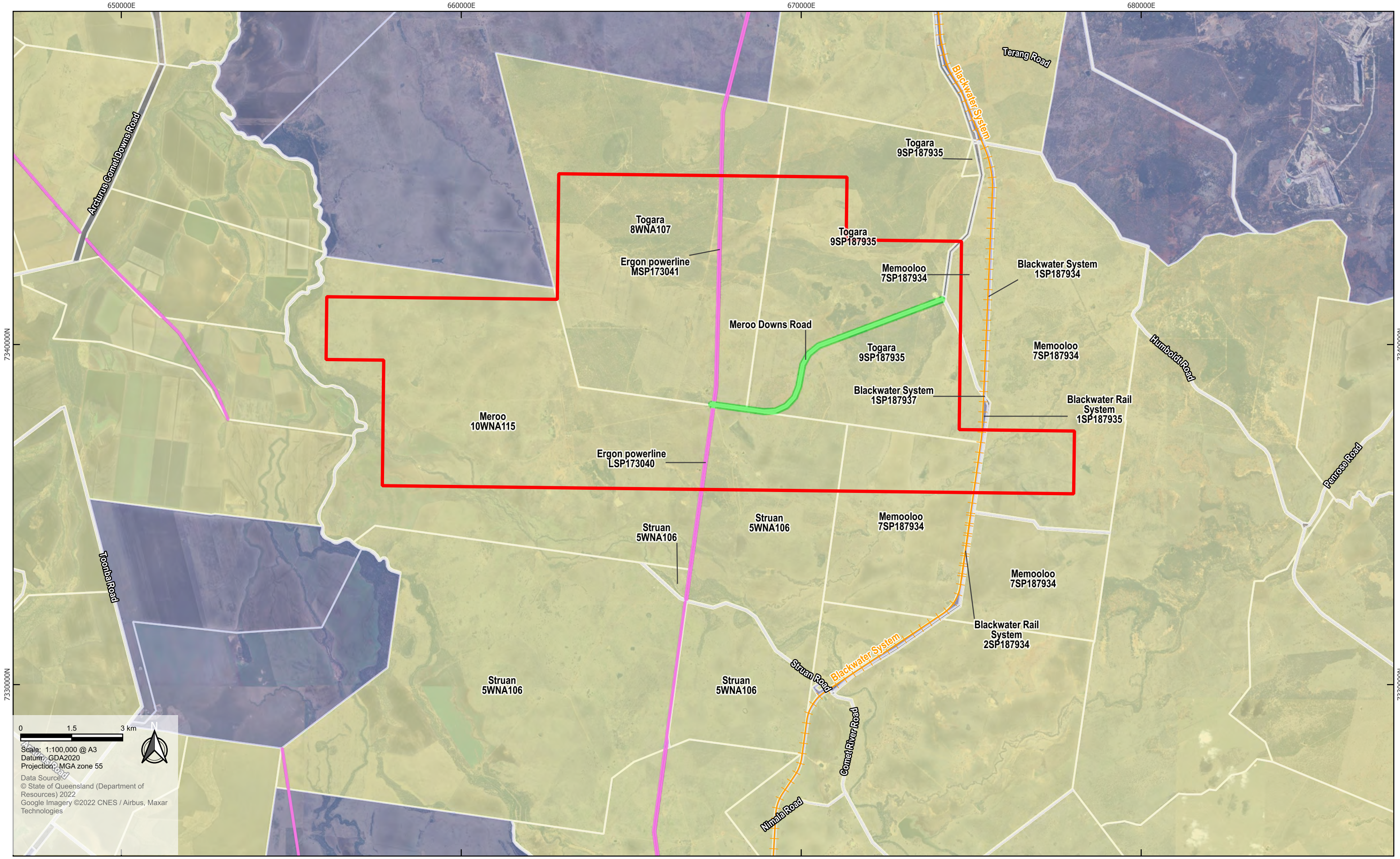
4.2 Property Description

4.2.1 Land Tenure

The project intersects sections of four rural properties, which are primarily used for grazing purposes as well as road parcels, easements and a railway corridor, as described in **Table 5** and illustrated in **Figure 2**.

Table 4. Property details

Lot on Plan	Tenure	Property name
8WNA107	Freehold	Togara
9SP187935	Freehold	Togara
5WNA106	Freehold	Struan
10WNA115	Freehold	Meroo
7SP187934	Freehold	Memooloo
1SP187935	Lands Lease	Blackwater Rail System
2SP187934	Lands Lease	Blackwater Rail System
Meroo Downs Road	Road	Meroo Downs Road
MSP173041	Easement	Ergon powerline
LSP173040	Easement	Ergon powerline



Legend

Petroleum Lease Boundary	Land tenure
Cadastre (DCDB)	Easement
Railways	Freehold
	Lands Lease
	Road



**Comet Ridge
Mahalo North CSG Project
Environmental Authority
Supporting Information Report for a Petroleum Lease**

Figure 2
Land tenure

5 PROJECT DESCRIPTION

The project includes the construction, operation, decommissioning, and rehabilitation of a CSG activity, including the following project components:

- GCF (including water treatment and water storage infrastructure)
- Gas wells
- Gas and water gathering pipelines
- New access tracks (extension of existing access tracks)

The project infrastructure layout is shown on **Figure 3**.

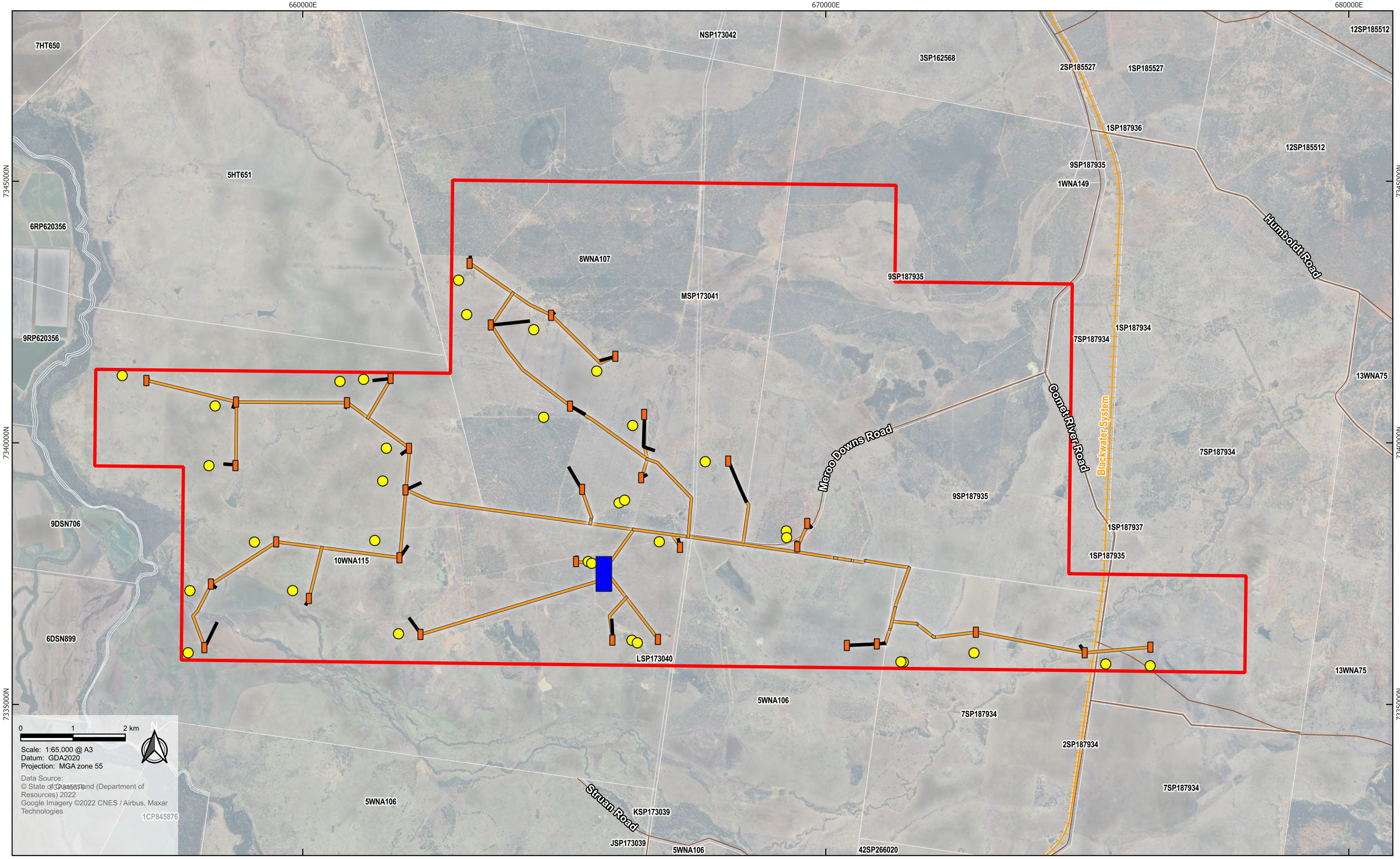
5.1 Project Disturbance Footprint

An estimated project disturbance area has been calculated in **Table 6**. It is important to note the estimated disturbance has been calculated on individual project components and there is potential overlap in the calculations. For example, the gas and water gathering pipelines and new access tracks have been calculated as individual components however, there is opportunity for this infrastructure to be co-located which would reduce the overall disturbance footprint and would be refined during the detailed design phase of the project.

Table 5. Estimated maximum disturbance footprint

Component	Description	Estimated area (ha)
GCF	<ul style="list-style-type: none"> • Two gas compression units, gas dehydration/separation units, safety and control systems, water tanks, safety flare, water treatment plant and water storage, permanent operational camp, workshop, office, washdown bay, parking 	20
Gas wells	<ul style="list-style-type: none"> • 68 wells, with a combination of vertical and lateral wells • Each well site constructed in an area of up to approximately 1 ha (100 m x 100 m) • The majority of this disturbance will be temporary, as each well site will be partially rehabilitated after construction is completed, leaving an area of approximately 20 m x 20 m (0.04 hectare) for well maintenance and access • Production wells will be fenced and generally include gas and water metering and separation equipment, electrical and control systems, particulate filter separator and manifolds to connect the water and gas pipelines 	68
Gas and water gathering pipelines	<ul style="list-style-type: none"> • Construction disturbance area of up to 18 m wide, with the exception of areas of environmental significance where it is reduced to 6 m wide • Power lines and communication may be co-located within the gas and water gathering trench • Includes excavation of a trench (up to 0.85 m wide) • The majority of this disturbance will be temporary as the disturbed area will be restored to pasture as soon as practicable, and available to the landholder for grazing / cropping purposes 	92
New access tracks	<ul style="list-style-type: none"> • Existing access tracks will be utilised during all phases of the Project wherever possible • New access tracks only installed where necessary to connect to proposed infrastructure, estimated 8 km of new access tracks, at 6 m wide 	5
Estimated Total		185

Final disturbance areas will be calculated as the design of the processing area progresses and site constraints define the infrastructure layout. Pre-clearance ecological and cultural heritage assessments will be undertaken and reconciled to ensure they comply with the requirements under the relevant legislation.



Legend	
	Petroleum Lease Boundary
	Cadastrate (DCDB)
	Railways
	Gas compression facility
	New access tracks
	Indicative gathering lines
	Indicative lateral well
	Indicative vertical well



Comet Ridge
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Figure 3
 Project infrastructure layout

5.2 Gas Compression Facility

A 10 terajoules (TJ)/day GCF would be constructed to centrally gather gas and water produced from the production wells and pressurise this gas for export to domestic markets. The GCF will be located within a fenced compound and include the following equipment during operations:

- Gas compression units (two in operation)
- Gas dehydration / separation units
- Associated instrumentation and control systems
- Water infrastructure, refer to **Section 5.2.1.3**
- Water tanks
- Safety systems
- Safety flare
- Site office
- Workshop
- Storage of fuel and chemicals¹
- Vehicle washdown bay
- Potable water
- Vehicle parking
- Accommodation camp (5-person capacity during operation phase)

5.2.1 Proposed Activities

5.2.1.1 Construction

Construction activities for the GCF would include:

- **Planning and surveying:** survey of the proposed disturbance boundary, pre-clearance ecological and cultural heritage surveys
- **Site preparation:** establishment of access tracks, installation of erosion and sediment controls, clearing and grubbing the disturbance boundary, stripping, and stockpiling top soil and cleared vegetation, site levelling (if required)
- **Building works:** constructing and installing buildings, plant, and equipment
- **Site restoration:** spreading top soil and grass seed on disturbed areas not required for operation

5.2.1.2 Operations

Operations of the GCF would include:

- **Separation:** further separation of water, gas and solids, within the gas stream (initial separation occurs at the well site, at the gas / water separator)
- **Gas compression:** increase the gas pressure for the pipeline transfer
- **Water Infrastructure:** refer to **Section 5.2.1.3**
- **Maintenance:** maintenance of plant and equipment and facilities to ensure safe and reliable operation of the GCF
- **Flaring:** gas flaring undertaken only in an emergency situation

5.2.1.3 Sewage treatment

A packaged sewage treatment facility will be constructed onsite and have a total daily peak design capacity of less than 21 equivalent persons (EP). Any additional sewage generated during construction that is beyond the capacity of the sewage treatment facility will be collected by a licence a waste contractor and disposed of at a appropriately licenced liquid waste facility offsite.

¹ The maximum storage volume of fuels and chemicals on site will not exceed the ERA thresholds listed under s8(1), Schedule 2 of the EP Regulation

5.2.1.4 Water Infrastructure

A water treatment facility will be constructed to treat produced water to facilitate the beneficial use of water at a nominal treatment rate of up to 0.5 ML/day. The water treatment facility will include the following infrastructure:

- A package water treatment plant
- Above ground lined ring tanks to store:
 - Produced water from the wells
 - Treated produced water
 - Brine
- Aboveground pipes to connect water treatment plant and the ring tanks
- Pumping equipment to facilitate the transfer of treated produced water for beneficial re-use

Treated produced water from any treatment process will be stored in up to 100 ML of above-ground storages (e.g. lined ring tanks), constructed and operated in accordance with the manufacturers' specifications. Treated produced water generated from the project will be beneficially used to support irrigation and industrial activities, and development and operational activities (include drilling of the wells and dust suppression).

Brine from any treatment process will be stored in up to 100 ML of above-ground storages (e.g. lined ring tanks), constructed and operated in accordance with the manufacturers' specifications, from where it may be further concentrated via solar and mechanical evaporation to a concentrated slurry or solid salt. The concentrated waste product will be disposed of at a licensed waste facility.

5.2.1.5 Decommissioning and Rehabilitation

Decommissioning and rehabilitation of the GCF would include:

- Removal of the plant and equipment
- Disposal of salts from the lined ring tanks
- Decompaction of the soil and returning it to its previous landform
- Reseeding with pasture species

The GCF will be the last component of the project to be decommissioned and rehabilitated as it is required to be operational throughout the entire life of the project.

5.3 Gas Production Wells

A maximum of 68 coal seam gas wells will be installed, comprising a combination of vertical and lateral wells. The lateral wells will intersect the vertical wells within the section drilled within the coal seam. Gas and water will be collected from the vertical wells. There will be no hydraulic fracturing/stimulation or blasting activities as part of the proposed activities. A conceptual diagram illustrating the connection between a vertical and lateral well is provided in **Figure 4**.

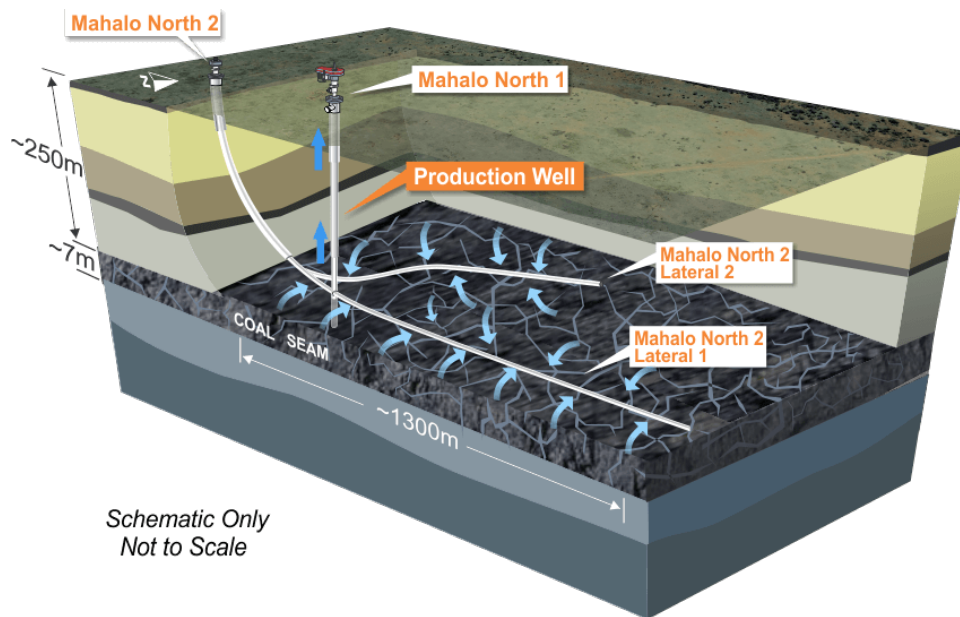


Figure 4. Conceptual Diagram of Vertical and Lateral Gas Wells

Source: Comet Ridge, 2022

Each production well will be located within a fenced compound of approximately 20 metres (m) x 20 m and include the following equipment during operations:

- Well head
- Gas and water meter
- Gas and water separation equipment
- Electrical and control systems
- Particulate filter separator
- Manifolds to connect to water and gas gathering pipeline
- Fuel storage
- Mixed fuel generator (initially using diesel, then transferred to gas when the well is producing gas)
- Fence and gate

Each associated lateral gas well will be in a suspended well state, and will have cattle panels installed around the well head, of approximately 8 m x 8 m. No other plant or equipment will be installed at a suspended lateral well site.

5.3.1 Proposed Activities

5.3.1.1 Construction

Construction activities for each gas well would include:

- **Planning and surveying:** survey of the proposed disturbance boundary, pre-clearance ecological and cultural heritage surveys
- **Site preparation:** establishment of access tracks, installation of erosion and sediment controls, clearing and grubbing the disturbance boundary, stripping and stockpiling top soil and cleared vegetation, site levelling (if required)
- **Well establishment:** installation of well pad, drilling of wells using rotary mud or air drilling, setting up drill rig and associated equipment, completion of wells using a completion rig, installation of a pump within the production well to reduce the hydrostatic pressure of the coal seam and facilitate gas production, installation of fencing and gate

- **Site restoration:** At completion of well construction, the disturbance footprint will be reduced to approximately 0.04 ha (20 m x 20 m). Top soil and grass seed will be spread over disturbed areas not required for operation

Wells would be constructed in accordance with the *Code of Practice for the construction and abandonment of petroleum wells and associated bores in Queensland V2* (DNRME 2019).

5.3.1.2 Operations

Operations of the gas wells would include:

- **CSG extraction:** engines (i.e. generators) will power wellhead pumps to extract water from the production well and facilitating gas to flow
- **Maintenance:** maintenance of plant and equipment and workover of wells to ensure safe and reliable operation of each well

Workovers of wells will be completed as required and not expected to be a frequent occurrence.

5.3.1.3 Decommissioning and Rehabilitation

Decommissioning and rehabilitation of the gas wells once no longer operational would include:

- Vertical wells will be fully cemented back to surface from the bottom
- Lateral wells will be cemented from the bottom of the 7 inch casing back to the surface
- Removal of all plant, equipment, and fencing
- Spreading top soil and grass seed on disturbed areas

Each well is expected to be operational for 12-15 years. Decommissioning of each well is proposed to be completed progressively as wells are depleted, plugged, and abandoned over the life of the project.

5.4 Gas and Water Gathering Pipelines

Gas and water from each of the well sites will be transported through a network of gathering pipelines to connect to the GCF. The gathering pipelines will be installed underground. The gathering pipelines will comprise the following components:

- Polypipe underground low pressure gas pipelines
- Water pipelines, power and communications may be co-located with the gas gathering network to connect to the GCF
- Main lines valves to allow maintenance activities to be undertaken in sections along the pipeline

5.4.1 Proposed Activities

5.4.1.1 Construction

Construction activities for the gathering pipelines would include:

- **Planning and surveying:** survey of the pipeline route, pre-clearance ecological and cultural heritage surveys
- **Site preparation:** installation of erosion and sediment controls, clearing and grubbing, stripping, and stockpiling top soil and cleared vegetation in windrows
- **Excavation:** excavating a trench along the proposed gas and water gathering route to the appropriate depth and width (up to 0.85 m wide)
- **Welding and stringing:** laying the pipeline adjacent to the trench and welding sections of pipe together to create a continuous length of pipeline
- **Pipe laying:** placing the welded pipeline into the trench
- **Watercourse and waterway crossings:** refer to **Section 5.4.1.2**
- **Backfilling:** backfill trench with excavated material and compacting
- **Testing:** pressure testing the pipeline to ensure that it is safe and functioning properly

- **Partial restoration:** spreading top soil and grass seed across the disturbed area

5.4.1.2 Watercourse and Waterway Crossings

The gathering pipelines will intersect watercourses (as defined under the Water Act) and waterways (as defined under the Fisheries Act). Installation of the gathering pipeline across these watercourses will be via open-cut trenching or horizontal directional drilling (HDD). The installation method will be determined with consideration to environmental constraints, geotechnical characteristics, and standard conditions at each proposed crossing location. The construction of each crossing is expected to take approximately one week.

Waterway crossings would be designed with consideration to the *Accepted development requirements for operational work that is constructing or raising waterway barrier works* (DAF 2018). Watercourse crossings will be designed with consideration to the *Riverine Protection Permit Exemption Requirements* (DRDMW 2023a).

Each method of crossing has been described further below.

Open-Cut Trenching

Open-cut trenching will be used where impacts to identified environmentally sensitive areas or significant ecological values can be avoided. Open-cut trenching method will only be undertaken on times during no/low flow in the watercourse.

The method for open-cut trenching will involve:

- **Planning and surveying:** survey of the proposed access route, pre-clearance ecological and cultural heritage surveys
- **Site preparation:** establishment of access tracks, installation of appropriate erosion and sediment control within the disturbed areas and on either side of the watercourse/waterway
- **Vegetation Clearing:** clearing vegetation on either side of the banks (if required)
- **Trench excavation:** trench dug across the watercourse/waterway
- **Pipeline installation:** pipeline is laid within the trench
- **Backfilling:** trench is backfilled with excavated material
- **Testing:** pressure testing the pipeline to ensure that it is safe and functioning properly.
- **Scour protection:** additional scour protection (e.g., rock mattress) may be installed to prevent exposure of the pipeline through natural scouring processes
- **Site restoration:** Once the trench is backfilled and scour protection installed, the bed and banks will be rehabilitated to the pre-disturbance condition

Horizontal Directional Drilling

A HDD method will be used in environmentally constrained watercourse crossings. This approach is a form of trenchless construction which reduces the disturbance footprint and limits the environmental impact associated with the project.

This trenchless method of construction involves the following activities:

- **Clearing and preparation:** entry and exit pits (approximately 1 m x 2 m wide) on either side of the crossing
- **Lowering:** the drilling equipment into the entry pit
- **Drilling:** a pilot bore underground from the entry pit toward the exit pit
- **Pulling:** the strung pipe through the pilot bore
- **Retrieving:** the drilling equipment from the exit pit
- **Testing:** pressure testing the pipeline to ensure that it is safe and functioning properly
- **Site restoration:** the entry and exit pits will be restored to pre-disturbance condition

5.4.1.3 Decommissioning and Rehabilitation

Decommissioning and rehabilitation of the gathering lines would include:

- The gas and water gathering line will be purged

- Underground infrastructure will be made safe and remain in ground
- Each end of the line will be cut off below ground level
- These areas will be restored to pre-disturbance condition (top soil installed and reseeded)

Decommissioning of gathering pipelines is proposed to be completed progressively as wells are depleted, plugged, and abandoned over the life of the project. This will also include the associated water, power and communications infrastructure.

5.5 New Access Tracks

5.5.1 Proposed Activities

The majority of access tracks required for the project will utilise existing access tracks. In areas where no access tracks exist, new tracks will be established to allow access to project infrastructure. Based on the current project layout, the project requires approximately 8 km of new access tracks to be established to access project infrastructure.

5.5.1.1 Construction

Construction activities for the new access tracks would include:

- **Planning and surveying:** survey of the proposed access track route, pre-clearance ecological and cultural heritage surveys
- **Site preparation:** installation of erosion and sediment controls, clearing and grubbing the access track stripping and stockpiling top soil and cleared vegetation
- **Access track establishment:** levelling and grading the access tracks
- **Site restoration:** spreading top soil and grass seed on disturbed areas not required for operation

5.5.1.2 Operations

Operations of the new access tracks would include:

- **Maintenance:** maintenance of the access tracks to ensure safe and reliable access to plant, equipment, and facilities

5.5.1.3 Decommissioning and Rehabilitation

Decommissioning and rehabilitation of access tracks is proposed to be completed progressively as project infrastructure is no longer required for operations, provided the access tracks are not required by the landholder. Rehabilitation of the access tracks would include spreading top soil and grass seed on disturbed areas.

5.6 Timing and Duration

Construction works are proposed to be undertaken between 6:30am to 6:30pm, Monday to Sunday. During operations, the project will operate 24 hours a day, seven days a week. The timing and duration of each project phase is provided in **Table 7**.

Table 6. Timing and duration of the project

Project phase	Timing (Commencement)	Duration
Construction	Year 1	Approximately 9 – 10 months of activity per annum, weather dependent (approx. 4 production wells proposed to be drilled per annum)
Operations	Year 2	30 years

Project phase	Timing (Commencement)	Duration
Decommissioning and Rehabilitation	2050	Progressive rehabilitation to occur as gas wells come to the end of their life. Gas well life is expected to be around 12-15 years.

5.7 Workforce

5.7.1 Construction

The anticipated peak construction workforce numbers for the project are provided in **Table 8**. The workforce for drilling of the wells will be housed in a temporary drilling camp located on each property where the wells are located. The workforce required for the construction of the GCF (which will be constructed prior to drilling activities), construction of access tracks and gathering network, will drive in from the local towns each day. Local towns may include but are not limited to Rolleston, Springsure, Comet and/or Emerald.

Drilling of the wells and construction of the gas and water gathering network may occur concurrently, the GCF and access tracks will be constructed prior, so that the anticipated maximum workforce at any one time may be up to 41 people.

Table 7. Anticipated maximum workforce

Project component	Workforce numbers	Drive in, drive out (DIDO)
Drilling of the wells	35	No, workers will stay in temporary drill camp on site
Constructing access tracks	3	Yes, workers will drive from local towns
Constructing GCF	8	Yes, workers will drive from local towns
Constructing gathering network	6	Yes, workers will drive from local towns
Anticipated Total	41	

5.7.2 Operations

The anticipated peak operational workforce numbers are expected to be two personnel per day shift. Operators will be employed for scheduled maintenance, inspection activities and other routine tasks. Operating personnel will either drive to site each day from the local towns, or stay in the five person permanent camp located at the GCF for the duration of their shift. Telemetry will be installed on the wells and at the GCF, which mean that the site can also be monitored and operated remotely if required.

6 ASSESSMENT CRITERIA

The following section of this report provides descriptions of existing environmental aspects that have the potential to be impacted due to the construction and operation of proposed activities. Environmental values including land, ecology, air, noise, surface water, groundwater, and waste, along with potential impacts and management practices, have been assessed and outlined, in order to minimise the impact of the proposed activities on each environmental value.

The assessment has been carried out in accordance with DES Guideline *Application Requirements for Petroleum Activities* (DEHP 2013) prepared in accordance with the EP Act.

6.1 Assessment Approach

Appropriately qualified and experienced persons have undertaken technical assessments, which have been used to guide the process of assessing potential impacts from the proposed activities. Residual risks and management practices have been considered in order to reduce impacts as part of the assessments.

6.1.1 Environmental Values

The EP Act provides a definition of environmental values as:

- A quality of physical characteristic of the environment that is conducive to ecological health or public amenity or safety, or
- Another quality of the environment identified and declared to be an environmental value under an environmental protection policy or regulation

Environmental values are described in **Section 7** to inform the assessment of impacts relevant to this EA application.

6.1.2 Potential Impacts

Activities and their potential impacts to environmental values have been identified as part of the application. The type and extent of impacts have been considered in order to assist in the development of appropriate environmental management practices.

6.1.3 Management Practices

Appropriate management practices have been identified and will be implemented to ensure impacts to environmental values (including sensitive receptors where relevant) are minimised, where possible.

7 ASSESSMENT OF ENVIRONMENTAL IMPACTS

7.1 Land

7.1.1 Environmental Values

The environmental values of the land to be protected or enhanced include:

- Integrity of undisturbed land and ecosystems
- Integrity of the top soil as a resource for rehabilitation
- Stability of disturbed land and ensuring it is non-polluting
- Integrity of soil health and function including the physical and chemical attributes relative to vegetation establishment and growth
- Integrity of soil stability and structure for erosion protection, and
- Suitability of the land for continued agricultural use after rehabilitation

7.1.2 Existing Environment

7.1.2.1 Topography

Topography across the project area descends in a relatively even manner from 250 m Australian Height Datum (AHD) at the eastern boundary of the project area to 190 m Australian Height Datum (AHD) at the south-western boundary, refer **Figure 5**.

The topography of the land in the surrounding areas includes the outcrop of the Clematis Group which forms the high ground of the Expedition Ranges to the east of the project area, rising to approximately 800 m AHD along the escarpment.

7.1.2.2 Soils

With reference to Atlas of Australian Soils (ALA 2023), four soil map units have been identified within the project area, the general description associated with each map units include, refer **Figure 6**.

- **CC23** – Grey self-mulching cracking clays (covers most of the western boundary including Comet River and its connecting drainages)
- **My21** – Red massive earths (covers most of the eastern boundary including the Humboldt Creek and elevated plains to the east)
- **CC21** – Grey self-mulching cracking clays (covers a small section of the southern boundary)
- **Kd8** – Black self-mulching cracking clays (covers a small section of the south-east corner of the project area)

There is no acid sulphate soil mapped within the project area.

7.1.2.3 Regional Planning Interests

With reference to State Mapping and RPI Act, the entire project area is mapped as Priority Agricultural Area. The project area is also partly mapped as strategic cropping land, covering a small section in the southwest of the project area, and another small section in the southeast of the project area, refer **Figure 7**.

7.1.2.4 Geology and Hydrogeology

The regional geology of the project area comprises sediments from the Early Permian to Middle Triassic age Bowen Basin, refer **Figure 8**. The project is located on the southern end of the Comet Ridge outcrop and is flanked by the Taroom Trough to the east and the Denison Trough to the west. The projects' CSG production will target the Bandanna Formation of the Bowen Basin to depth of 200-250 metres below ground level (mbgl). The Bandanna Formation is also known as the Baralaba or Rangal Coal Measures.

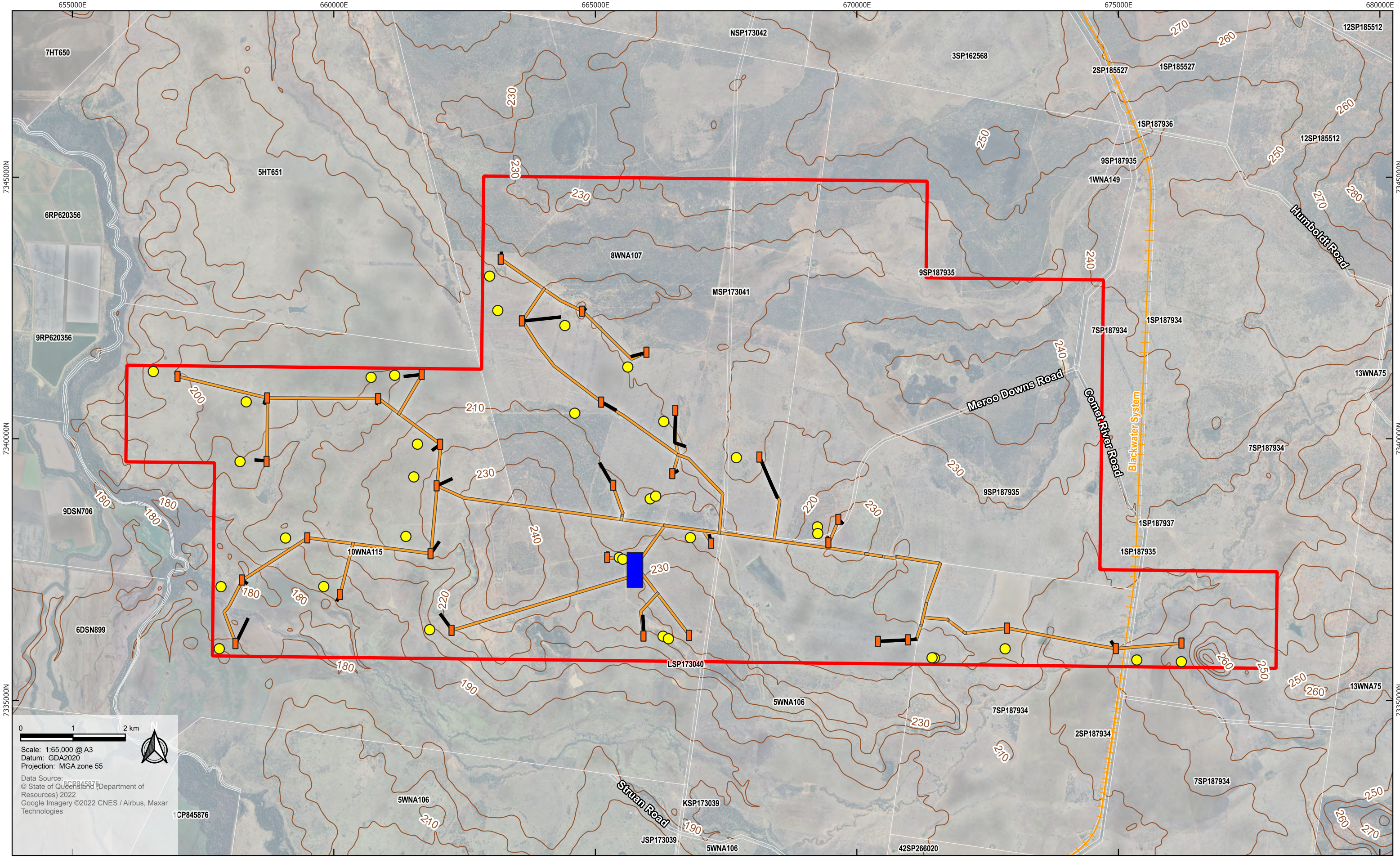
Quaternary and Tertiary (Cainozoic) deposits overlay the Bowen Basin units. The Tertiary deposits comprise basalts with interbedded tuff and volcanolithic fragments. The Quaternary deposits predominantly comprise alluvial sediments associated with the major drainage features.

7.1.2.5 Land Use and Tenure

The primary land use within the project area is classified as being used for grazing. The majority of the project area is freehold tenure, with the exception of road parcels, a railway corridor and easement parcel, refer to **Figure 2**.

The main public road within the project area is the Meroo Downs Road, which connects to Comet-Rolleston Road to the east of the project area. An Ergon powerline easement intersects the project area through the centre in a north-south direction. The blackwater railway system intersects 2 km of the project area in the east in a north-south direction.

There is a stock route located within the road corridor of Comet-Rolleston Road that is mapped within the eastern section of the project area.

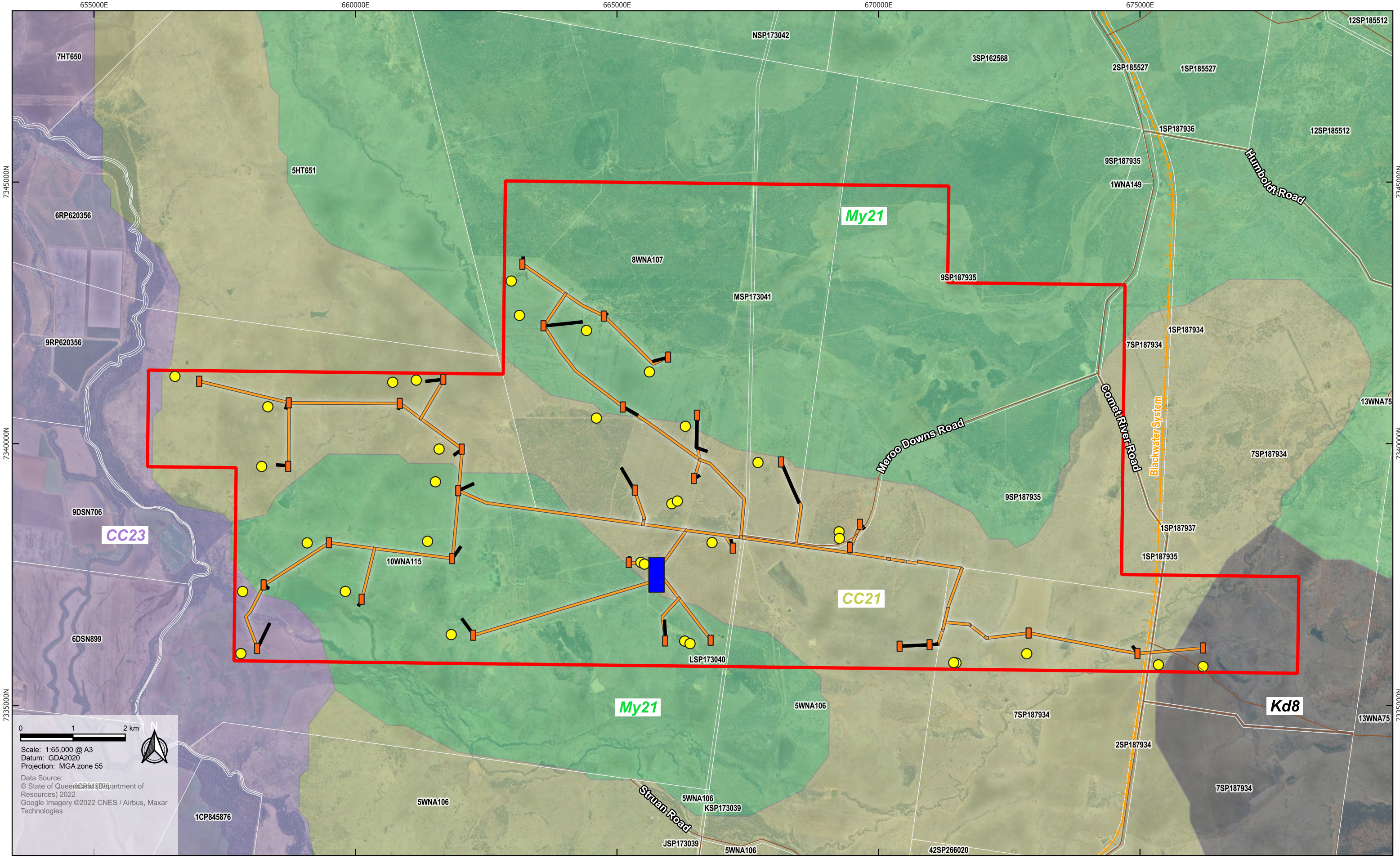


Legend		
	Petroleum Lease Boundary	Infrastructure (Indicative only)
	Cadastrate (DCDB)	
	Elevation contour (mAHD)	
	Railways	
		Gas production wells



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Figure 5
 Mapped site topography



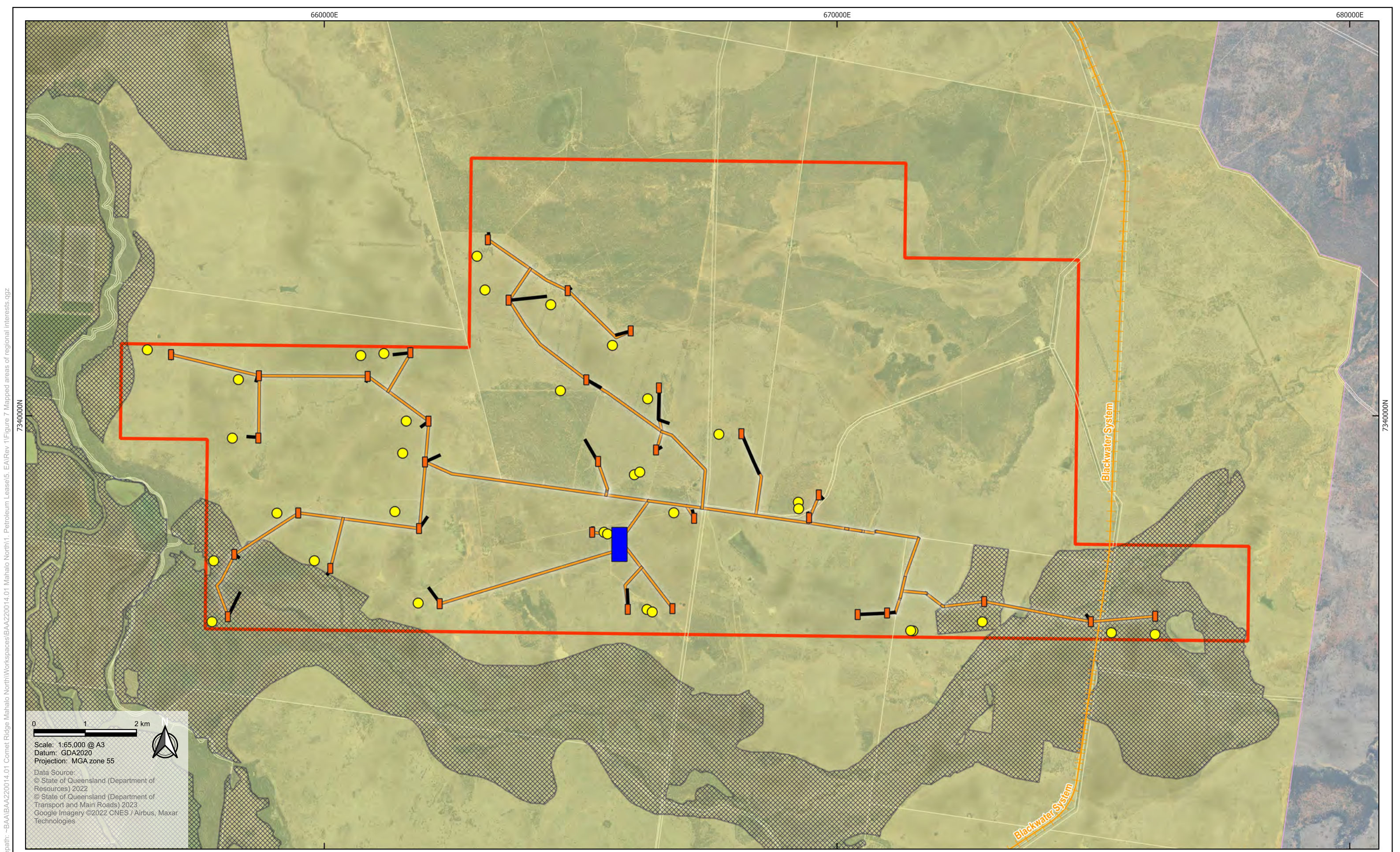
Scale: 1:65,000 @ A3
 Datum: GDA2020
 Projection: MGA zone 55
 Data Source:
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Legend	
	Petroleum Lease Boundary
	Cadastre (DCDB)
	Roads and tracks
	Railways
	Soils (Atlas of Australian Soils) CC21
	CC23
	Kd8
	My21
	Infrastructure (Indicative only) Gas compression facility
	New access tracks
	Indicative gathering lines
	Gas production wells Indicative lateral well
	Indicative vertical well



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Figure 6
 Mapped soil types



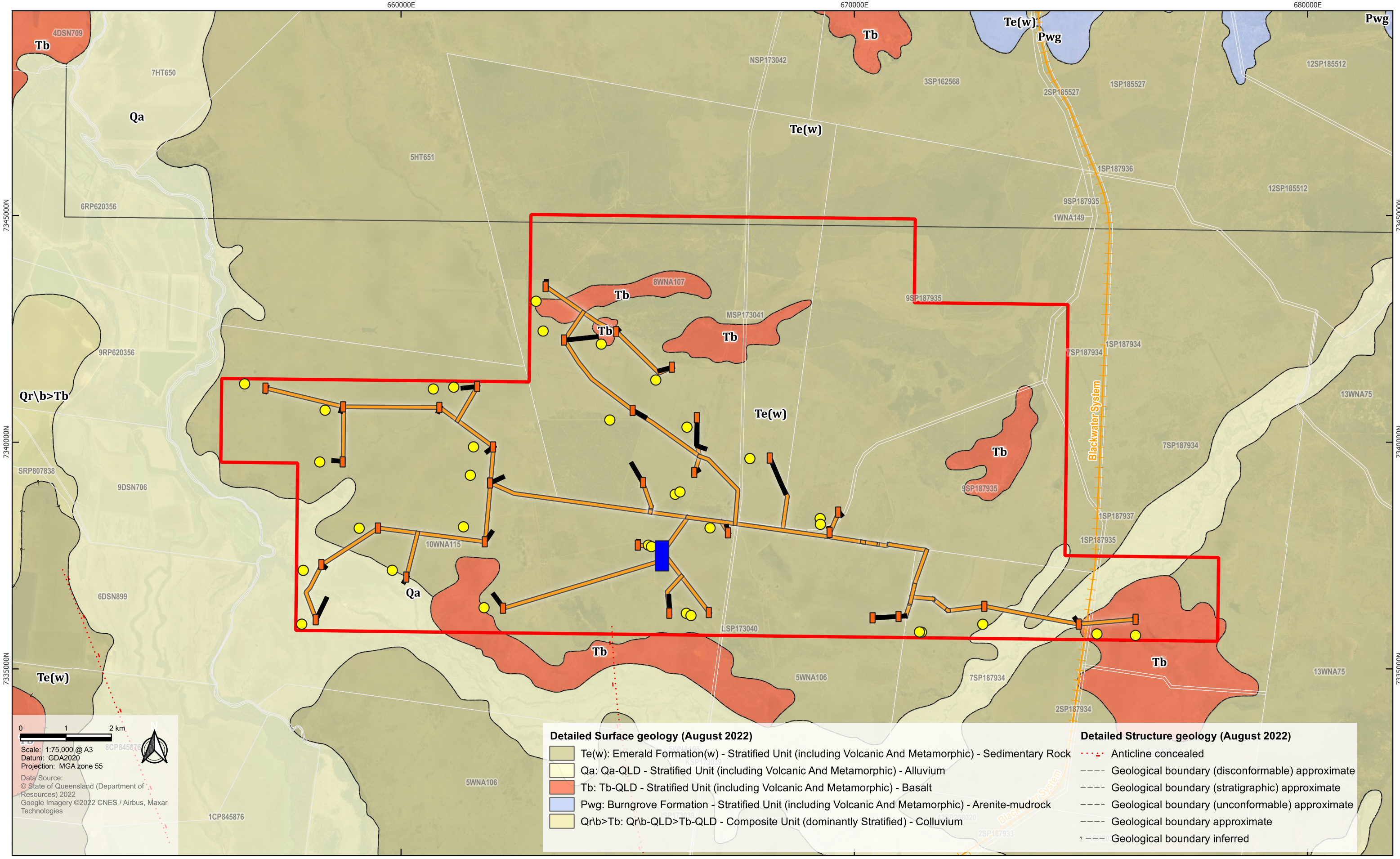
Scale: 1:65,000 @ A3
 Datum: GDA2020
 Projection: MGA zone 55
 Data Source:
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Legend		
Petroleum Lease Boundary	Infrastructure (Indicative only)	Gas production wells
Cadastre (DCDB)	Gas compression facility	Indicative lateral well
Priority agricultural areas (PAAs)	New access tracks	Indicative vertical well
Strategic cropping area (SCA)	Indicative gathering lines	
Railways		



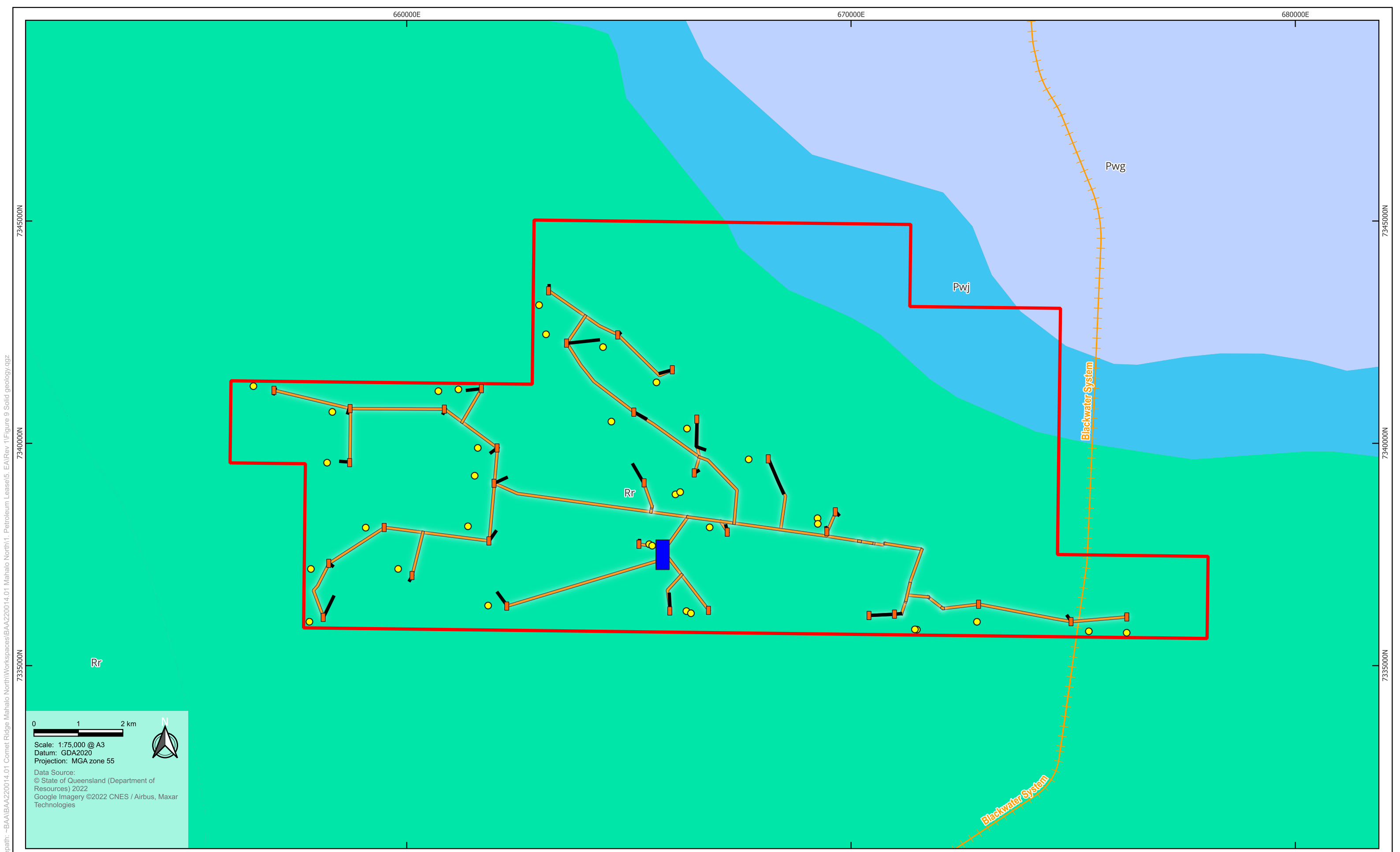
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Figure 7
 Mapped areas of regional interests



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Figure 8
Mapped surface geology



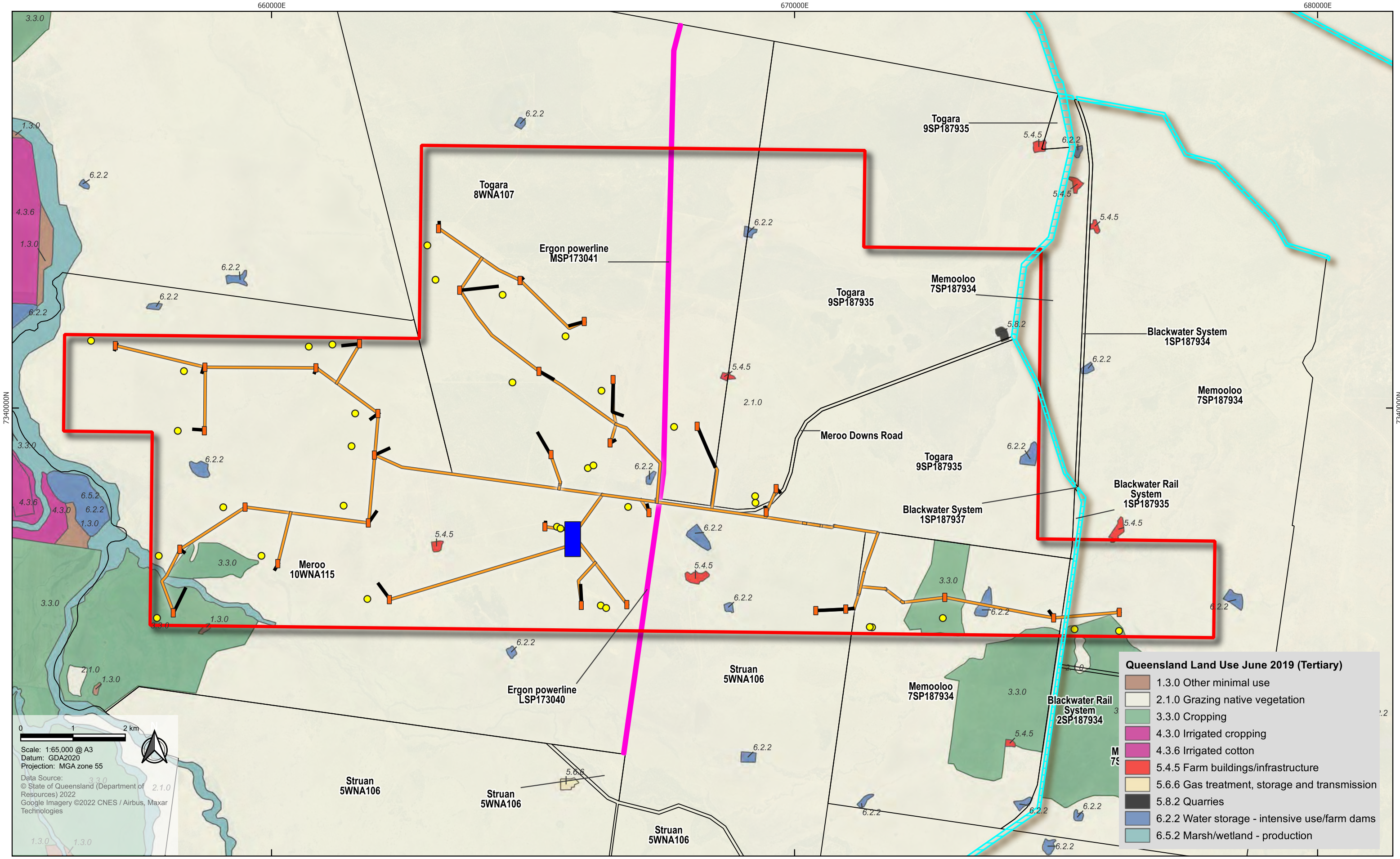
Legend

- | | | | |
|--------------------------|---|---|-----------------------------|
| Petroleum Lease Boundary | Regional Bowen Basin Solid Geology | Infrastructure (Indicative only) | Gas production wells |
| Railways | Burngrove Formation | Gas compression facility | Indicative lateral well |
| | Rangal Coal Measures, Bandanna Formation, | New access tracks | Indicative vertical well |
| | Baralaba Coal Measures | Indicative gathering lines | |
| | Rewan Group | | |



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Figure 9
Solid geology



Legend		
	Petroleum Lease Boundary	Infrastructure (Indicative only)
	Cadastre (DCDB)	
	Stock routes	
	Easement	

Gas production wells	
	Indicative lateral well
	Indicative vertical well



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Figure 10
 Mapped land use

7.1.3 Emissions and Releases

There are no proposed releases to land as part of the proposed activities. However, there is potential for environmental values as they relate to land to be impacted through uncontrolled or accidental spills of chemicals or contaminated waste to the environment.

Proposed activities which have the potential to impact land may arise from the following:

- CSG drilling and well completion activities
- Raw CSG water (as a waste)
- Treated CSG water (as a waste)
- CSG operational activities

The potential impacts related to uncontrolled or accidental spills of chemicals or contaminated waste is described in **Section 7.1.4**.

7.1.4 Potential Impacts

If not managed appropriately, the potential impacts to land as a result of proposed activities may include, but not limited to:

- Loss of agricultural land
- Disturbance to chemical, biological, and structural composition of soil
- Changes to land profile
- Disruption to existing landholder operations
- Introduction and spread of pest species due to human, vehicle and machinery movement and disturbance of land in pest infestation areas
- Contamination of land including the uncontrolled release of chemicals, contaminated waste or produced water

7.1.5 Management Practices

The Proponent will utilise a range of measures that will mitigate and/or minimise potential impacts to ecological values, as outlined in **Table 9**. As an overarching management tool, the Proponent will develop and implement an environmental management plan (EMP), refer to **Section 7.1.5.1**.

Table 8. Recommended mitigation measures for potential impacts to land values

Impact	Management measure	Project timing
Loss of agricultural land	The disturbance footprint reduced to the greatest extent possible	Detailed design
	Co-locate infrastructure to reduce disturbance	Detailed design
	Gas and water gathering lines will be buried underground and to a suitable depth to allow existing grazing and cropping land to continue throughout the life of the project	Construction
	Clearing to only occur within designated/approved areas to minimise loss of agricultural land	Construction
	Utilise existing access tracks where possible	On-going
Disturbance to chemical, biological, and structural composition of soil	Develop and implement a top soil management plan, refer Section 7.1.5.2 .	Pre-Construction
	Clearing to only occur within designated/approved areas to minimise changes to soils and land profile	Construction
	Minimise the duration of exposed soils by completing backfilling activities as soon as possible after excavation activities	Construction
Changes to land profile	Develop and implement an erosion and sediment control plan (ESC Plan), refer to Section 7.1.5.3	Pre-Construction
Disruption to existing landholder operations	The disturbance footprint reduced to the greatest extent possible	Detailed design
	Undertake activities in accordance with signed Conduct and Compensation Agreement's between the Proponent and key stakeholders	On-going
	The Proponent will record, investigate, and resolve complaints and incidents relating to project activities	On-going

Impact	Management measure	Project timing
	The applicant will notify the administering authority and landholders as soon as practicable and in compliance of the EA after becoming aware of any release of contaminants not in accordance with the EA or where environmental harm, or the potential for environmental harm has occurred	On-going
	Following the completion of CSG activities, all wells, pipelines equipment, access tracks, structures, and buildings, which are not required by the landholder, will be decommissioned.	Decommissioning
Introduction and spread of pest weed species due to human, vehicle and machinery movement and disturbance of land in pest infestation areas	Develop and implement a weed and pest management plan prior to construction works being carried out in line with the <i>Central Highlands Regional Council biosecurity plan 2020-2025</i> (CHRC 2019), refer to Section 7.1.5.4 .	Pre-construction
	Mapping of the extent of weed/pest occurrence within the project footprint will be recorded during pre-clearance surveys.	Pre-construction
	Undertake activities in accordance with signed Conduct and Compensation Agreement's between the Proponent and key stakeholders	On-going
	Vehicle wash downs will be located at the GCF within the project area and will be required for all personnel to use prior to vehicles/plant/machinery entering areas in accordance with entry requirements with landowners	On-going
	All personnel entering the site in vehicles will be required to complete a weed hygiene declaration/vehicle hygiene inspection report. This action will be required for the life of the project to ensure all reasonable and practical steps are undertaken to prevent or minimise biosecurity risks	On-going
	Site induction program will include weed and pest management for all project employees	On-going
	Disposal and storage of putrescible wastes must be undertaken appropriately to ensure feral animals aren't attracted to the project area.	On-going
	Regular monitoring of weed and pest occurrence in association with the project's proposed activities areas	On-going
	Respond to complaints from adjacent landowners relating to weeds and pests	On-going
Contamination of land including the uncontrolled release of chemicals, contaminated waste or produced water	Develop and implement the following management plans relating to chemical storage, waste and CSG water: <ul style="list-style-type: none"> • EMP (Section 7.1.5.1) • ESC Plan (Section 7.1.5.3) • Spill response plan (Section 7.1.5.5) • Environmental contingency plan (Section 7.1.5.6) • CSG water management plan (Appendix B) • Waste management plan (Section 7.7.4.1) 	Pre-Construction
	Spills response kits available on site	On-going
	Site induction program relating to spill response management will be implemented for all project employees	On-going
	Store project materials and chemicals in accordance with: <ul style="list-style-type: none"> • AS 3780:2008 – <i>The storage and handling of corrosive substances</i> • AS 1940:2004 – <i>The storage and handling of flammable and combustible liquids</i> • AS 3833:2007 – <i>Storage and handling of mixed classes of dangerous goods in packaged and intermediate bulk containers</i> 	On-going

7.1.5.1 Environmental Management Plan

The EMP will outline the management and mitigation measures required for the proposed activities associated with the project. The plan will describe how potential environmental impacts associated with the construction, operations and decommissioning phases of the project will be managed. The plan will also ensure compliance with the EA conditions, industry guidelines and regulatory requirements will be met.

The EMP will include but is not limited to:

- Roles and responsibilities
- Project activities relevant to the phase of the project
- Legislative requirements, including relevant EA conditions
- Environmental values
- Risk assessment
- Management measures
- Inspections and monitoring requirements
- Implementation (i.e. training, inductions, communications, and notifications)

7.1.5.2 Top soil Management Plan

The Proponent will develop and implements a top soil management plan to manage the excavation activities associated with the construction of the project.

The top soil management plan will include but is not limited to:

- Roles and responsibilities
- Project activities relevant to the phase of the project
- Legislative requirements, including relevant EA conditions
- Environmental values
- Top soil control strategies, for example:
 - Soil stockpiles/windrows located away from drainage channels and watercourses/waterways
 - Placement of excavated soil material upstream of excavation trench to allow runoff into trench
 - Limiting duration of stockpile of soil material, with backfilling completed as soon as practicable
 - Manage top soil in accordance with ESCP
- Inspections and monitoring requirements
- Review requirements

7.1.5.3 Erosion and Sediment Control Plan

The Proponent will develop and implement an ESC Plan to mitigate uncontrolled sediment flows to the environment and into waterways as a result of proposed activities.

The ESC Plan will include but is not limited to:

- Roles and responsibilities
- Project activities relevant to the phase of the project
- Legislative requirements, including relevant EA conditions
- Environmental values
- Erosion and sediment control measures, for example:
 - Regular inspection of erosion and sediment controls and repairs as necessary
 - Soil and surface stabilisation techniques
 - Soil stockpiling strategies
 - Sediment fences
 - Bunds
- Drainage control measures
- Inspections and monitoring requirements
- Review requirements

7.1.5.4 Weed and Pest Management Plan

A weed and pest management plan will be prepared and implemented for the project. The weed and pest management plan will include but it not limited to:

- Roles and responsibilities

- Project activities relevant to the phase of the project
- Legislative requirements, including relevant EA conditions
- Environmental values
- List of weed and pest species known within and surrounding the project area
- Management controls (i.e. prevention, containment, eradication)
- Training requirements
- Inspections and monitoring requirements
- Review requirements

7.1.5.5 Spill Response Plan

A spill response plan will be prepared and implemented for the project. The spill response plan will include but is not limited to:

- Roles and responsibilities
- Project activities relevant to the phase of the project
- Legislative requirements, including relevant EA conditions
- Environmental values
- Procedures for spill response to be implemented by contractors in accordance with the conditions of the EA
- Notification requirements of spills
- Investigation and reporting requirements in accordance with potential risk to the environment
- Training requirements
- Inspections and monitoring requirements
- Review requirements

7.1.5.6 Environmental Contingency Plan

An environmental contingency plan will be prepared and implemented to provide a framework for the Proponent to respond to emergency environmental incidents.

The environmental contingency plan will include (but not be limited to the following):

- Roles and responsibilities
- Project activities relevant to the phase of the project
- Legislative requirements, including relevant EA conditions
- Identify communication protocols with relevant parties in the event of an emergency environmental incident
- Set instructions for investigating the cause of an emergency environmental incident
- Identify remedial actions to be implemented to reduce the likelihood of reoccurrence of similar emergency environmental incidents
- Develop procedures and plans for the management of emergency environmental incident as required during the project life
- Training requirements
- Inspections and monitoring requirements
- Review requirements

7.2 Ecology

An Environmental Assessment Report (EAR) has been carried out by Epic Environmental to identify the terrestrial ecology values of the project area and assess potential project impacts related to terrestrial ecology, refer to **Appendix D**. An Aquatic Values Assessment Report (Aquatics Report) has been carried out by DPM EnviroSciences (DPM) to identify the aquatic ecology values of the project area and assess potential project impacts associated with aquatic ecology, refer to **Appendix E**.

A summary of both the EAR and Aquatics Report is provided in **Section 7.2.2**.

7.2.1 Environmental Values

The environmental values of the project and adjacent areas which are to be protected or enhanced are:

- The integrity of undisturbed ecosystems
- The integrity of bioregions and regional ecosystems (RE) and the habitat values they provide
- Flora, including vegetation communities, endangered, vulnerable, rare or near threatened, special least concern, and pest species
- The integrity of habitat for endangered, vulnerable, or near threatened and special lease concern species
- Category B and C environmentally sensitive areas (ESAs)
- Fauna, including fauna present, protected animal breeding places, endangered, vulnerable or near threatened species, pest species, plants or animals and their habitats, including threatened wildlife, near threatened wildlife and rare wildlife under the relevant legislation including NC Act
- Prescribed environmental matters as defined in Queensland's EO Act
- State and nationally significant biodiversity values
- Areas with high ecological significance values including, but not limited to, nationally threatened ecological communities, large tracts of remnant vegetation and connectivity corridors
- The integrity of movement corridors provided by riparian zone vegetation

7.2.2 Existing Environment

Prior to commencing field surveys, desktop assessments were carried out to identify MNES and MSES considered relevant to the project area. This includes species and vegetation communities of conservation significance that potentially occur within the project area. Information from publicly available databases and resources were investigated to provide insight into the ecological values associated with the project area.

The desktop assessment results are provided in **Appendix F** and included the following:

- DCCEEW Protected Matters Search Tool (PMST) (records within a 50 km radius of the point -24.0489, 148.6281 (GDA2020), located in the centre of the project) (DCCEEW 2023a)
- Queensland DES WildNet database (records within a 50 km radius around the point -24.0489, 148.6281 (GDA2020)) (DES 2023a)
- Species Profile and Threats Database maintained by DCCEEW (DCCEEW 2023b)
- ALA, a web-based search tool that is a partnership between CSIRO, Australian museums, herbaria and other biological collections, and the Australian Government (ALA 2023)
- DES Map of ESAs (DES 2023b)
- DES MSES mapping (DES 2023c)
- DoR Regulated Vegetation Management Map and Vegetation Management Supporting Map, including RE, essential habitat, watercourse, and wetland mapping (DoR 2023a)

There has also been extensive ecological assessment work in the local area in recent years. Where considered relevant, the desktop assessment and discussion of field results within this assessment includes information from the following reports:

- *Mahalo Gas Project: Ecology technical report* (Golder 2018) – project encompassed lands to the immediate south and south-east of the current project area

- *Blackwater terrestrial ecology survey report* (EMM 2022) – project encompassed lands within the eastern portion of the current project area (on Togara property) as well as lands to the immediate east

The desktop assessment of environmental values was verified through flora and fauna field surveys conducted by suitably qualified personnel from Epic and DPM. Two rounds of terrestrial and aquatic field surveys were completed. Terrestrial ecology surveys were completed during April 2022 and January-February 2023 and aquatic field surveys were completed during August 2022 and March 2023.

The methods for field surveys included:

- **Flora survey:** combination of formalised secondary and quaternary level sampling procedures, as defined in the *Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland* (Neldner et al. 2022)
- **Fauna survey:** a combination of trapping, Anabat recording of ultra-sonic micro-bat calls, visual searches, audio surveys, bird survey, opportunistic observations, night-time spotlighting, and targeted assessments of habitats considered to be of highest quality. At each trap site, 25 Type-A Elliott Traps were deployed, and four pairs of funnel traps were deployed
- **Aquatic survey:** aquatic habitat assessment, in situ water quality measurements, collection of water samples for laboratory analysis, aquatic habitat structure, aquatic flora, aquatic fauna including fish and macroinvertebrates, targeted survey effort including trapping using fyke nets. Survey procedures and assessment was undertaken in accordance with with *Queensland Australian River Assessment System (AusRivAS) Sampling and Processing Manual* (DNRM 2001)

7.2.2.1 Matters of National Environmental Significance

The DCCEEW PMST identifies MNES protected under the EPBC Act considered as potentially occurring within the project area and surrounds (DCCEEW 2023a). The PMST identified three categories of MNES potentially present, as summarised in **Table 10**. A copy of the PMST is provided in **Appendix F**.

Table 9. Matters of national environmental significance relevant to the project area

MNES	Relevance to the project
World heritage properties	None identified
National heritage places	
Wetlands of International Importance	
Great Barrier Reef Marine Park	
Commonwealth Marine Area	
Listed Threatened Ecological Communities (TECs)	<p>The PMST report identifies the following five TECs listed as ‘Endangered’ under the EPBC Act as possibly present with the project area:</p> <ul style="list-style-type: none"> • Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant) • Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin • Poplar Box (<i>Eucalyptus populnea</i>) Grassy Woodland on Alluvial Plains • Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions • Weeping Myall Woodlands <p>There are three REs mapped as present within the project area which are considered analogous to the Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant) TEC: RE 11.4.8, 11.4.9 and 11.5.16.</p>
Listed threatened species:	26 species listed as threatened are predicted to be present within 50 km of the project area, including 19 fauna species and seven flora species.
Listed migratory species	Nine species listed as migratory species are predicted to be present within 50 km of project area.

7.2.2.2 Matters of State Environmental Significance

The Queensland Government Environmental Reports Online portal identified six MSES as present within the project area, as summarised in **Table 11**. A copy of the MSES Report is provided in **Appendix F**.

Table 10. Matters of State Environmental Significance relevant to the project area

Matters of State Environmental Significance	Relevance to the project
Wetlands in a wetland protection area or wetlands of high ecological significance as listed under the EP Regulation	There is a large area mapped as a Wetland Protection Area located in the north of the project area (refer Figure 11).
Protected wildlife habitat for species listed as threatened or special least concern (NC Act) fauna or flora as listed under the NC Animals Regulation/NC Flora Regulation	There are patches of protected wildlife habitat located throughout the project area. These largely occur in the northern portion of the project area and are considered to provide core habitat for Ornamental Snake (refer Section 7.2.2.8 and Figure 12).
Regulated vegetation under the VM Act:	
Regulated Vegetation – Category B (remnant) that are ‘endangered’ or ‘of concern’ regional ecosystems	There are a number of polygons mapped at present comprising vegetation listed as endangered under the VM Act. These largely occur on the northern portion of the project area. There are small sections of the southern boundary of the project area that comprises vegetation listed as endangered and of concern (refer Figure 12).
Regulated Vegetation – Category C (High-value Regrowth) that are ‘endangered’ or ‘of concern’ regional ecosystems	The project area contains Category C endangered vegetation present at the north-east of the project area (refer Figure 12).
Essential habitat on the essential habitat map for wildlife prescribed as critically endangered, endangered, or vulnerable under the NC Act	There are patches of essential habitat located throughout the project area (refer Figure 12). These largely occur in the north-east of the project area and are considered to provide habitat for Ornamental Snake
Regulated vegetation located within a defined distance from the defining banks of a relevant watercourse identified on the VM Act watercourse and drainage feature map	Watercourse mapping intersects very little regulated vegetation within the project area (refer Figure 12). Regulated vegetation is mapped largely in two polygons in the northern portion of the project area.
Regulated vegetation management located within a wetland or within 100 metres from the defining bank of a wetland identified on the VM Act wetlands map	Two mapped wetland areas occur in the north of the project area (refer Figure 11).
REs	The project area contains the following RE categories <ul style="list-style-type: none"> • Category A or B area containing endangered vegetation mapping • Category A or B are that is least concern vegetation mapping • Category C or R area containing endangered vegetation mapping Refer to Section 7.2.2.3 for further details on REs. Mapped REs are shown on Figure 12 .
Flora survey trigger map	None identified
Groundwater Dependent Ecosystems (GDE)	Terrestrial (moderate potential) GDE, as well as aquatic (moderate potential) GDE has been identified as occurring within the project area (refer Figure 13).
ESA	Queensland Government mapping of ESAs (DES 2022a) indicates the following ESAs occur within the project area (refer Figure 14): <ul style="list-style-type: none"> • Category B – Vegetation (remnant and regrowth) listed as endangered under the EP Act (Biodiversity status). This includes vegetation identified as non-remnant under VM Act RE mapping • Category C – Essential habitat for wildlife prescribed as critically endangered, endangered or vulnerable under the NC Act • Category C - Of Concern Regional Ecosystems – Remnant (Biodiversity Status)

7.2.2.3 Mapped Regional Ecosystems

Current DoR vegetation community mapping identifies 13 REs within the project area mapped as a mix of homogeneous and heterogenous polygons. The REs are described in **Table 12** and shown on **Figure 12**.

Table 11. Mapped regional ecosystems within project area

Regional Ecosystem	Short description (Queensland Herbarium 2021b)	VM Act Status	EP Act Status
11.3.1	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on alluvial plains	Endangered	Endangered
11.3.3	<i>Eucalyptus coolabah</i> woodland on alluvial plains	Of concern	Of concern
11.4.8	<i>Eucalyptus cambageana</i> woodland to open forest with <i>Acacia harpophylla</i> or <i>A. argyrodendron</i> on Cainozoic clay plains	Endangered	Endangered
11.4.9	<i>Acacia harpophylla</i> shrubby woodland with <i>Terminalia oblongata</i> on Cainozoic clay plains	Endangered	Endangered
11.4.9a	<i>Acacia harpophylla</i> , <i>Lysiphyllum carronii</i> +/- <i>Casuarina cristata</i> open forest to woodland. Not a Wetland	Endangered	Endangered
11.5.2	<i>Eucalyptus crebra</i> , <i>Corymbia</i> spp., with <i>E. moluccana</i> woodland on lower slopes of Cainozoic sand plains and/or remnant surfaces	Least Concern	No Concern
11.5.3	<i>Eucalyptus populnea</i> +/- <i>E. melanophloia</i> +/- <i>Corymbia clarksoniana</i> woodland on Cainozoic sand plains and/or remnant surfaces	Least Concern	No Concern
11.5.9	<i>Eucalyptus crebra</i> and other <i>Eucalyptus</i> spp. And <i>Corymbia</i> spp. Woodland on Cainozoic sand plains and/or remnant surfaces	Least Concern	No Concern
11.5.9b	<i>Eucalyptus crebra</i> , <i>E. tenuipes</i> , <i>Lysicarpus angustifolius</i> +/- <i>Corymbia</i> spp. Woodland. Not a Wetland	Least Concern	No concern at present
11.5.16	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest in depressions on Cainozoic sand plains and remnant surfaces	Endangered	Endangered
11.7.2	<i>Acacia</i> spp. Woodland on Cainozoic lateritic duricrust. Scarp retreat zone	Least Concern	No concern at present
11.8.4	<i>Eucalyptus melanophloia</i> woodland to open woodland on Cainozoic igneous rocks.	Least Concern	No concern at present
11.8.5	<i>Eucalyptus orgadophila</i> open woodland on Cainozoic igneous rocks	Least Concern	No concern at present

7.2.2.4 Conservation Significant Flora Species

The desktop review identified in PMST and Wildnet comprised of eight flora species listed as threatened under the NC Act and/or EPBC Act as potentially occurring within 50 km of the project area (refer **Figure 15**), including:

- *Aristida annua* (Vulnerable – NC Act and EPBC Act) – One record (1993) located 6 km north of the project area, two records (1971-1995) located south-west within 50 km of the project area
- *Bertya opponens* (Least Concern – NC Act, Vulnerable – EPBC Act) – Seven records (1985-2019) located within 50 km north-east of the project area. (1934-1999)
- *Cadellia pentastylis* (Vulnerable – NC Act and EPBC Act) – Two records (1991-1996) located 25 km northeast of the project area. One record (2011) located 31 km south of the project area
- *Dichanthium queenslandicum* (Vulnerable – NC Act, Endangered – EPBC Act) -17 records exist within 50 km of the project area to the north, west and south-west

- *Dichanthium setosum* – (Least Concern – NC Act, Vulnerable – EPBC Act) – Three records 35-50 km south west of the project area from 2018
- *Leichhardtia brevifolia* (Vulnerable – EPBC Act) – Six records (1985-2004) located within 50 km east of the project area (high uncertainty on the coordinate precision of the record location associated with a single 1990 record)
- *Solanum dissectum* (Endangered – NC Act and EPBC Act) – Four records (2010-2019) located within 40 km northeast of the project area
- *Solanum elachophyllum* (Endangered – NC Act) – 10 records (1964-2019) located within 50 km of the project area to the northeast, east and southeast (high uncertainty on the coordinate precision of the record location associated with a 1964 and 2015 record). In addition a total of five individuals of the species were identified within the project area during 2019 (EMM 2022)

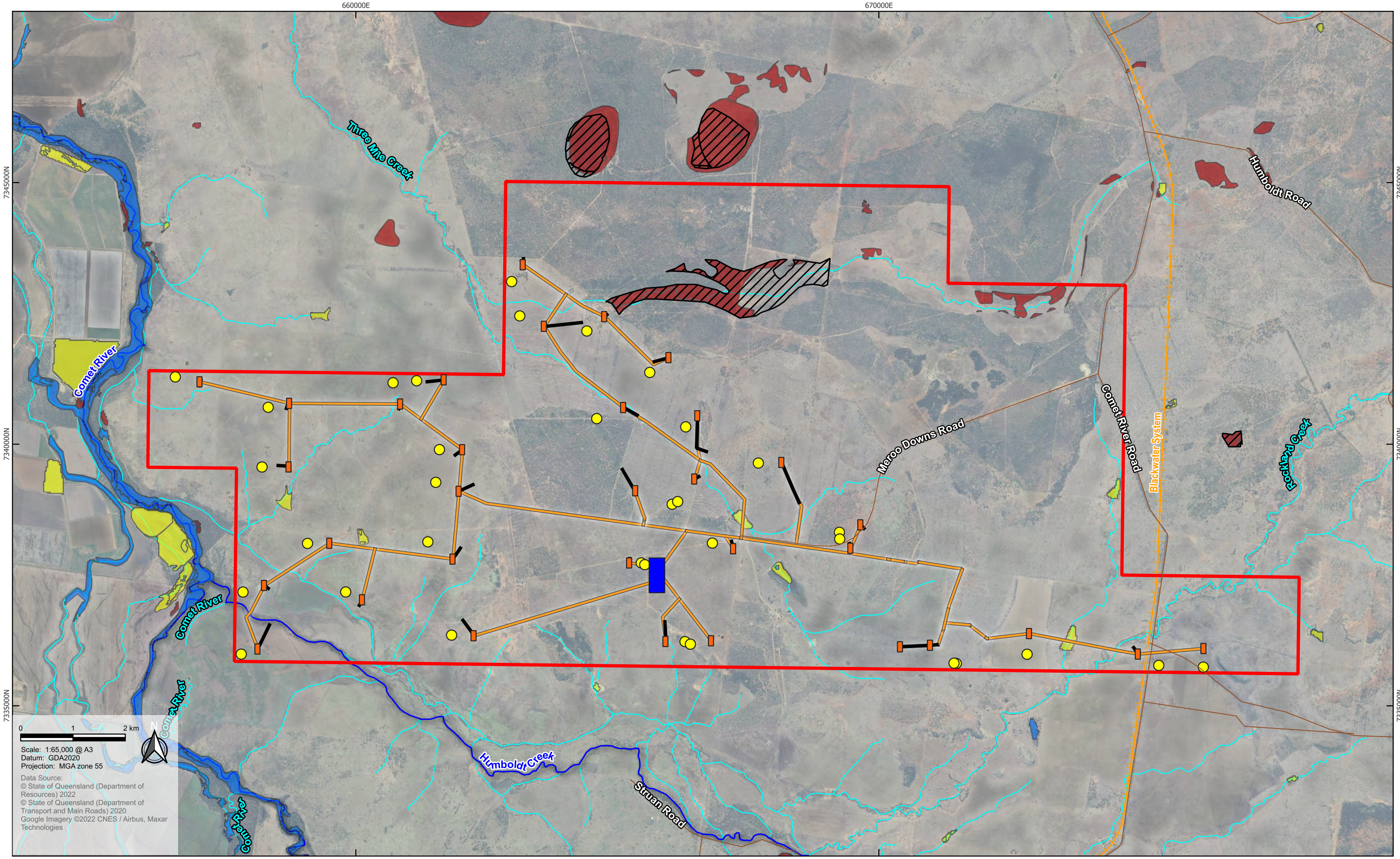
The remaining threatened flora species identified in database searches are considered *unlikely* to occur within the project area.

7.2.2.5 Conservation Significant Fauna Species

The desktop review identified ten fauna species listed as threatened under the NC Act and/or EPBC Act as potentially occurring within 50 km of the project area (refer **Figure 16**), including:

- Red Goshawk (*Erythrotriorchis radiatus*) (Vulnerable – EPBC Act, Endangered – NC Act) – Several records (1996-1998) located 41-51 km northeast of the project area. Scattered records in the wider region surrounding the project area but all are older (pre 1981)
- Australian Painted Snipe (Endangered – NC Act and EPBC Act) – Two undated Birdlife Australia records located 38 km and 47 km west of the project area
- Squatter Pigeon (southern) (*Geophaps scripta scripta*) (Vulnerable – NC Act and EPBC Act) - Two records undated Birdlife Australia records located 15 km and 24 km north of the project area (high uncertainty on the coordinate precision of the record location associated with these records)
- Grey Falcon (*Falco hypoleucos*) (Vulnerable – NC Act and EPBC Act) – Sparse records scattered in the wider area surrounding the project area. Nearest record located 41 km east of the project area. All of these records are older (pre 1981)
- Painted Honeyeater (*Grantiella picta*) (Vulnerable – NC Act and EPBC Act) – Two records (1985-2017) located 38 km and 48 km north-east of the project area
- Northern Quoll (*Dasyurus hallucatus*) (Endangered – EPBC Act, Least Concern – NC Act) – Three records (1967-1975 and one undated) located 47 km west of the project area. One record (1997) located 41 km south
- Greater Glider (*Petauroides volans*) (Endangered – NC Act and EPBC Act) – Multiple records located northeast at least 38 km from the project area. Closest records (1997) located 24 km south of the project area. Several records (2012 and 2016) located south and west including relatively recent records near Springsure (48 km west)
- Koala (*Phascolarctos cinereus*) (Vulnerable – EPBC Act, Vulnerable – NC Act) – Large number of database records in wider area including two records (1976 and 1996) within the project area itself. Most records are older (pre1990). Nearest recent record (2012) located 17 km south-east of the project area
- Ornamental Snake (Vulnerable – EPBC Act, Vulnerable – NC Act) – Nearest database records located approximately 25 km to the north (1995) and 45 km to the north-west (1977). Recorded during surveys for other projects in the wider area (Golders 2019; EMM 2022). All sightings were located west of the Comet-Rolleston Road despite targeted surveys for the species within the east of the current project area (EMM 2022) and to the immediate south (Golders 2019).
- Grey Snake (*Hemiaspis damelii*) (Endangered - EPBC Act, Endangered – NC Act) - One record (2003) located 39 km north of the project area

No conservation significant fauna listed as threatened or migratory were recorded during the 2022 or 2023 field survey. A single species listed as Special Least Concern under the NC Act was recorded: Short-beaked Echidna. A detailed assessment of the likelihood of occurrence within the project area of conservation significant fauna species identified during the desktop review is provided in **Appendix F**.

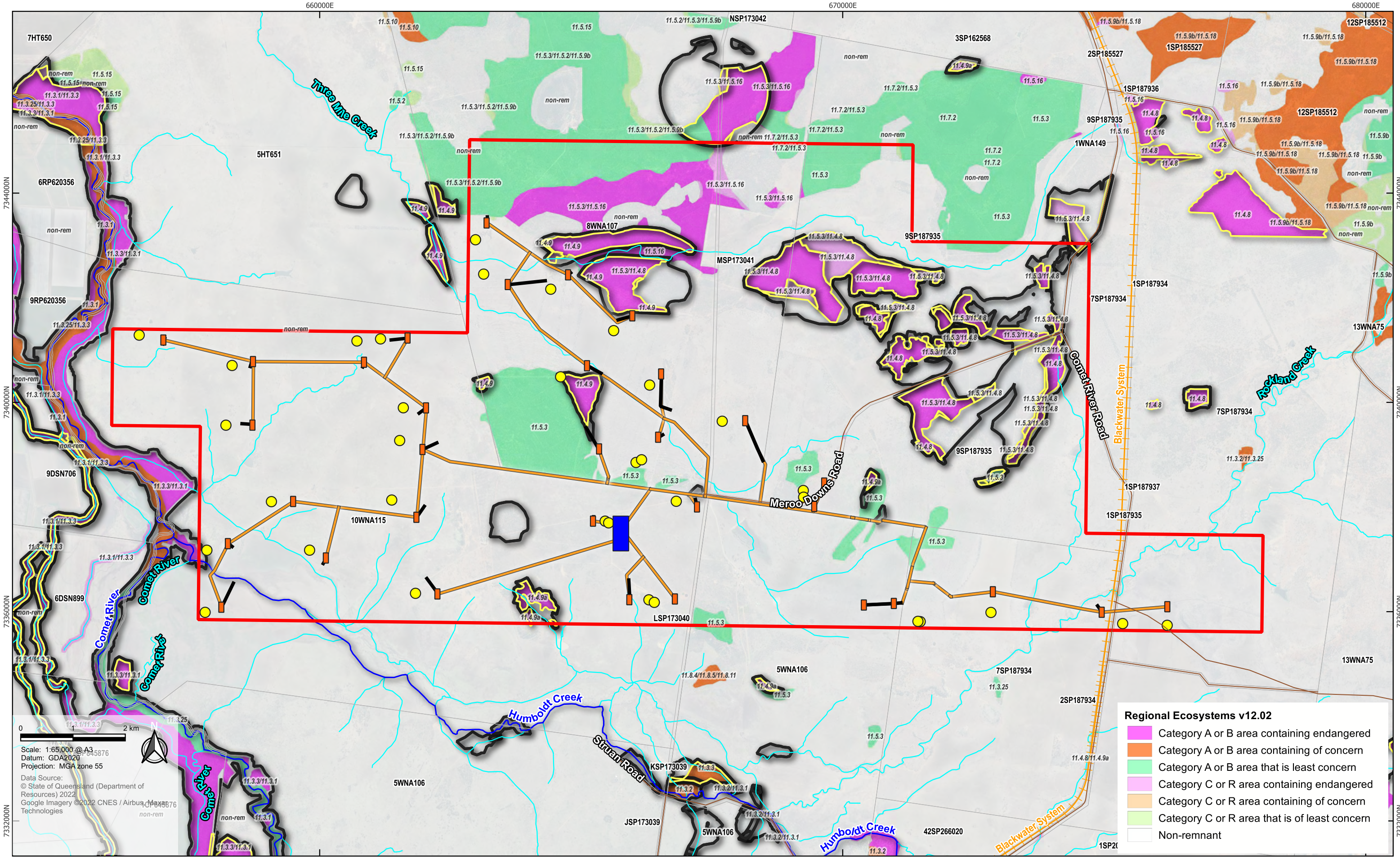


Legend		Infrastructure (Indicative only)		Gas production wells		Vegetation management		Wetland areas (Qld Wetland Mapping v5.0)	
	Petroleum Lease Boundary		Gas compression facility		Indicative lateral well		Major		Lacustrine
	Roads and tracks		New access tracks		Indicative vertical well		Minor		Palustrine
	Railways		Indicative gathering lines						Riverine
									MSES - High ecological significance wetlands



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Figure 11
Mapped wetlands



Legend

- Petroleum Lease Boundary
- Cadastre (DCDB)
- Vegetation management essential habitat v11.04
- MSES - Wildlife habitat (endangered or vulnerable)
- Roads and tracks
- Railways

Infrastructure (Indicative only)

- Gas compression facility
- New access tracks
- Indicative gathering lines

Gas production wells

- Indicative lateral well
- Indicative vertical well

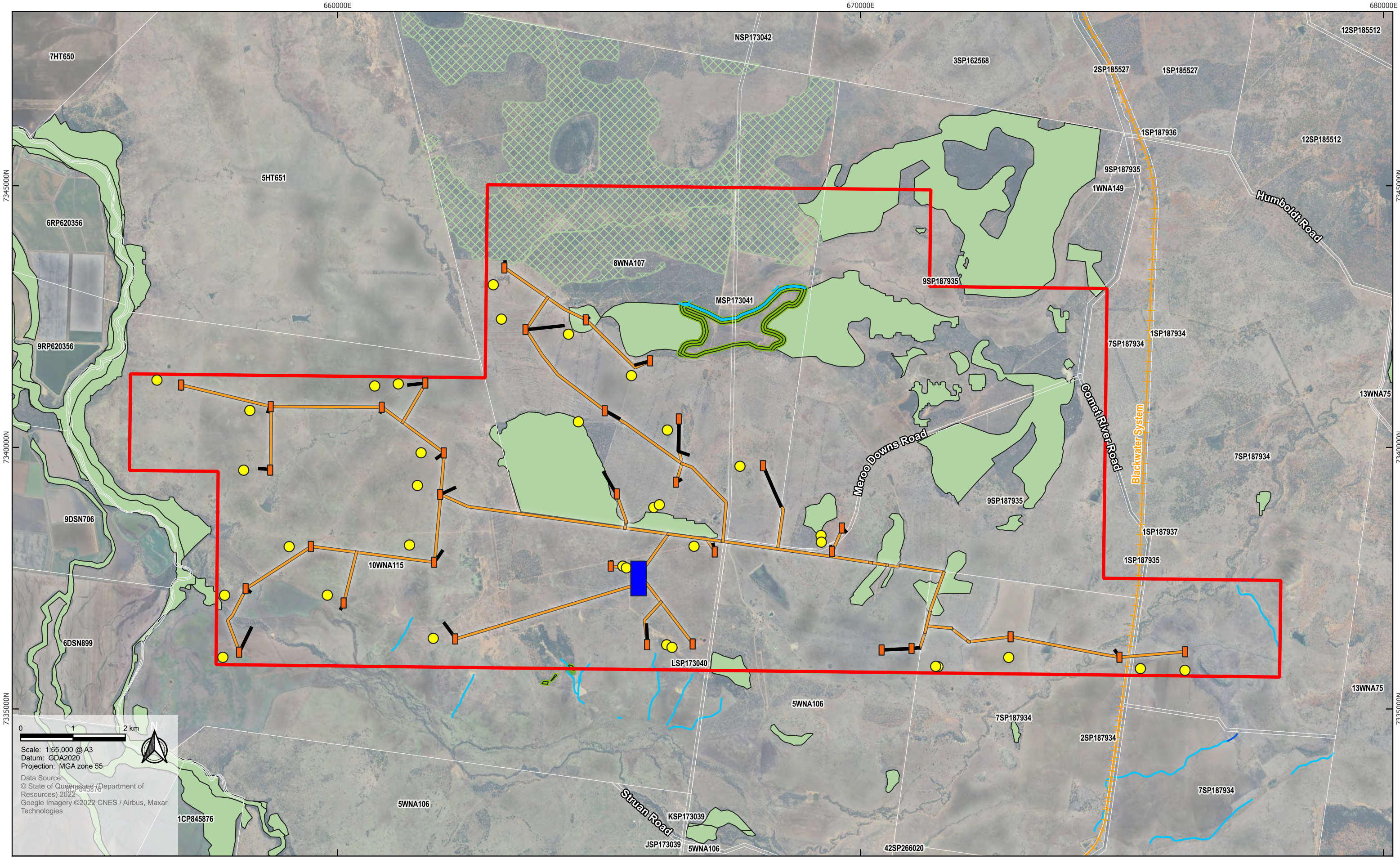
Vegetation management watercourse v6

- Major
- Minor



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Figure 12
Mapped regional ecosystems and essential habitat



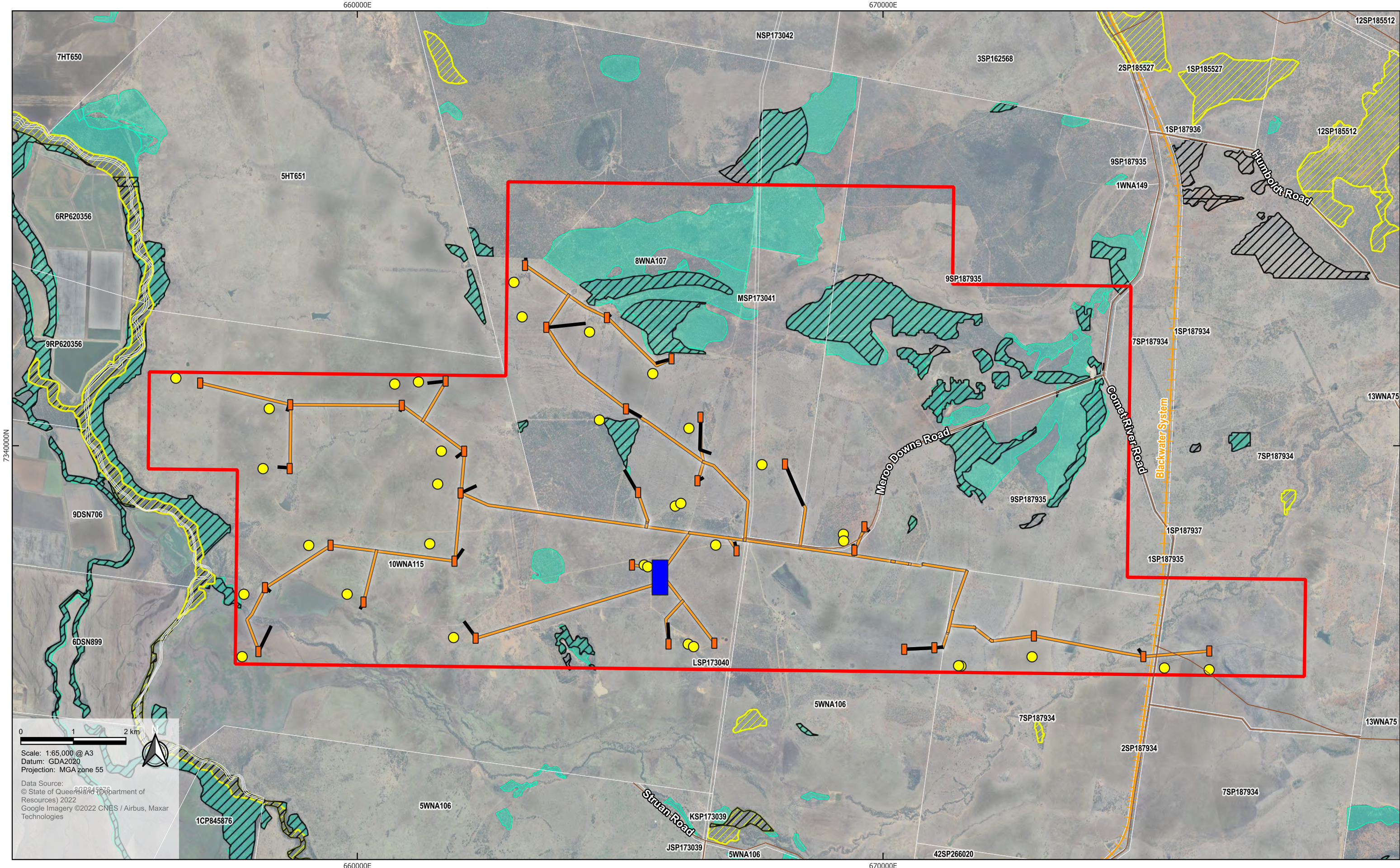
Scale: 1:65,000 @ A3
 Datum: GDA2020
 Projection: MGA zone 55
 Data Source:
 © State of Queensland (Department of Resources) 2022
 Google Imagery ©2022 CNES / Airbus, Maxar Technologies

Legend		Surface groundwater dependant ecosystems areas		Terrestrial groundwater dependant ecosystems areas	
Petroleum Lease Boundary	New access tracks	81-100% Derived GDE - moderate confidence	81-100% Derived GDE - moderate confidence	81-100% Derived GDE - low confidence	01-80% Derived GDE - moderate confidence
Cadastre (DCDB)	Indicative gathering lines	Surface groundwater dependant ecosystems lines	Derived GDE - high confidence	01-80% Derived GDE - low confidence	
Railways	Gas production wells	Indicative lateral well	Indicative vertical well		
Infrastructure (Indicative only)					
Gas compression facility					



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Figure 13
 Mapped groundwater dependent ecosystems



0 1 2 km

Scale: 1:65,000 @ A3
 Datum: GDA2020
 Projection: MGA zone 55

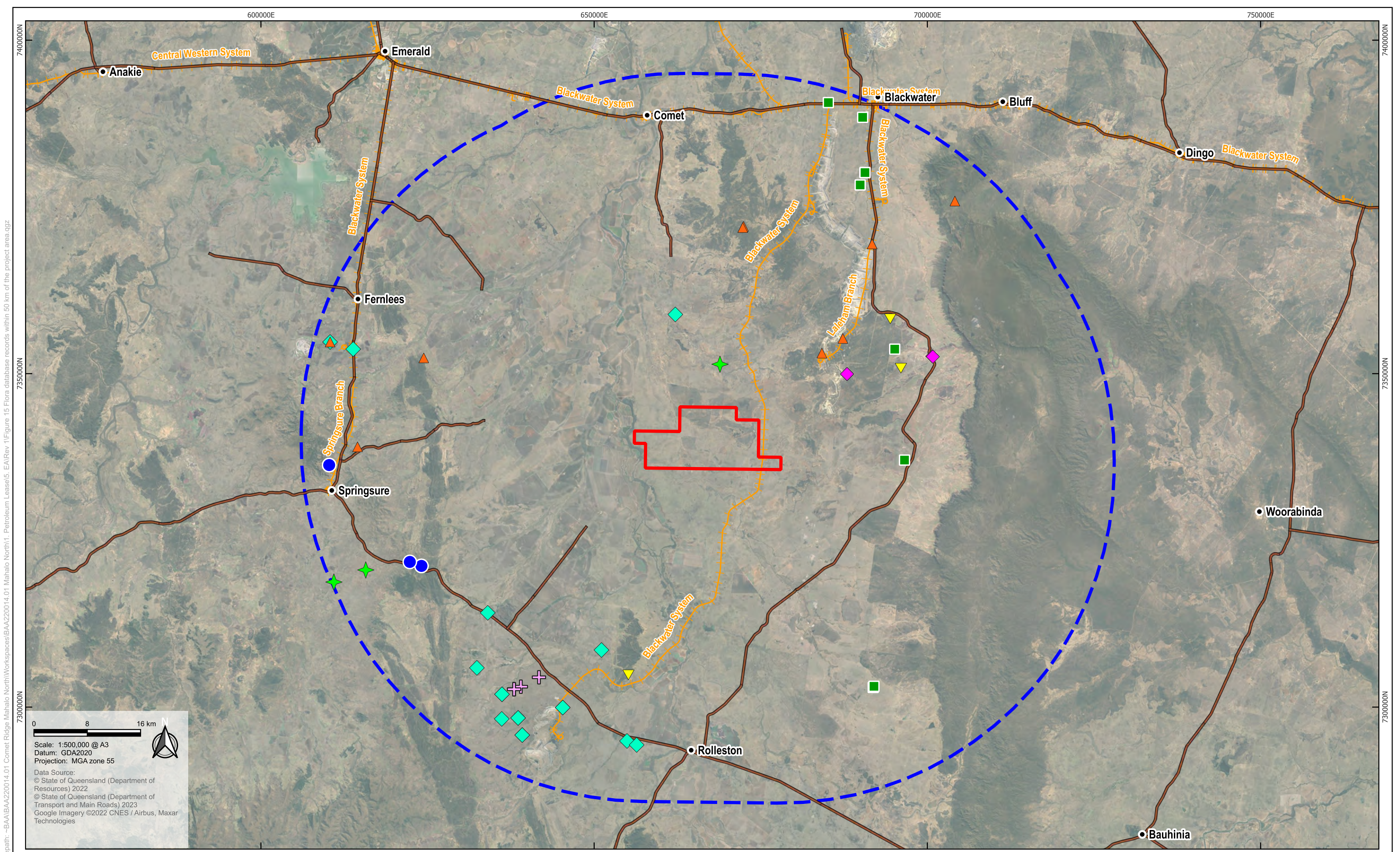
Data Source:
 © State of Queensland (Department of Resources) 2022
 Google Imagery ©2022 CNES / Airbus, Maxar Technologies

Legend		Infrastructure (Indicative only)		Gas production wells		Environmentally sensitive areas	
	Petroleum Lease Boundary		Gas compression facility		Indicative lateral well		Cat B ESA - Endangered regional ecosystems (remnant and regrowth)
	Cadastre (DCDB)		New access tracks		Indicative vertical well		Cat C ESA - Essential habitat
	Roads and tracks		Indicative gathering lines				Cat C ESA - Of concern regional ecosystems
	Railways						



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Figure 14
 Mapped environmentally sensitive areas

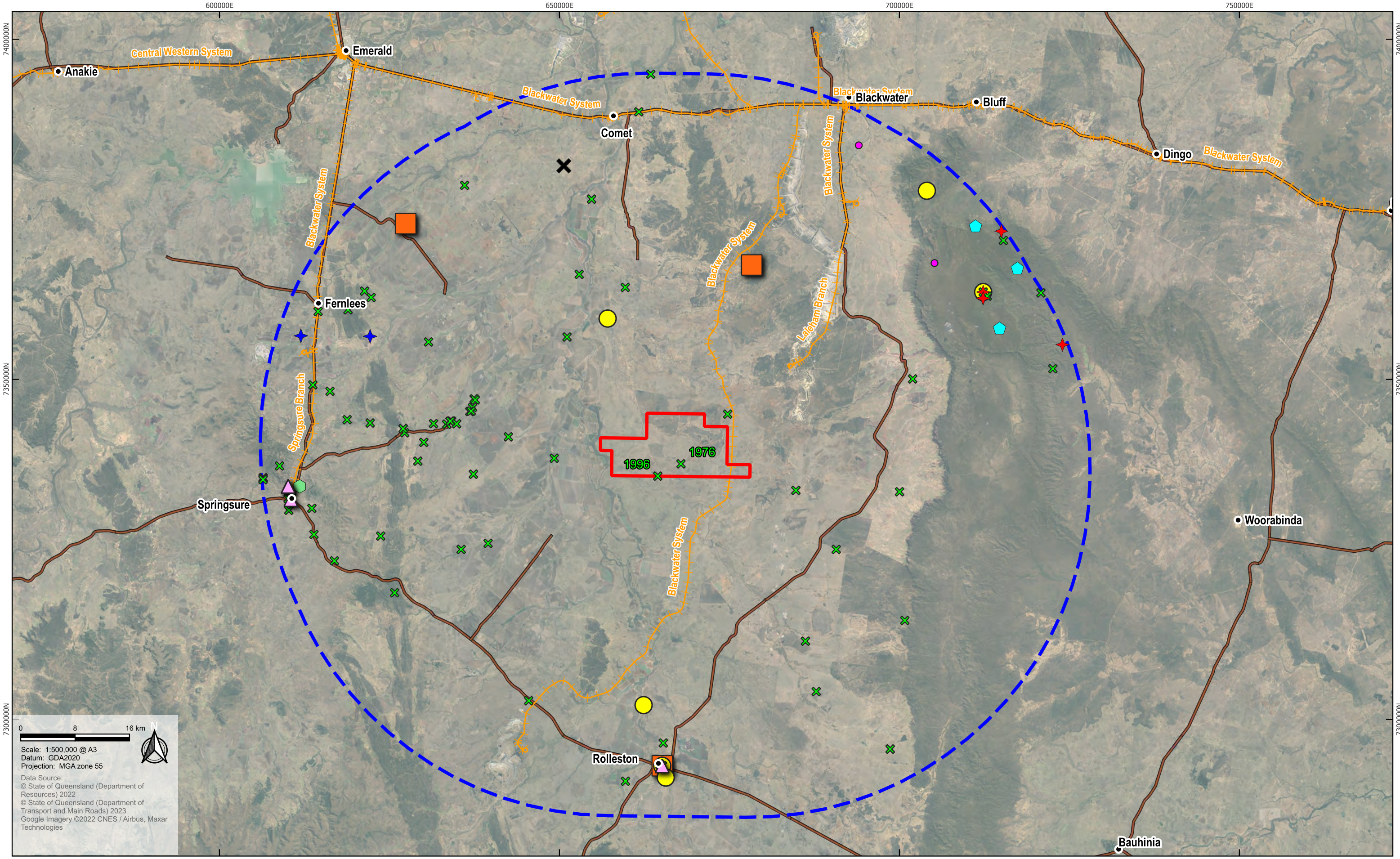


Legend		Threatened flora records	
	Petroleum Lease Boundary		<i>Dichanthium queenslandicum</i>
	50 km buffer		<i>Aristida annua</i>
	Railways		<i>Dichanthium setosum</i>
	State controlled roads		<i>Leichhardtia brevifolia</i>
			<i>Bertya opposens</i>
			<i>Cadellia pentastylis</i>
			<i>Solanum dissectum</i>
			<i>Solanum elachophyllum</i>



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Figure 15
 Flora database records within 50 km of the project area



Legend

- Petroleum Lease Boundary
- 50 km buffer
- Railways
- State controlled roads

Threatened fauna records

- ★ Australian Painted-snipe
- ⬠ Greater Glider
- ⬡ Grey Falcon

- ✕ Grey Snake
- ✕ Koala
- ▲ Northern Quoll
- Ornamental Snake

- Painted Honeyeater
- ★ Red Goshawk
- Squatter Pigeon (southern subspecies)



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Figure 16
Fauna database records within 50 km of the project area

7.2.2.6 Ground-Truthed Regional Ecosystems

Field surveys were undertaken to verify the current RE mapping and confirmed the presence of six vegetation communities analogous to six RE types. A single TEC, Brigalow (*Acacia harpophylla* dominant or co-dominant) was identified within the project area. The TEC is listed as Endangered under the EPBC Act. Two vegetation communities, remnant Brigalow woodland and regrowth Brigalow woodland are considered analogous to Brigalow TEC. The majority of vegetation within the project area is listed as No Concern under the EP Act.

The description, status, and area of each RE is provided in **Table 13**, the extent of each field verified RE is illustrated in **Figure 17** and photos of the REs are provided in **Plate 1** to **Plate 4**.

Table 12. Field-Verified Regional Ecosystems within project area

Vegetation community	RE	Regulated vegetation category	TEC	EP Act (biodiversity) status	Field verified extent within project area (ha)
1. Remnant Brigalow woodland	11.3.1	B	Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant)	Endangered	21.77
	11.4.8				84.79
	11.4.9				73.20
	11.4.9a				36.65
	11.5.16				76.59
2. Regrowth Brigalow woodland	11.4.8	C	N/A	No concern at present	3.57
	11.4.9a				27.37
3. Remnant Blackwood woodland	11.4.8	B	N/A	Endangered	104.76
4. Remnant Poplar Box woodland	11.5.3	B	N/A	No concern at present	1,181.38
5. Regrowth Poplar Box woodland	11.5.3	C			289.05



Plate 1. Remnant Brigalow woodland



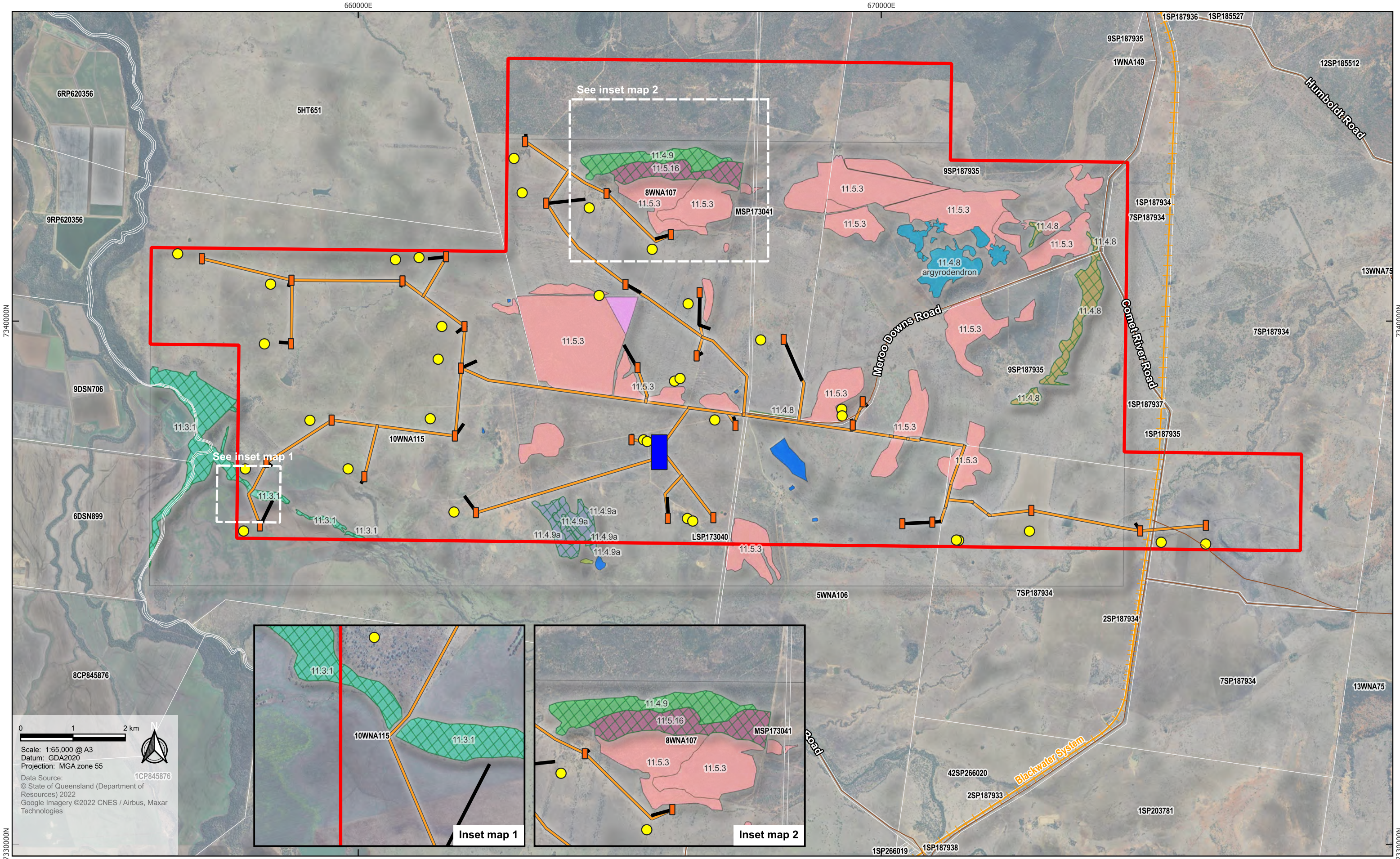
Plate 2. Regrowth Brigalow woodland



Plate 3. Remnant Poplar Box woodland



Plate 4. Regrowth Poplar Box woodland



Legend	
Petroleum Lease Boundary	Gas compression facility
Cadastre (DCDB)	New access tracks
Roads and tracks	Indicative gathering lines
Railways	Indicative lateral well
	Indicative vertical well
	Threatened ecological community
	Brigalow
Ground-truthed Regional Ecosystems	
11.3.1 Brigalow	11.4.8 argyrodendron
11.4.8 argyrodendron	11.4.9
11.4.9	11.5.3
11.5.3	11.8.4
11.4.9 Brigalow	Non-remnant
11.4.9a Brigalow	water
11.5.16 Brigalow	
11.5.3	



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Figure 17
 Ground-truthed regional ecosystems

7.2.2.7 Observed Fauna

The April 2022 and February 2023 surveys recorded a total of 138 fauna species including 10 frogs, 18 reptiles, 91 bird and 19 mammal species within and in the immediate surrounds of the area. This includes at least 11 microbat species recorded via Anabat monitoring. The fauna comprised a range of mostly widespread and common fauna species known from the region. A complete list of the observed fauna species is provided in **Appendix D**. A summary of the observed fauna is provided below.

Herpetofauna

Common species of frogs observed included:

- Green-striped Frog (*Cyclorana alboguttata*)
- Salmon-striped Frog (*Limnodynastes salmini*)
- Northern Banjo Frog (*Limnodynastes terraereginae*) (refer **Plate 5**)
- The introduced Cane Toad (*Rhinella marina*) was commonly observed throughout during spotlighting

18 species of reptiles were identified across both surveys including two geckos, eight skinks, two dragons (refer **Plate 6**) and six snake species.



Plate 5. Northern Banjo Frog (February 2023)



Plate 6. Bearded Dragon (February 2023)

Birds

Timbered areas provided habitat for a range of species common to the region including:

- Peaceful Dove (*Geopelia striata*)
- Striped Honeyeater (*Plectorhyncha lanceolata*)
- Grey-crowned Babbler (*Pomatostomus temporalis*)
- Pied Butcherbird (*Cracticus nigrogularis*)

The abundant grasslands provided habitat for a range of species associated with open habitats including:

- Horsfield's Bushlark (*Mirafra javanica*)
- Rufous Songlark (*Megalurus mathewsi*)
- Brown Falcon (*Falco berigora*)
- finch species and Black-faced Woodswallow (*Artamus cinereus*)

Nocturnal birds were observed to be common during both surveys and in particular during the February 2023 survey.

Mammals

Native mammal species were dominated by microbats (11 species) as recorded by echolocation recordings. In general mammals were only sparingly observed which may reflect the heavy grass cover and limited availability of habitats able to be surveyed, particularly for spotlighting activity. The only macropod observed

onsite was scattered individuals of Eastern Grey Kangaroo (*Macropus giganteus*). Short-beaked Echidna (*Tachyglossus aculeatus*) was observed on a single occasion. Rufous Bettong (*Aepyprymnus rufescens*) was recorded off-site although tracks likely to be of the species were recorded within the project area. No arboreal mammals were observed.

7.2.2.8 Observed Fauna Habitat Values

In general, faunal habitat quality at the time of the February 2023 survey was in relatively good condition due to recent rainfall. Grass coverage was dense across much of the project area. Shallow water-filled waterholes were scattered across the north of the project area and frog activity was high. Nevertheless, the fauna habitat values present are limited by the extent of vegetation clearing and blade ploughing for cattle grazing purposes. A summary of the observed fauna habitat during field surveys is provided below.

Eucalypt Woodlands

Dry woodland communities dominate the tracts of vegetation remaining in the project area, largely within the northern portion of the project area. Throughout much of the project area these communities appear to have been impacted by past tree clearing or tree thinning with few large canopy trees present (**Plate 7**).

Dominant canopy species throughout include Poplar Box, Silver-leaved Ironbark (*E. melanophloia*), Dawson Gum (*E. cambageana*) and Long-fruited Bloodwood. There is a distinct lower storey often dominated by White Cypress Pine, Wilga (*Geijera parviflora*), Acacia species and immature canopy trees. Buloke (*Allocasuarina luehmannii*) occurs in the north of the project area. The shrub layer was variable in extent and the ground layer was often dense due to the wet summer conditions experienced in the region prior to the February 2023 survey.

Past tree clearing activities have limited the availability of some habitat features useful to fauna. Large tree hollows provide shelter/nest sites for a range of arboreal fauna (such as large gliders, possums owls and parrots) but were uncommon throughout due to the lack of old growth trees. Similarly, large woody debris, which provides shelter for a range of ground dwelling fauna species was generally sparsely distributed.

Nevertheless, these woodland habitats provide seasonal food resources for nectivorous bird species (honeyeaters and lorikeets), year-round prey resources for smaller insectivorous bird species and microbats, and small tree hollows suitable as shelter sites for microbats and small gliders. Koala is known to utilise the leaves of a variety of eucalypt species for foraging. It is noted no arboreal mammal species were recorded during spotlighting surveys. In general, the bird assemblage recorded during the site surveys was restricted to widespread and commonly occurring species.



Plate 7. Disturbed Poplar Box woodland (February 2023)

Acacia Woodlands to Open Forest

There are stands of open forest/woodland dominated by a continuous canopy of Brigalow (refer **Plate 8**) or Blackwood scattered within north of the project area, as well as a single patch of Brigalow with a vine-thicket understorey located in the south of the project area. Brigalow has been extensively cleared across much of the project area. These patches are often disturbed with an uneven canopy (but provide suitable foraging values for a variety of smaller forest bird species (e.g. Weebill (*Smicrornis brevirostris*), Rufous Whistler (*Pachycephala rufiventris*) and fairywrens) that prefer a more closed canopy and dense low vegetation.

There is abundant shelter for small ground fauna (particularly reptiles) in the form of low shrubs and fallen timber. Gilgais occur in some stands of remaining Brigalow within the central/west portion of the project area. Following heavy rainfall gilgais may provide habitat for frogs and associated predators such as snakes, herons, and egrets.



Plate 8. Disturbed Brigalow woodland (April 2022)

Non-remnant Grasslands

Non-remnant grasslands dominate much of the project area including much of the western portion of the project area. In general, the grasslands provide limited structural and floristic diversity, and thereby limited faunal diversity in comparison to forested habitats. The limited structure of grasslands provide habitat for species that depend on grasslands and open habitats for foraging such as Eastern Grey Kangaroo (*Macropus giganteus*), finches, Horsfield's Bushlark (*Mirafra javanica*), Rufous Songlark (*Megalurus mathewsi*) and Jacky Winter (*Microeca fascinans*).

The project area has been subject to extensive blade ploughing to encourage pasture grass growth for cattle grazing (anecdotally), refer **Plate 9**. In the south-west of the project area, paddocks adjacent to Humboldt Creek are subject to cropping activity. As a result, there is little habitat variation with few stands of large trees.

Scattered gilgaied areas comprising standing water were found to occur as sparsely scattered, wide and shallow (<50 cm deep) depressions in the central/north-western portion of the project area (refer **Plate 10**). State mapping for threatened fauna species indicates there is habitat for Ornamental Snake (*Denisonia maculate*) (Vulnerable – EPBC Act and NC Act) within the project area, as associated with gilgaied areas (refer **Figure 18**). This habitat was targeted during the February 2023 survey due to the potential presence of Ornamental Snake.

Ornamental Snake has been recorded to the east and south-east of the project area (EMM 2022) and is considered likely to occur based on the presence of suitable gilgai habitat, although targeted trapping during ideal conditions did not record the species. A variety of frog species were common in the vicinity of water-filled gilgai depressions which provides forage value for some predator species such as snakes, herons, and egrets.

Buffel Grass (*Cenchrus ciliaris*) is dominant with scattered individuals or patches of low regrowth trees occurring, often dominated by *Acacia crassa* (refer **Plate 11**). Given the poor structural diversity present, the

grassland habitat in the south-west of the project area provides very limited value for fauna being largely restricted to grassland bird species such as Horsfield's Bushlark, Australian Pipit (*Anthus australis*) and Golden-headed Cisticola (*Cisticola exilis*) as well as other widely occurring species of open country.



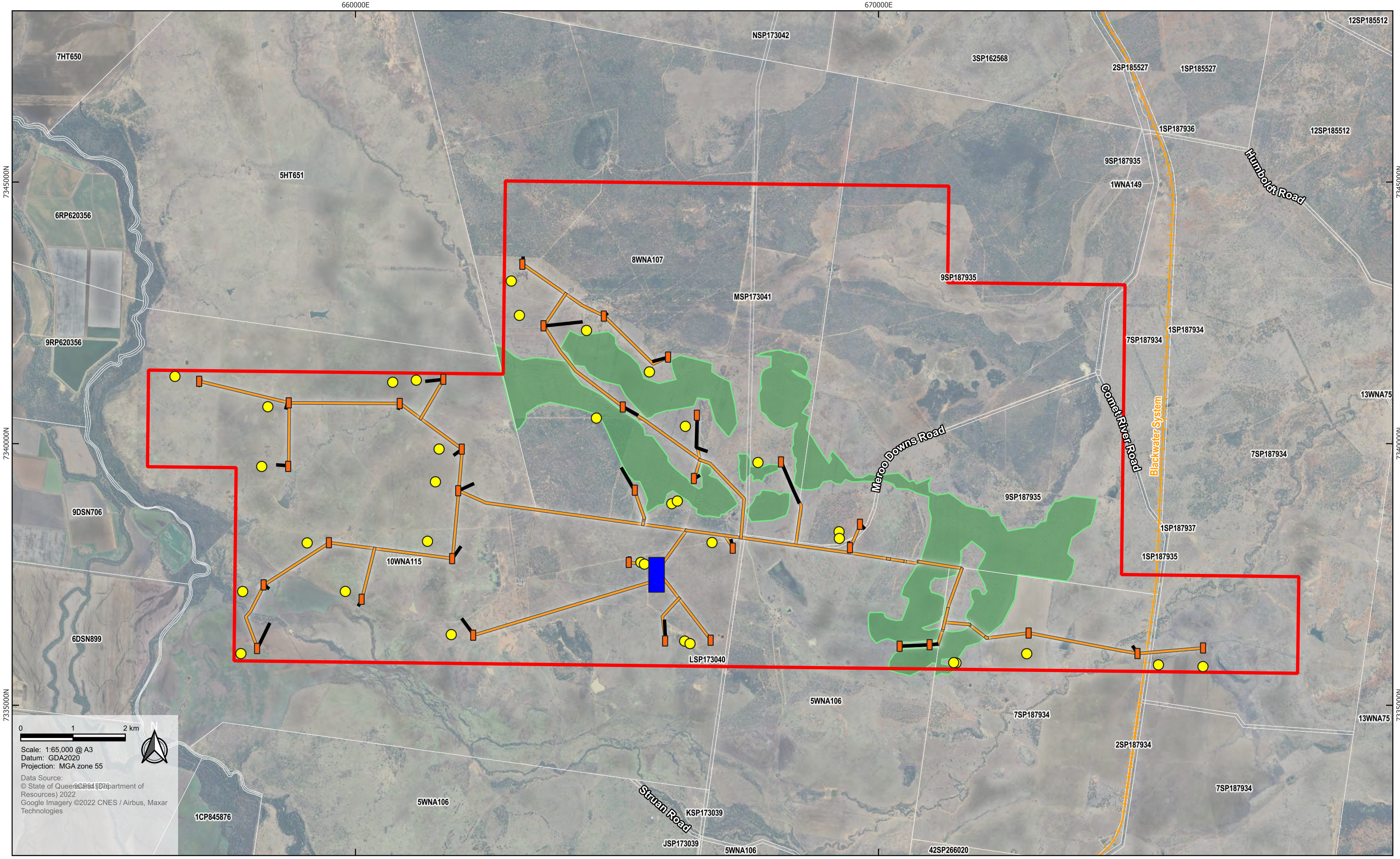
Plate 9. Blade plough areas (April 2022)



Plate 10. Water-filled gilgai (February 2023)



Plate 11. Non-remnant grassland (February 2023)



Legend

Petroleum Lease Boundary	Infrastructure (Indicative only)	Gas production wells
Cadastre (DCDB)	Gas compression facility	Indicative lateral well
Gilgai habitat	New access tracks	Indicative vertical well
Railways	Indicative gathering lines	



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Figure 18
Ground-truthed gilgai habitat

7.2.2.9 Aquatic Ecology

Aquatic habitat assessments were undertaken at 20 sites in August 2022 (dry season) and at 16 sites in March 2023 (wet season) within and surrounding the project area. This included 13 riverine system drainage lines, three palustrine wetland waterbodies (two of which are State-mapped wetlands of High Ecological significance [HES wetlands]), three sites within a State-mapped palustrine wetland RE (State-mapped as a HES wetland), and four sites within State-mapped lacustrine wetland waterbodies. Targeted survey for the Critically Endangered (EPBC Act and NC Act) white-throated snapping turtle (*Elseya albagula*) was undertaken at two sites on the Comet River in March 2023. A summary of the observed aquatic habitat during field surveys is provided below.

Waterways

Waterways, as defined by the Fisheries Act, include rivers, creeks, streams, watercourses, or inlets of the sea. The waterways mapped within the project area are listed in **Table 14** and illustrated on **Figure 19**.

The main waterways within the project area are Humboldt Creek and Rockland Creek which drains into the Comet River, located approximately 800 m downstream to the west of the project area. Comet River is classified as a seventh order stream (DES 2023d). Comet River is also mapped as being at ‘Major’ risk of adverse impact from waterway barrier works on fish movement under the Fisheries Act.

The waterways in the project area are largely ephemeral or episodic, experiencing flow only after sustained or intense rainfall and runoff in the catchment. Stream flows are highly variable, with most channels expected to dry up during winter to early spring when rainfall and runoff is expected to be low. Consequently, physical attributes, water quality, and the composition of aquatic flora and fauna communities are expected to be highly variable over time.

Flow in the Comet River is seasonal, alternatively wet and dry most years, according to seasonal changes. Intermittent and semi-permanent to permanent pools are likely to persist on the Comet River and Humboldt Creek at locations with less permeable clay substrates where standing water may persist for longer periods. These pools would provide important dry season refuge for aquatic fauna.

Table 13. Waterways within the project area

Waterway Name	Risk Classification (as per the Fisheries Act 1994)	Stream Order (DES 2023d)
Humboldt Creek	Major	5, 6
Rockland Creek	High	3
Three unnamed waterways	Low to Moderate	2
16 unnamed waterways	Low to Moderate	1

Watercourses

A watercourse, as defined by the Water Act, includes a river, creek, or other stream, including a stream in the form of an anabranch or a tributary, in which water flows permanently or intermittently, regardless of the frequency of flow events. Humboldt Creek is mapped as a ‘watercourse’ within the project area (DoR 2023b). All other ‘unmapped’ watercourses within the project area are considered to be ‘drainage features’, as illustrated on **Figure 20**.

Wetlands and Waterbodies

Six modified lacustrine wetland waterbodies (largely farm dams) and one State-mapped Wetland Protection Area (WPA) were observed during the field surveys. This includes a HES wetland comprising State-mapped palustrine wetland RE 11.5.16 (palustrine wetland dominated by *Acacia harpophylla* and/or *Casuarina cristata* open forest) located in the north of the project area.

A larger area of RE 11.5.16 had been mapped in an earlier version of the Queensland RE mapping, which formed the basis for the extent of the State-mapped HES wetland. The latest version of RE mapping (version 12.02, DoR 2023a) has removed the cleared component of this polygon comprising the eastern half of the State-mapped HES wetland. The remaining half is State mapped as RE 11.5.16, although was field verified as being RE 11.5.3 (*Eucalyptus populnea* on Cainozoic sand plains) which is not classified as a wetland, refer **Plate**

12. Despite the mapping discrepancies, the Proponent does not intend to challenge the State-mapped HES wetland and will instead avoid it by maintaining a separation of at least 200 m for the proposed activities.



Plate 12. State-mapped HES wetland comprising State-mapped palustrine RE 11.5.16, field verified as RE 11.5.3 (not a wetland)

Aquatic Habitat Values

Overall aquatic values within the project area range from Low to High, as per the aquatic values ratings shown in **Table 15**. The sites on Humboldt Creek and Rockland Creek were rated as having Moderate aquatic value, due to their importance as conduits for fish passage. The smaller, unnamed tributaries were rated as having Low aquatic value. The adjoining Comet River (outside of the project area) is rated as having High aquatic value as it provides known habitat for the Critically Endangered (EBPC Act and NC Act) white-throated snapping turtle.

The State-mapped HES wetlands were rated High aquatic value due to their mapped status. The lacustrine wetland waterbodies (mostly farm dams) were rated Low aquatic value, although still provide important watering and foraging resources for terrestrial fauna and some dry season refuge for Least Concern fish and turtle species.

No conservation-significant aquatic flora or fauna species listed under the NC Act and/or EPBC Act were recorded within the project area. Due to habitat requirements and distributional range, it is unlikely that any conservation-significant aquatic flora or fauna species occur within the waterways or wetlands of the project area as either resident or transient occurrences.

Table 14. Adopted criteria for assigning aquatic values ratings

Aquatic values/sensitivity	Criteria
High	Permanent riverine waterbody or natural wetland HES Wetland

Aquatic values/sensitivity	Criteria
	EVNT species habitat present
	Known presence of platypus breeding place
	Near natural / excellent in-stream habitat
	Excellent habitat bioassessment score (111 – 135) ⁽¹⁾
Moderate	Ephemeral or semi-permanent waterbody
	Wetland of General Ecological Significance
	Priority flora species cover moderate or extensive
	Priority fauna species present
	Platypus foraging habitat present
	Some good quality in-stream habitat
	Regional conduit for fish passage (mapped Major or High)
	Good habitat bioassessment score (75 – 110) ⁽¹⁾
Low	Dry season riverine refuge for common (Least Concern) species
	Ephemeral waterbody
	No EVNT species or platypus habitat
	In-stream habitat highly modified / disturbed
	Poor to Fair habitat bioassessment score (0 – 74) ⁽¹⁾
Table notes:	
⁽¹⁾ Based on AusRivAS categories (DNRM 2011)	

Source: DPM 2023, (extracted from Table 4 of **Appendix E**)

Aquatic Flora Species

A total of 28 species of aquatic or semi-aquatic plants were recorded from the project area during the field surveys. Most aquatic flora species detected are considered LC under the NC Act. Four are listed as Special Least Concern under the NC Act. During the surveys, the following Special Least Concern aquatic flora species were recorded:

- *Caldesia oligococca*
- Starfruit (*Demasonium minus*)
- Water nymph (*Najas tenuifolia*)
- Swamp lily (*Ottelia ovalifolia*)
- Curly pondweed (*Potamogeton crispus*)

Three Priority aquatic flora species² were detected, comprising:

- Tall flatsedge (*Cyperus exaltatus*)
- Native water hyacinth (*Monochoria cyanea*)
- Water nymph (*Najas tenuifolia*)

Most aquatic flora species encountered are semi-aquatic species including grasses, sedges and rushes. The greatest diversity of aquatic flora was recorded from the lacustrine wetland waterbodies.

The lack of both diversity and abundance of aquatic plants at some sites reflects the harsh physical conditions, cattle grazing and trampling, or a combination of these factors.

Aquatic Fauna Species

The Critically Endangered (EPBC Act and NC Act) white-throated snapping turtle (*Elseya albagula*) was captured from two survey sites along the Comet River in March 2023, refer **Plate 13**. The turtles were two males of approximately 25 cm and 27 cm curved carapace length. Species identification has been confirmed by Principal Aquatic Ecologist Chris Pietsch (Blue Earth Environmental) who has extensive experience in the capture, tagging and tracking of this species and the Queensland Museum. Refer to **Appendix E** for species confirmation advice. This species is known to utilise productive but often ephemeral riffle zones but falls back

² Priority species are those listed as such in the Back on Track (BoT) Actions for Biodiversity for the Fitzroy Natural Resource Management (NRM) Region (DERM 2010) or in the Expert Panel Reports of the Aquatic Conservation Assessments (ACA) for riverine and non-riverine wetlands of the Fitzroy section of the Great Barrier Reef (GBR) catchment (Inglis and Howell 2009; Rollason and Howell 2012)

to less productive large slow-moving pools or isolated waterholes during the drier months (Cann and Saddler 2017).



Plate 13. White-throated snapping turtle (*Elseya albagula*) recorded along Comet River (March 2023)

Fish bycatch was recorded as part of the turtle survey effort undertaken along the Comet River during March 2023. A total of 101 fish were captured from two survey sites along the Comet River in March 2023, comprising the following species:

- Agassiz's glassfish (*Ambassis agassizii*)
- Spangled perch (*Leiopotherapon unicolor*)
- Eastern rainbowfish (*Melanotaenia splendida splendida*)
- Bony bream (*Nematalosa erebi*)
- Hyrtl's catfish (*Neosilurus hyrtlui*)
- Sleepy cod (*Oxyeleotris lineolata*)
- Freshwater catfish (*Tandanus tandanus*)

The mesh size (20 mm stretched) was too large to capture smaller species such as gudgeon species (*Hypseleotris* spp.).

The platypus (*Ornithorhynchus anatinus*) is listed as Special Least Concern under the NC Act for cultural reasons. The WetlandInfo database (DES 2023d) identifies the platypus as having previously been recorded from the Comet River drainage sub-basin. ALA (2023) identifies these records as being from the Carnarvon Gorge area.

The seasonal nature of the waterways and palustrine wetlands of the project area are not conducive to sustaining a population of platypus. Similarly, the lacustrine waterbodies (i.e. farm dams) of the project area are unlikely to sustain a population of platypus as, despite relative permanence of wetted habitat, these artificial/modified waterbodies lack the banks and habitat features necessary for platypus burrow construction.

No platypus burrows were encountered during the surveys, despite targeted searches at each aquatic habitat assessment site. It is considered unlikely that platypus occupy the project area.

7.2.2.10 Groundwater Dependent Ecosystems – Terrestrial and Surface Expression

During the field survey undertaken by Epic and DPM ecologists in February and March 2023, targeted searches occurred to ground truth the presence of terrestrial and surface expression GDE within the project area. The areas surveyed were based on a review of desktop searches of mapped GDEs within the project area (refer to **Figure 13**). Refer to **Section 7.6.3.3** for information about subterranean fauna GDEs.

No terrestrial or surface expression GDEs were confirmed during the field surveys, nor are they likely to occur. A summary of the findings is provided below:

Terrestrial GDE:

- ‘Low Confidence’ derived terrestrial GDE area (Lat/Long: -24.05636;148.62160 GDA2020): the area had a mixture of Poplar Box and Silver-leaved Ironbark woodland with a variety of other species as well as pockets of Brigalow to the north-east corner. None of these communities have the attributes required to be classified as GDEs (refer **Plate 14**).
- ‘Low Confidence’ derived terrestrial GDE area (Comet River, 800 m west of the project area, Lat/Long: -24.06085;148.54368 GDA2020): the area is largely dominated by Brigalow which have shallow root systems and are not groundwater dependent, and large Coolibah trees which are likely supported by a shallow aquifer layer supplied by the Comet River (refer **Plate 15**).



Plate 14. Low Confidence derived terrestrial GDE area - Lat/Long: -24.05636;148.62160



Plate 15. Low Confidence derived terrestrial GDE area – Comet River (outside project area)

Surface Expression GDE:

- ‘Moderate confidence’ derived surface expression GDE areas (Lat/Long: -24.0187; 148.6533 GDA 2020) – being a State-mapped palustrine wetland waterbody ‘within 50 m of the edge of basalt plains and hills (100 ha or more) with fresh, intermittent flow’ (DES 2023e), but field verified as non-remnant and unlikely to have previously been a wetland RE or wetland waterbody (refer **Plate 16**).
- ‘Moderate confidence’ derived surface expression GDE lines (Lat/Long: -24.0874;148.6333, -24.083; 148.6185, -24.0786; 148.5853, -24.0652; 148.7442 GDA2020) being State-mapped first and second order streams comprising ‘channels on or within 100 m of basalt plains and hills (100 ha or more) with fresh, intermittent flow’ (DES 2023e). Found no evidence of groundwater expressions, salt seeps, hydrophytes, or other on-ground indicators of being a GDE. The health, apparent moisture levels and extent of riparian vegetation was consistent with other waterways of the project area not mapped as potential surface expression GDEs (refer **Plate 17 - Plate 20**).



Plate 16. Moderate Confidence derived surface expression GDE areas - Lat/Long: -24.0187; 148.6533



Plate 17. Moderate Confidence derived surface expression GDE lines - Lat/Long: -24.0874;148.6333



Plate 18. Moderate Confidence derived surface expression GDE lines - Lat/Long: -24.083; 148.6185



Plate 19. Moderate Confidence derived surface expression GDE lines - Lat/Long: -24.0786; 148.5853



Plate 20. Moderate Confidence derived surface expression GDE lines - Lat/Long: -24.0652; 148.7442

7.2.2.11 Weed Species

A total of 14 non-native weed species were identified within the project area during field surveys, including six invasive pasture grasses with Buffel Grass being the most abundant and comprising between 5 % and 30 % of ground cover in wooded areas. Buffel Grass has infested cleared areas and also invaded woodland vegetation including Brigalow. Parthenium (*Parthenium hysterophorus*) was also dense in cleared areas, particularly sites with clay soils and with greater soil moisture. Prickly Pear (*Opuntia stricta*) was scattered in low density across the project area. Non-native flora species identified within the project area, their Biosecurity listings, and Weeds of National Significance (WoNS) status are provided in **Table 16**.

Table 15. Non-native flora species identified within the project area

Common name (Species name)	Biosecurity Act category	WoNS
African Lovegrass (<i>Eragrostis curvula</i>)	-	-
Black Pigweed (<i>Trianthema portulacastrum</i>)	-	-
Buffel Grass	-	-
Flannel Weed (<i>Sida cordifolia</i>)	-	-
Guinea Grass (<i>Megathyrsus maximus</i>)	-	-
Harrisia Cactus (<i>Harrisia martinii</i>)	3	-
Parthenium	3	Yes
Prickly Pear	3	Yes
Purple Pigeon Grass (<i>Setaria incrassata</i>)	-	-
Red Natal Grass (<i>Melenis repens</i>)	-	-
Rhodes Grass (<i>Chloris gayana</i>)	-	-

Common name (Species name)	Biosecurity Act category	WoNS
Sabi Grass (<i>Urochloa mosambicensis</i>)	-	-
Shrubby Stylo (<i>Stylosanthes scabra</i>)	-	-
Siratro (<i>Macropodium atropurpureum</i>)	-	-

7.2.2.12 Pest Species

Seven species of feral animal were recorded during the field surveys within the project area (refer **Table 17**). Only Cane Toad was observed to be common (during spotlighting surveys). Common Myna was observed sporadically at several sites throughout the project area. Of the species, four are listed under Schedule 2 of the Biosecurity Act as ‘Restricted Matters’.

Table 16. Pest species identified during the 2022/23 field surveys

Scientific name	Common name	Biosecurity Act categories
<i>Sus scrofa</i>	Pig	3,4,6
<i>Mus musculus</i>	House Mouse	-
<i>Acridotheres tristis</i>	Common Myna	-
<i>Rhinella marina</i>	Cane Toad	-
<i>Oryctolagus cuniculus</i>	Rabbit	3,4,5,6
<i>Canis lupus</i>	Common Dog/Dingo	3,4,6
<i>Felis catus</i>	Cat	3,4,6

7.2.2.13 Pest Fish Species

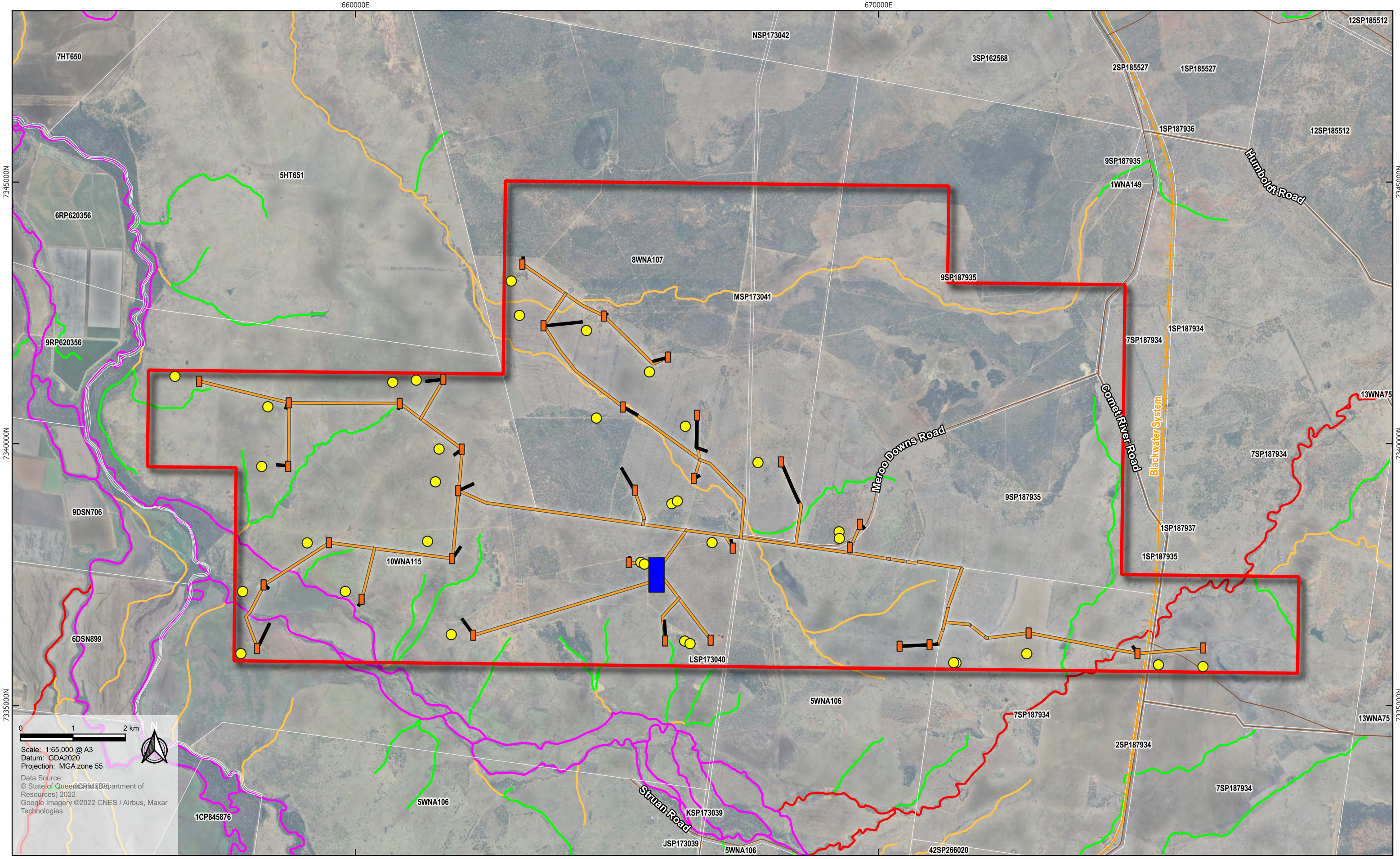
Six introduced fish species have been recorded from the Fitzroy Basin based on information available on the WetlandInfo database (DES 2023d), including:

- Mosquitofish (*Gambusia holbrooki*)
- Guppy (*Poecilia reticulata*)
- Goldfish (*Carassius auratus*)
- European carp (*Cyprinus carpio*)
- Mozambique mouthbrooder / tilapia (*Oreochromis mossambicus*)
- Platy (*Xiphophorus maculatus*)

None of the introduced fish species were identified during the field surveys.

7.2.2.14 Introduced Aquatic Reptiles

No introduced aquatic reptile species were recorded during the field surveys, and none were identified from the desktop review as having potential to occur in the project area.



Filepath: -BAA\BAA220014.01 Comet Ridge Mahalo North\Workspaces\BAA220014.01 Mahalo North\ Petroleum Lease\5. EA\Rev 1\Figure 19 Mapped Queensland waterways for waterway barrier works under Fisheries Act 1994.ggz

Scale: 1:65,000 @ A3
 Datum: GDA2020
 Projection: MGA zone 55

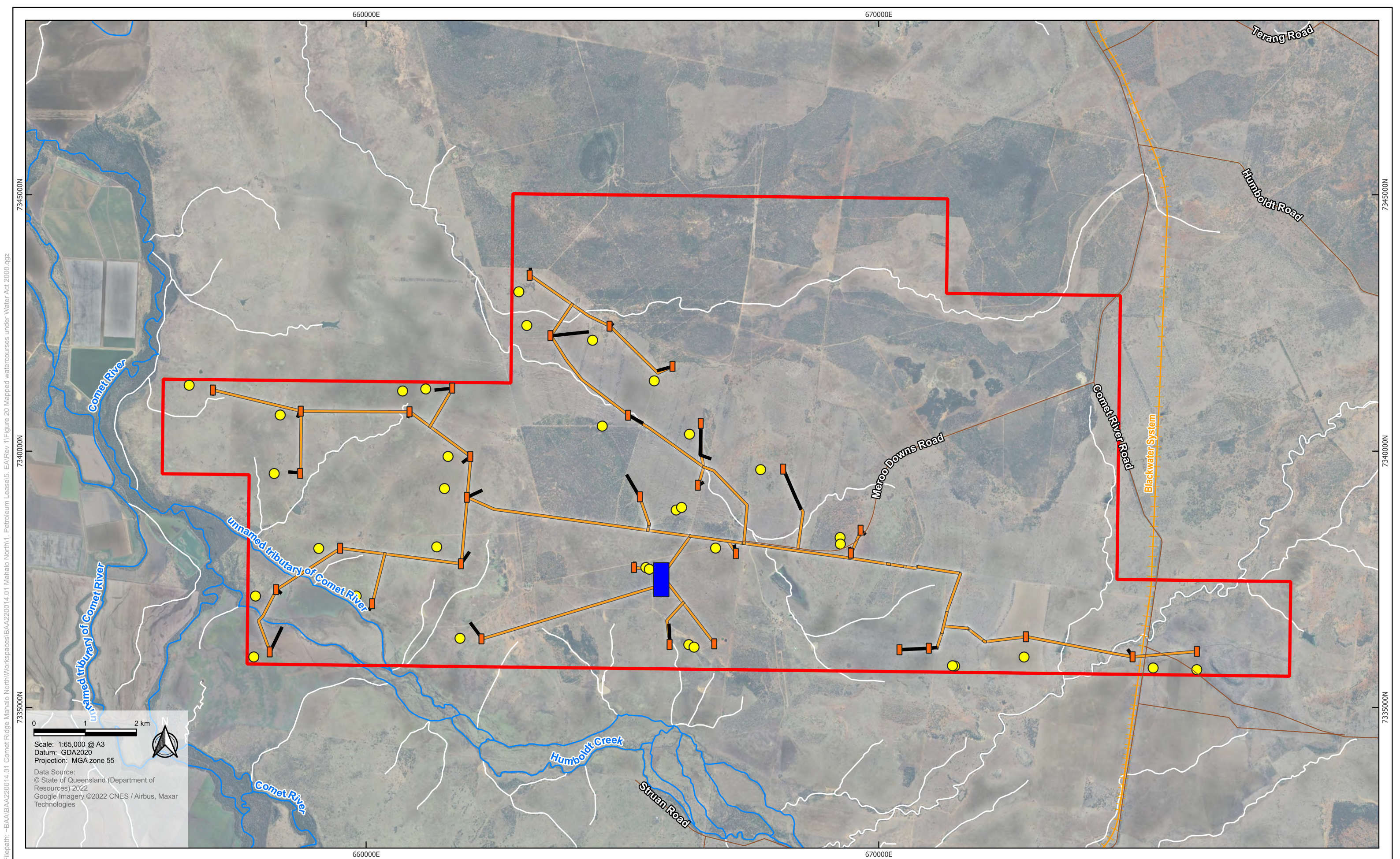
Data Source:
 © State of Queensland (Department of Resources) 2022
 Google Imagery ©2022 CNES / Airbus, Maxar Technologies

Legend		Infrastructure (Indicative only)		Gas production wells		QLD waterways for waterway barrier works	
	Petroleum Lease Boundary		Gas compression facility		Indicative lateral well		Low
	Cadastre (DCDB)		New access tracks		Indicative vertical well		Moderate
	Roads and tracks		Indicative gathering lines				High
	Railways						Major



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Figure 19
 Mapped Queensland waterways for waterway barrier works under Fisheries Act 1994



Filepath: -BAA\BAA220014.01 Comet Ridge Mahalo North\Workspaces\BAA220014.01 Mahalo North\1. Petroleum Lease\5. EAI\Rev 1\Figure 20 Mapped watercourses under Water Act 2000.qgz

0 1 2 km
 Scale: 1:65,000 @ A3
 Datum: GDA2020
 Projection: MGA zone 55
 Data Source:
 © State of Queensland (Department of Resources) 2022
 Google Imagery ©2022 CNES / Airbus, Maxar Technologies

Legend		Infrastructure (Indicative only)		Gas production wells		Watercourse identification map	
	Petroleum Lease Boundary		Gas compression facility		Indicative lateral well		Watercourse (defined by Water Act 2000)
	Roads and tracks		New access tracks		Indicative vertical well		Unmapped
	Railways		Indicative gathering lines				



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Figure 20
 Mapped watercourses under Water Act 2000

7.2.3 Emissions and Releases

The emissions from CSG activities that could pose potential risks to ecological environmental values are broadly characterised into the following activity types:

- Construction activities, including dust generation from earthworks and emissions from vehicular traffic
- CSG extraction processes
- Raw CSG water storage
- Treated CSG water disposal
- CSG operations which can include chemical and fuel storage or leakage

7.2.4 Potential Impacts

The project's proposed activities have potential to impact a range of ecological values directly and indirectly if not managed appropriately, including vegetation communities and habitat for threatened flora and fauna. The majority of impacts are expected to occur during construction of project infrastructure, which comprises the following:

- CSG production well pads (34 lateral wells and 34 production well pads, maximum disturbance area per well pad of 1 ha). Following construction 0.04 ha (20 m x 20 m) at each well will be retained for the operational phase and the remainder will be rehabilitated (based on the previous flora species/vegetation community present)
- New access tracks where required (disturbance width of up to 6 m)
- Gas and water gathering line (disturbance width of 18 m, reduced to 6 m in areas of environmental significance)
- One temporary construction camp requiring 1 ha located near works sites in previously cleared grazing lands that are not located in areas mapped as suitable habitat for Ornamental Snake
- Gas compression facility (disturbance area of approximately 6 ha) including:
 - CSG processing and water management/storage infrastructure
 - Site offices
 - One permanent operational camp
 - Other ancillary infrastructure (e.g., storage buildings)

The current proposed layout of the project is depicted on the ground-truthed vegetation mapping for the project area in **Figure 17**. The design of the project will be subject to further refinement as the design phase progresses.

Potential impacts to ecological values may include, but not limited to:

- Clearing of vegetation (including habitat fragmentation and loss of connectivity)
- Fauna mortality and injury (likely most prevalent during construction)
- Modification of aquatic habitat at the location of proposed waterway/watercourse crossings
- Excessive dust generation associated with earthworks and vehicular traffic associated with the Project construction and operation
- Potential noise and lighting impacts
- Introduction and/or spread of weed species from increased vehicular traffic and land clearance
- Introduction of pest fauna species from inappropriate disposal and storage of putrescible wastes
- Contamination from incidental spills, chemical storages, and waste storages
- Potential severe fires as a result of project activities

Further detail on the potential impacts is provided in **Section 7.2.4.1 to Section 7.2.4.8**.

7.2.4.1 Clearing of Vegetation

The clearing of vegetation is the most significant and direct impact on ecological values from the project’s proposed activities. Land clearance is listed as a key threatening process under the EPBC Act. The removal of habitat reduces the size of local populations of flora and fauna dependent on that habitat. These impacts are immediate and significant in the short-term. Impacts may persist in the long-term if habitat created during rehabilitation does not closely resemble pre-disturbance ecosystems. In addition, if sufficient habitat refuges are not maintained locally, prior to the maturation of rehabilitated land, local extinction of certain species may occur.

Given the heavily modified landscape present, project infrastructure has been located away from sensitive ecological values as much as is feasible. The disturbance footprint has been subject to several revisions in order to further avoid identified higher values habitats. There is no proposed impact to Category A, B or C ESAs as part of the projects proposed activities.

The predicted extent of overall impact to vegetation communities and habitat for threatened species (including MNES) is provided in **Table 18**. It is important to note that the proposed impact area listed in **Table 18** is not the ‘estimated disturbance footprint’ listed in **Section 5.1**. The extent of impact is based on the results of the ground-truthed vegetation mapping (where surveys could be carried out), analysis of aerial imagery (elsewhere in the project area) and onsite habitat assessments (particularly with regard to Ornamental Snake).

Table 17. Predicted vegetation clearing

RE	Biodiversity (EP Act) status	Potential MNES habitat	Proposed impact area (ha)
11.5.3	1.17	Koala, Squatter Pigeon	1.17
Non-remnant (gilgais present)	0.89	Ornamental Snake, Grey Snake, Australian Painted Snipe	0.88
Non-remnant (other)	154.86	N/A	170.56
Overall area			178.27

Least Concern and Special Least Concern aquatic flora would also be impacted by a loss of habitat required for the construction of the gas and water gathering lines and new access tracks. No conservation significant (EPBC Act or NC Act) aquatic flora species are likely to be impacted.

Highly fragmented habitats support fewer species than connected blocks of habitat of the same size. This is because fragmentation restricts dispersal of fauna and plant seeds between available habitat. The impacts of habitat fragmentation depend on the degree to which dispersal is inhibited by habitat gaps, the size of the remaining habitat fragments, and ecological attributes of the species.

The landscape associated with the project has been heavily impacted by tree clearing for cattle grazing purposes. The project infrastructure has been situated in areas already cleared of vegetation wherever possible. There will be very little clearing of remnant vegetation required. Accordingly, there will be no impact to landscape connectivity and habitat fragmentation as a result of the project.

7.2.4.2 Fauna Mortality and Injury

Clearing of vegetation for the project presents a risk of direct mortality or injury to fauna. Fauna of low mobility are at risk of injury or death from heavy machinery and vehicular movements during the construction of the project and to a lesser extent during operations. Additional impacts include the trapping of fauna in trenches during installation of gas pipelines. The operational phase is unlikely to add to this impact due to the small scale of project operations.

Poorly designed watercourse/waterway structures can kill or otherwise injure fish moving over or around them or can cause fish to become stranded and subjected to poor water quality, lack of food, increased predation, crowding or other conditions can that impact on their health, wellbeing, and productivity.

7.2.4.3 Modification of Aquatic Habitat

The proposed construction of gathering lines and associated new access tracks for the project would result in minor modification of aquatic habitat at the location of proposed crossings. These habitats comprise waterways with ephemeral to episodic flow, and one semi-permanent lacustrine wetland waterbody (farm dam). Aquatic habitats of the project area are not expected to support aquatic species of conservation-significance listed under the NC Act or EPBC Act, given the lack of suitable habitat features.

The construction of gathering lines and associated new access tracks would result in the removal of aquatic habitat and riparian vegetation from the bed and banks of watercourses/waterways.

The waterway crossings would comprise bed level or culvert crossings for vehicles. The construction disturbance would be up to 18 m wide and reduced to 6 m wide through areas of environmental significance, which includes watercourses/waterways. The placement of gathering lines through watercourses/waterways would utilise either under-boring techniques, or open trench and backfill during times of no/low flow (refer to **Section 5.4.1.2**).

Construction activities that involve disturbance of the bed and banks of watercourses/waterways have the potential to impact:

- Channel morphology, hydraulic characteristics, and aquatic habitat within, upstream of, and downstream of, the construction area
- Water quality, due to erosion and sedimentation leading to locally increased dissolved and suspended solids, turbidity, nutrients, and contaminants, and reduced dissolved oxygen levels
- Water quality, due to accidental release of drilling fluids from under-boring
- Aquatic and riparian ecological health and community assemblages, associated with the modification of habitat and changes in water quality
- Fish passage, albeit temporary and with impacts likely limited to resilient species well adapted to highly ephemeral systems
- The behaviour of aquatic biota (including avoidance response, and reduced foraging) and physiology (including gill damage to fish) associated with increased suspended sediment concentrations and deposition

High impact petroleum activities would not occur within 200 m of the mapped HES wetland, consistent with Condition 'water 3' of the Streamlined model conditions for petroleum activities (DES 2016). Consequently, impacts on HES wetlands are not anticipated.

7.2.4.4 Airborne Dust

Earthworks and vehicular traffic associated with project construction and operation activities can generate substantial amounts of dust during dry weather (Field et al. 2010). Dust can have both a physical and chemical impact on plants, either through the smothering of leaves, whereupon the rate of deposition is important, or through chemical changes to the soil or directly to the plant surface. Changes in soil properties, such as pH, can ultimately impact plant species assemblages. Dust can form a hard crust on the leaf surface, increasing leaf temperature and increasing susceptibility to drought. Dust can have adverse impacts on plant photosynthesis, respiration, transpiration, and productivity (Farmer 1993; Chaston & Doley 2006). Evidence of potential impacts on entire vegetation communities is scarce. Many studies focus on specific impacts to single species and findings may not be conclusive.

The pronounced wet and dry seasons associated with the project area (inland southern Brigalow Belt) may make vegetation in these areas less susceptible to the impacts of dust. In general, the construction disturbance will take place well away from extant woody vegetation communities.

7.2.4.5 Noise and Lighting

Understanding of the impacts of noise on fauna is limited. There are no current government policies or guidelines that recommend noise thresholds or limits for development activities to mitigate potential harm to fauna. Noise may affect wildlife through a variety of impacts such as:

- Interfering with communication calls
- Interfering with foraging/defence through cloaking the sound of predators and prey
- Causing general stress or avoidance reactions
- Changes in reproductive or nesting behaviours

Excessive noise may lead some species to avoid noisy areas, which could result in the localised fragmentation of habitat at the species or individual territory level. Radle (2007) states the consensus that terrestrial fauna will avoid any industrial plant or construction area where noise or vibration presents an annoyance to them. Nevertheless, many animals may interpret a new noise as a potential danger at first, but rapidly understand the noise is not associated with any threats (Radle 2007).

Artificial lighting may have a range of impacts across different groups of taxa and between species within these groups. Some taxa such as rodents may avoid brightly lit areas at night. Alternatively, nocturnal fauna such as many microbat species, frogs and some reptiles may congregate at artificial lights to feed on insects attracted to light (Perry et al. 2008; Rich & Longcore 2006). Although, other microbat species may avoid well-lit areas (Threlfall et al. 2013). Artificial light can alter foraging and calling by frogs and probably impairs their vision (Buchanan 1993) and may lead to individuals being killed by vehicles when attracted to lights for feeding on invertebrates.

Noise impacts from the project's proposed activities to surrounding fauna habitat will largely be restricted to that emitted during construction activities. The GCF is likely to be the only substantial source of noise and lighting impacts during operations. The facility is located in cleared habitat on Meroo Downs with relatively poor habitat for fauna present. Post-construction it is expected that any resident fauna will become accustomed to the ongoing noise generated by the facility. The CSG production wells will be powered by a generator and is expected to emit low level noise that is not expected to impact fauna. Similarly, lighting at well sites will be unnecessary, or restricted to low levels that will not be an impact on fauna.

7.2.4.6 Weed and Pest Animals

Introduced weeds have the potential to impact on terrestrial and aquatic ecological values as native flora can become displaced through competition with weed species, and adversely affected by browsing and soil trampling caused by feral herbivores. Native fauna populations, particularly small to medium sized species, may be impacted by predation from introduced carnivores such as feral cats and Red Fox. These are indirect impacts which may not manifest themselves in the short-term and are likely to be exacerbated by existing cattle grazing activities on land within the project area.

Introduced weed species are already present throughout the project area which is dominated by Buffel Grass in the ground layer throughout. Parthenium was observed to be common, particularly in the non-remnant grassland areas and is listed as a WoNS and under the State's Biosecurity Act.

The following activities associated with the project's proposed activities have the potential to promote the proliferation of weeds and pests within the project area, or introduce new weeds and pests from surrounding areas:

- The use of construction machinery, plant and materials sourced from outside the region and increased vehicular traffic in general may introduce and spread weed seeds if biosecurity hygiene measures are not in place
- Land clearance favours the establishment of weeds due to increased light and soil disturbance
- Inappropriate disposal and storage of putrescible wastes may attract feral animals

The pests and weeds currently occurring within the project area are not expected to significantly proliferate in response to the project's proposed activities. The main threat is the introduction of new weeds to the area via contaminated vehicles, plant, or soils.

7.2.4.7 Contamination from Incidental Spills, Chemical Storages, and Waste Storages

The accidental release of pollutants from the project's proposed activities has the potential to degrade the surrounding environment and local watercourses/waterways within and downstream of the project area.

Potential sources of contaminants may include runoff from chemical and fuel/oil storage areas during drilling activities and around the water treatment plant as well as general wastewater from vehicle/machinery washdown areas.

In the event of a significant fuel spill (>200 litres) (L) to watercourses/waterways there is potential to have a local impact on both flora and fauna. The extent of impact will of course be dependent on the size of the spill and the volume of water in the waterway (including whether there is flow), thereby influencing the length of stream potentially impacted.

Nevertheless, despite the potential impacts broadly described above, it is noted the watercourses/waterways in the project area are highly ephemeral (no flows occurring the majority of the time) and are predominantly likely to be considered to be of low value, with the exception of Humboldt Creek which is located in the south-west of the project area and Comet River which is located approximately 800m outside of the project area to the west.

The project will treat produced water generated by CSG extraction through reverse osmosis processing. Produced water will be stored in 'feed tanks' and saline water produced by processing will be stored in separate 'brine tanks' within the water treatment facility site. Treated water is proposed to be transferred to landholders for beneficial use such as agriculture. The project's treated wastewater will be managed under the State's End of Waste Code (EOWC) such that no impacts to aquatic ecological values are expected.

7.2.4.8 Fire

The project is located within largely cleared grazing lands with tracts of sclerophyll woodlands mainly to the north. The woodland areas have potential to be severely impacted by accidental high-intensity fires caused by the project's proposed activities. Fire hazard mapping for Queensland indicates the majority of woodlands within the project area as having a 'medium potential bushfire intensity'. There are very small pockets of 'high' potential bushfire intensity' associated with woodland remnants in the south of the project area.

Fire is noted as a threatening process on the Brigalow TEC occurring within the project area. Project-specific fire management measures will be developed and implemented in line with Queensland guidelines and in collaboration with local landowners.

7.2.5 Significant Residual Impact Assessment

One TEC, 10 threatened species and six bird species listed as Migratory under the EPBC Act have some potential to occur in the project area (refer **Table 8** and **Table 10**) comprising the following MNES:

- Known to occur:
 - Brigalow TEC – Endangered
- Likely to occur
 - Annual wiregrass (*Aristida annua*) – Vulnerable
 - Ornamental Snake – Vulnerable
 - Koala – Endangered
 - White-throated Snapping Turtle – Critically Endangered
- Possibly occurs - flora:
 - Ooline - Vulnerable
 - *Dichanthium setosum* - Vulnerable
- Possibly occurs - fauna:
 - Australian Painted Snipe – Endangered
 - Squatter Pigeon (southern) – Vulnerable
 - Painted Honeyeater - Vulnerable
 - Grey Snake – Endangered
- Possibly occurs - migratory
 - Glossy Ibis
 - Latham's Snipe

- Sharp-tailed Sandpiper
- Gull-billed Tern
- Caspian Tern
- Fork-tailed Swift

An assessment of the potential for significant impacts resulting from the proposed activities was carried out only on those MNES considered as potentially subject to impacts.

7.2.5.1 MNES Not Subject to Significant Impact Assessment

The potential impact on the following species is considered very minor at worst and they are not assessed further and can be managed under general management measures outlined in **Section 7.2.6**.

Brigalow TEC

The project infrastructure has been located away from sensitive ecological values as much as is feasible. The disturbance footprint has been subject to several revisions in order to further avoid identified higher values habitats. All occurrences of Brigalow TEC have been avoided and no potential for significant impacts are considered possible.

Ooline

This species is known from Cape York Peninsula, including sites near Musgrave, the Irvineband to Petford area, and south-west of Mt Garnet (DEWHA 2008a). Suitable habitat for the species occurs throughout the project area in the form of Brigalow and Poplar Box dominated woodland and open-forest, although the species was not observed during project field surveys. The only suitable habitat for the species is provided by remnant RE 11.5.3 with a total area of 1.17 ha occurring within the disturbance footprint. The extent of disturbance is considered negligible given the species was not observed within the disturbance footprint.

Dichanthium setosum

This species is largely restricted to the NSW Central Highlands although small populations occur within central Queensland including Carnarvon National Park, and near the localities of Albinia, Springsure, Elphinstone and Mount Wyatt. The species occurs in association with heavy basaltic black soils and red-brown hard-setting loams with clay subsoil (DEWHA 2008b). The species was not detected within the project area during field surveys associated with the project. The species is considered a possible occurrence within the project area. The only suitable habitat for the species considered present within the project area is provided by RE 11.8.4 with a total area of 1.7 ha occurring. This vegetation type will not be directly impacted by the project and no impact on the species is expected.

Annual Wiregrass

This species is restricted to central Queensland in the Emerald and Springsure districts where it is known to occur in eucalypt woodlands (with *Eucalyptus orgadophila*) and natural grasslands on basalt derived black clay soils (DE 2014a). The species was not detected within the project area during field surveys but is considered a possible occurrence within the project area. Potential habitat for the species within the project area is considered to be restricted to Brigalow habitats on land zone 4 (RE 11.4.8 and 11.4.9). These communities have been avoided and no impact on the species is expected.

Squatter Pigeon & Painted Honeyeater

Impacts to fauna and flora species associated with the presence of woody vegetation include Squatter Pigeon (southern) and Painted Honeyeater. The potential impact on these species is considered very minor at worst and they have not been assessed for a SRI.

Migratory species

There is a possibility for a number of migratory wetland-associated bird species to be present. The Project will not impact any of the existing waterbodies, including several farm dams of various sizes, within the project area. Gull-billed Tern or Caspian Tern will not be impacted by the project as a result. Following heavy rainfall events three of the species (Sharp-tailed Sandpiper, Latham's Snipe and Glossy Ibis) may also have a low

potential to use water-filled gilgais within the project area although no migratory species were identified during either Project survey.

Fork-tailed Swift is an aerial species that may occur over any habitat including inland, coastal and marine areas and disturbed habitat such as urban areas. It has only occasionally been recorded as landing in Australia. The species is highly mobile and may forage anywhere from 1 m up to 100s of metres above ground (Higgins 1999; DCCEEW 2023b). Given the species’ aerial habits it is inconceivable the project area would represent ‘important habitat’ (as defined in DE 2013) for the species and the proposed activities would be highly unlikely to impact the species in any way.

7.2.5.2 Matters of National Environmental Significance

Under Part 3 of the EPBC Act, a person must not undertake an action that will have, or is likely to have, a significant impact on a protected matter, without approval from the Minister. An assessment of the potential for significant residual impact resulting from the project’s proposed activities was carried out only on those MNES considered as potentially subject to substantial impacts. Impacts to MNES from the project will be assessed through an EPBC Act referral to DCCEEW.

The significant residual impact assessment on MNES has been carried out in accordance with the *MNES significant impact guidelines 1.1* (MNES Guidelines) (DE 2013). A summary of the findings is provided in **Table 19**.

Table 18. Significant residual impact assessment - MNES

MNES	EPBC Act Status	Likelihood of occurrence (DCCEEW 2023a)	Significant Residual Impact Assessment
Threatened Species			
White-throated Snapping Turtle	Critically Endangered	Likely to occur	<p>No significant residual impact expected</p> <p>The Critically Endangered White-throated Snapping Turtle was recorded downstream in the Comet River adjoining the project area during field surveys in March 2023, refer Section 7.2.2.9.</p> <p>Potential impacts of the project on the White-throated Snapping Turtle relate to impacts on water flows, water quality and sedimentation.</p> <p>The project is not proposing to contain any surface water flows and will maintain as far as possible all overland flow paths. There will be no/negligible impact on flows in the Comet River as a result of the project’s proposed activities.</p> <p>In terms of water quality, the project will not be releasing any CSG produced water into the receiving environment and any overland flows affected by construction will be managed in accordance with best practice erosion and sediment control.</p> <p>It is considered unlikely a significant impact on downstream receiving waters, including habitat for the MNES White-throated Snapping Turtle will occur as a result of the project.</p>
Ornamental Snake	Vulnerable	Likely to occur	<p>No significant residual impact expected</p> <p>The species was not recorded during field surveys for the project despite ideal conditions occurring during the survey period (February 2023) (i.e. frog prey abundant</p>

MNES	EPBC Act Status	Likelihood of occurrence (DCCEEW 2023a)	Significant Residual Impact Assessment
			<p>and active, waterbodies commonly present and warm humid nights).</p> <p>There are three database records located within 50 km of the project area. The nearest is from 1995, located 22 km north of the project area but appears to be erroneously located based on the site information associated with the record. There are two other records to the east of the project area (EMM 2022), refer Figure 18.</p> <p>There is potentially 1,513 ha of suitable habitat within the project area. The project layout currently proposes to impact up to 0.88 ha of cleared gilgai habitat which represents only 0.058% of the mapped habitat occurring within the project area.</p> <p>It is considered unlikely a significant impact to Ornamental Snake will occur as a result of the project.</p>
Grey Snake	Endangered	Possibly occurs	<p>No significant residual impact expected The species was not recorded during field surveys for the project.</p> <p>There is a record dated in 2003 located 38 km north of the project area. There is a record of uncertain origin located 127 km north north-west of the project area. The validity of these records cannot be verified. All other records are from the Rockhampton area (>190 km east) or much further south around Roma and Miles (>270 km from the project area).</p> <p>There is no evidence habitat critical to the survival of the species is present in the project area. It is uncertain if the species actually occurs within the project area or the region.</p> <p>It is considered unlikely a significant impact to Grey Snake will occur as a result of the project.</p>
Australian Painted Snipe	Endangered	Possibly occurs	<p>No significant residual impact expected The species was not recorded during field surveys for the project.</p> <p>There are two undated Birdlife Australia records of the species located 40 and 50 km east of the project area (ALA 2023).</p> <p>It is uncertain if the species actually occurs within the project area. Suitable habitat for breeding is unlikely to occur. The project's extent of impact to potential habitat comprising gilgais is minor given the extent of habitat present within the project area.</p> <p>It is considered unlikely a significant impact to Australian Painted Snipe will occur as a result of the project.</p>

MNES	EPBC Act Status	Likelihood of occurrence (DCCEEW 2023a)	Significant Residual Impact Assessment
Koala	Endangered	Likely to occur	<p>No significant residual impact expected The species (including any signs of presence) was not recorded during field surveys for the project (including spotlighting).</p> <p>There are older database records located within the project area (ALA 2023).</p> <p>There is no evidence the minor area of remnant vegetation associated with project area would support all or part of a local population of Koala. The Project is considered unlikely to affect habitat critical to the survival of the species.</p> <p>It is considered unlikely a significant impact to Koala will occur as a result of the project.</p>

7.2.5.3 Matters of State Environmental Significance

The *Queensland Environmental Offsets Policy Significant Residual Impact Guideline* (QEOP Guideline) (DEHP 2014) is used to determine if a prescribed activity would have a significant residual impact on a MSES.

A significant residual impact is defined under the QEOP Guideline as:

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.*

There are two MSES relevant to aquatic ecology that are known to occur in the project area that may be subject to impacts from the project, comprising:

- HES Wetlands
- Waterways Providing for Fish Passage

An assessment against the criteria detailed in the QEOP Guideline has been undertaken to assess any possible significant residual impact resulting from the project’s proposed activities. A summary of the findings is provided in **Table 20**.

Table 19. Significant residual impact assessment - MSES

Prescribed environmental matter	Guideline criteria (DEHP 2014)	Assessment outcome
Wetlands in a wetland protection area or wetlands of high ecological significance as listed under the Environmental Protection Regulation 2019	Assessed under relevant significant impact assessment criteria (refer DEHP 2014)	No significant residual impact expected The project footprint is located >200 m away from the wetland protection area in line with the <i>streamlined model conditions for petroleum activities</i> (ESR/2016/1989, Versions 2.02, 07 May 2016) (DES 2016)
Protected wildlife habitat for species listed as threatened or special least concern (NC Act) fauna or flora as listed under the NC Animals Regulation/NC Flora Regulation	Species assessed under relevant significant impact assessment criteria (refer DEHP 2014) where necessary.	No significant residual impact expected The project footprint provides likely or known habitat for several flora and fauna species listed as threatened under the NC Act, refer to Section 7.2.2 . The majority of these have been assessed for significant impacts under the EPBC Act in Section 7.2.5.1 .

Prescribed environmental matter	Guideline criteria (DEHP 2014)	Assessment outcome
		<p>The project footprint will intersect potential habitat for the following species listed only under the NC Act:</p> <ul style="list-style-type: none"> • Short-beaked Echidna - special least concern • <i>Solanum elachophyllum</i> - endangered <p>The Short-beaked Echidna ranges widely across the Australian mainland and there is no evidence the project area would exclusively support a population of the species.</p> <p>The <i>Solanum elachophyllum</i> is a small shrub growing up to 0.4 m in height. The project will not impact any of the known locations or associated tract of vegetation located within the project area.</p>
Category B (remnant) areas on the regulated vegetation management map, that are 'endangered' and 'of concern' regional ecosystems	<p>Clearing for linear infrastructure:</p> <ul style="list-style-type: none"> • Greater than 25 m wide in a grassland (structural category) RE; or • Greater than 20 m wide in a sparse (structural category) RE; or • Greater than 10 m wide in a dense to mid-dense (structural category) RE. 	<p>No significant residual impact expected Clearing of remnant or regrowth vegetation communities has been avoided by refining the project design.</p>
Regulated vegetation located within a defined distance from the defining banks of a relevant watercourse identified on the VM Act watercourse and drainage feature map	<p>Clearing for non-linear infrastructure (such as well pads):</p> <ul style="list-style-type: none"> • Area greater than 5 ha where in a grassland (structural category) RE; or • Area greater than 2 ha where in a sparse (structural category) RE; or • Area greater than 0.5 ha where in a dense to mid-dense (structural category) RE. 	<p>No significant residual impact expected The defined distances for relevant watercourses in the project area are as follows:</p> <ul style="list-style-type: none"> • Stream order 1 and 2 – 25 m • Stream order 3 and 4 – 50 m • Stream order 5 and 6 – 100 m <p>Vegetation clearing for non-linear infrastructure will not occur within 5 m of the defined banks of a relevant watercourse or drainage line. Clearing for linear infrastructure (gas and water gathering pipeline disturbance) has been designed to avoid watercourse vegetation.</p>
Regulated vegetation management located within a wetland or within 100 metres from the defining bank of a wetland identified on the VM Act wetlands map		<p>No significant residual impact expected No areas of regulated vegetation within 100 m of a mapped VM Act wetland are intersected by the project.</p>
Essential habitat on the essential habitat map for wildlife prescribed as critically endangered, endangered or vulnerable under the NC Act	<p>Species assessed under relevant significant impact assessment criteria (refer DEHP 2014) where necessary.</p>	<p>No significant residual impact expected Clearing of essential habitat for Ornamental Snake (vulnerable under the NC Act) has been largely avoided by refining the project design, refer to Section 7.2.5.1.</p>
Connectivity areas	<p>Assessed using DES' landscape fragmentation and connectivity tool' (refer 0 for output results)</p>	<p>No significant residual impact expected The analysis from the 'landscape fragmentation and connectivity tool' has determined any impact on connectivity areas is not significant.</p>
Waterway providing for fish habitat	<p>Result in the mortality or injury of fish</p>	<p>No significant residual impact expected The project is unlikely to result in barriers that cause the mortality or injury of native fish because waterway crossings would be constructed in accordance with the <i>Accepted Development Requirements for Operational</i></p>

Prescribed environmental matter	Guideline criteria (DEHP 2014)	Assessment outcome
		<p><i>Work that is Constructing or Raising Waterway Barrier Works (DAF 2018), or in consultation and agreement with DAF, so as not to create a barrier to fish movement.</i></p>
	<p>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.</p>	<p>No significant residual impact expected The project is unlikely to result in conditions that would substantially increase risks to the health, wellbeing and productivity of fish seeking passage because waterway crossings would be constructed so as not to create a barrier to fish movement.</p>
	<p>Reduce the extent, frequency or duration of fish passage previously found at a site.</p>	<p>No significant residual impact expected The project is not proposing to contain any surface flows and will maintain as far as possible all overland flow paths. The project will only increase the area of hardstand by a minimal fraction of the total petroleum lease area (<0.1% increase). Therefore, the project is anticipated to have a negligible measurable impact on the extent, frequency and duration of flows encountered in waterways within and surrounding the project area. Further, the project is unlikely to reduce the extent, frequency or duration of fish passage previously found within the project area because waterway crossings would be constructed in accordance with the <i>Accepted Development Requirements for Operational Work that is Constructing or Raising Waterway Barrier Works (DAF 2018)</i>, or in consultation and agreement with DAF, to maintain the extent, frequency, and duration of fish movement.</p>
	<p>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.</p>	<p>No significant residual impact expected The waterways of the project area are not known to constitute any rare, unique, or particularly important habitats or features essential for the breeding and/or survival of the native fish species known to utilise this area. Several waterways mapped as being at Low or Moderate risk of adverse impact on fish movement would be temporarily impacted by the construction of vehicle access tracks and/or gathering lines (Section 7.2.2.9). However, these waterways are of low stream order (1 or 2), are highly ephemeral, and are not considered to constitute, nor provide a conduit to, fish habitat areas essential for the breeding and/or survival of native fish.</p> <p>Vehicle access tracks and/or gathering lines are proposed to cross at one location on Rockland Creek (mapped High risk), one location on Humboldt Creek (mapped Major risk), and one location on the Humboldt Creek flood channel (mapped Major risk, but field verified as Low to no risk). The standard 18 m wide disturbance</p>

Prescribed environmental matter	Guideline criteria (DEHP 2014)	Assessment outcome
		would be reduced to 6 m wide at all waterways crossings. These minor impact footprints are unlikely to be considered substantial modification, destruction, or fragmentation of fish habitats.
	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.	<p>No significant residual impact expected Any crossing on a mapped waterway will be undertaken via under-boring or open trench and backfill (during times of no/low flow). Either construction method will not result in a measurable change to the hydrological regime of the waterways within and surrounding the project area.</p> <p>The volume, depth, timing, duration, and frequency of flows would continue to reflect the ephemeral and variable flow nature of the waterways of the project area. The project is considered unlikely to result in a substantial and measurable change in the hydrological regime of these waterways, and the seasonality of fish movements is unlikely to be affected.</p>
	Lead to significant changes in water quality parameters such as temperature, dissolved oxygen, pH and conductivity that provide cues to movement in local fish species.	<p>No significant residual impact expected The project is unlikely to lead to an abrupt or otherwise significant change in water quality parameters that would be expected to cue local fish movement. The project will not be releasing any CSG produced water into the receiving environment and any overland flows affected by construction would be managed in accordance with best practice erosion and sediment control.</p> <p>The risk of deteriorating water quality would be mitigated by monitoring and maintaining receiving environment water quality in accordance with the EA Conditions (once granted).</p>

7.2.5.4 Environmental Offsets

Based on the significant residual impact assessments for MNES and MSES associated with the potential project impacts, as detailed in **Section 7.2.5.1** and **Section 7.2.5.3**, there are no predicted impacts to environmental values potentially requiring environmental offsets.

7.2.6 Management Practices

The Proponent commits to a range of measures to minimise impacts to MNES, MSES and general ecological values, as outlined in **Table 21**. In the first instance, the final design process for the project will reduce the area of impact to habitat for threatened species as much as possible for the construction of the project. This has already been demonstrated through the reduction in vegetation clearing along disturbance to as little as 6 m wide in areas of environmental significance (such as vegetated areas or watercourse/waterway crossings).

As an overarching management tool, the Proponent will develop and implement an Environmental Protocol for Constraints Planning and Field Development, refer to **Section 7.2.6.1**.

Table 20. Recommended mitigation measures for potential impacts to ecological values

Impact	Management measure	Project timing
Vegetation clearing (including habitat fragmentation and loss of connectivity)	Where possible the overall project disturbance footprint will be refined and minimised further during the detailed design process	Detailed design
	Develop and implement an EMP prior to works being carried out, refer Section 7.1.5.1	Pre-construction
	Develop and implement a rehabilitation management plan, refer Section 7.8	Prior to clearing
	Site induction program relating to vegetation clearing to be implemented for all project employees	Project induction
	Vegetation clearing extents will be clearly demarcated with flagging or bunting prior to clearing to limit the area safely and reasonably required for permanent and temporary works	Prior to clearing
	Targeted pre-clearance surveys will be carried out prior to vegetation clearing. Pre-clearance surveys will be carried out by suitable qualified ecologists prior to vegetation clearing.	Prior to clearing
	Top soil to be stockpiled in wind rows and used for rehabilitation, where possible	Following clearing
	Disturbed areas that are no longer required will be immediately reinstated as soon as possible	Following construction
Fauna mortality	Develop and implement a fauna and flora management plan, refer Section 7.2.6.2	Pre-construction
	The designated Project Environmental Officer will develop a fauna register to record all fauna encountered during clearing works (as per fauna spotter-catchers) including fauna incidents (injuries and mortality).	Pre-construction
	Fauna spotter-catchers will inspect sites prior to vegetation clearing. Fauna habitat shelter features (large hollows) will be clearly marked where they are unable to be accessed/inspected prior to tree felling.	Prior to clearing
	EMP (Section 7.1.5.1) to incorporate procedures for tree felling that will minimise potential impacts on resident fauna where habitat shelter features are identified.	Prior to clearing
	EMP (Section 7.1.5.1) to incorporate measures applicable to trenching activity. Trenches left open overnight will be inspected by a qualified fauna spotter-catcher each morning prior to works being carried out.	Prior to clearing
	Onsite speed limits will be established to limit the potential for road collisions	On-going
	Local wildlife carer and/or veterinarian will be identified prior to works being carried out. Procedures will be in place where injured fauna are encountered during clearing works.	On-going
	Site induction program relating to species of significance to be implemented for all project employees	On-going
Noise and lighting	The final project design process will incorporate the use of low light spill lighting components and directional lighting (away from adjacent fauna habitat) where night lighting is considered necessary	Detailed design
	All construction/operational machinery will be maintained as per manufacturer design specifications to ensure project noise is minimised	On-going
	Onsite speed limits will be established throughout project area to limit noise levels as a result of vehicle movements.	On-going
	Site induction program relating to noise and lighting to be implemented for all project employees	On-going
Airborne dust	Monitoring of air/dust emissions will be carried out in accordance with EA conditions	Pre-construction
	Dust from sources such as tracks and top soil stockpiles will be suppressed during construction using water trucks/wetting to keep dust related impacts to a minimum. Water used for dust suppression will be obtained from project-associated produced water where possible	During construction - as required

Impact	Management measure	Project timing
	Monitoring of weather conditions will be carried out to inform project activities and planning during high-wind weather conditions.	On-going
	Site induction program relating to air quality nuisance to be implemented for all project employees	On-going
	Areas subject to vegetation clearing and no longer required for construction will be subject to vegetation reinstatement as soon as is practicable.	On-going
	Onsite speed limits will be established to minimise dust caused by vehicle movements	On-going
Weeds and pests	Develop and implement a weed and pest management plan prior to construction works being carried out in line with the <i>Central Highlands Regional Council biosecurity plan 2020-2025</i> (CHRC 2019), refer to Section 7.1.5.4.	Pre-construction
	Mapping of the extent of weed/pest occurrence within the project footprint will be recorded during pre-clearance surveys.	Pre-construction
	Undertake activities in accordance with signed Conduct and Compensation Agreement's between the Proponent and key stakeholders	On-going
	Vehicle wash downs will be located at the GCF within the project area and will be required for all personnel to use prior to vehicles/plant/machinery entering areas in accordance with entry requirements with landowners	On-going
	All personnel entering the site in vehicles will be required to complete a weed hygiene declaration/vehicle hygiene inspection report. This action will be required for the life of the project to ensure all reasonable and practical steps are undertaken to prevent or minimise biosecurity risks	On-going
	Site induction program will include weed and pest management for all project employees	On-going
	Disposal and storage of putrescible wastes must be undertaken appropriately to ensure feral animals aren't attracted to the project area.	On-going
	Regular monitoring of weed and pest occurrence in association with the project's proposed activities areas	On-going
	Respond to complaints from adjacent landowners relating to weeds and pests	On-going
Fire	Monitoring of weather conditions will be carried out to inform the project's proposed activities and planning during high fire-risk weather conditions	Ongoing
	The project will maintain communications with local representatives for the Queensland Fire and Emergency Services (QFES) regarding project activities and bushfire hazard conditions	On-going
	Appropriate fire breaks will be established and maintained	On-going
	Site will include designated smoking areas	On-going
	Onsite fire-fighting equipment will be regularly maintained, and staff training will be developed and implemented.	On-going
Aquatic habitat clearing at waterways and wetlands	The disturbance footprint reduced to the greatest extent possible	Detailed design
	Design and construct waterways crossings consistent with the <i>Riverine protection permit exemption requirements</i> (DRDMW 2023a).	Detailed design
	Design and construct waterway crossings consistent with the <i>Accepted Development Requirements for Operational Work that is Constructing or Raising Waterway Barrier Works</i> (DAF 2018). In the unlikely instance that waterway crossings cannot meet the DAF (2018) design criteria, alternative waterway crossings would be designed in consultation and agreement with DAF.	Detailed design
	Construction disturbance to be reduced to 6 m wide in areas associated with waterways/watercourse crossings. Utilise existing access tracks where possible. Access tracks would be co-located with gathering lines, to reduce the disturbance footprint.	Detailed design
	No wells (or infrastructure other than linear infrastructure) would be positioned within any wetland or waterway.	Detailed design
	Implement 200 m buffer from HES wetlands to any well pads or other high impact earthworks.	Detailed design
	Use HDD construction method as a preference for waterway/watercourse crossing to limit open trench excavations	Detailed design

Impact	Management measure	Project timing
	Wherever possible watercourse crossing will avoid instream works including through the use of directional drilling to locate pipelines under the watercourse. Where this is not possible (such as for new access tracks) works within a watercourse will be conducted in the following order of preference: <ul style="list-style-type: none"> • Conducting works when no water is present • Conducting works in times of no flow • Conducting works in times of flow but in a way that does not negatively impact the flow of water within the watercourse, permanently impound water or permanently divert the flow of water 	Construction
	Where open cut trenching in waterway/watercourse is required, stockpile soil away from the streambed. Apply erosion control rip rap (rock size to withstand predicted flow rates) to minimise the risk of encountering flow events whilst sediments/soils are exposed.	Construction
	Develop and implement a rehabilitation management plan, refer Section 7.8	Prior to clearing
Alteration to surface water quality and/or quantity	The disturbance footprint reduced to the greatest extent possible	Detailed design
	Develop and implement the following management plans relating to chemical storage, waste and CSG water: <ul style="list-style-type: none"> • EMP (Section 7.1.5.1) • ESC Plan (Section 7.1.5.3) • Spill response plan (Section 7.1.5.5) • Environmental contingency plan (Section 7.1.5.6) • CSG water management plan (Appendix B) • Waste management plan (Section 7.7.4.1) 	Pre-Construction
	Storage of chemicals and refuelling of plant and machinery to be a minimum of 200 m away from nearest waterway/watercourse	On-going
	Spills response kits available on site	On-going
	Site induction program relating to spill response management to be implemented for all project employees	On-going
	Store project materials and hazardous chemicals in accordance with: <ul style="list-style-type: none"> • AS 3780:2008 – <i>The storage and handling of corrosive substances</i> • AS 1940:2004 – <i>The storage and handling of flammable and combustible liquids</i> • AS 3833:2007 – <i>Storage and handling of mixed classes of dangerous goods in packaged and intermediate bulk containers</i> 	On-going
	Onsite washdown areas for project vehicles/machinery will be located and clearly demarcated to prevent contaminated run-off from entering waterways.	On-going
	Water quality will be monitored on a regular basis in accordance with the EA conditions	On-going
Creating a barrier to fish passage	Disturbance footprint reduced to the greatest extent possible to avoid waterways	Detailed design
	Design and construct waterway crossings consistent with the <i>Accepted Development Requirements for Operational Work that is Constructing or Raising Waterway Barrier Works</i> (DAF 2018). In the unlikely instance that waterway crossings cannot meet the DAF (2018) design criteria, alternative waterway crossings would be designed in consultation and agreement with DAF.	Detailed design

7.2.6.1 Environmental Protocol for Constraints Planning and Field Development

The project layout will be determined through the implementation of the Proponent’s Environmental Protocol for Constraints Planning and Field Development (the protocol) for all cases where construction involves significant disturbance to land. The protocol aims to avoid or limit (where avoidance is not possible) impacts such that infrastructure siting:

- Considers biodiversity values and environmental constraints
- Is compliant with EA conditions and State and Commonwealth regulatory requirements
- Identifies any external environmental approvals required

With respect to environmental values, the protocol addresses avoiding or minimising and managing potential impacts to:

- Biodiversity values contributing to MNES
- Habitat for wildlife, including MNES threatened ecological communities, flora, and fauna
- Wetlands, watercourses, springs, and groundwater dependent ecosystems

The protocol also recognises that, in addition to environmental constraints, landholder, engineering and cultural heritage constraints must be considered during infrastructure siting.

7.2.6.2 Fauna and Flora Management Plan

The project will develop a fauna and flora management plan that will be in place prior to construction works being carried out. The fauna and flora management plan will establish species-specific management procedures for each identified threatened species considered to be potentially or likely to be present within the project area.

7.3 Air Quality

An air quality assessment has been carried out by Katestone Environmental to identify the air quality values of the project area, undertake dispersion modelling and assess potential project impacts related to air quality, refer to **Appendix G**. A summary of air quality assessment is provided in **Section 7.3.2** to **Section 7.3.5**.

7.3.1 Environmental Values

The air environmental values which are to be enhanced or protected under the *Environmental Protection (Air) Policy 2019* (EPP Air) include the qualities of the air environment that are conducive to:

- Protecting the health and biodiversity of ecosystems
- Human health and wellbeing
- Protecting the aesthetics of the environment, including the appearance of buildings, structures, and other property
- Protecting agricultural use of the environment

7.3.1.1 Air Quality Objectives

The EPP Air defines air quality criteria for enhancing or protecting the air environmental values. The air quality criteria are described in Schedule 1 of the EPP Air for air quality indicators. The objectives for health and wellbeing relevant to the project are summarised in **Table 22**.

Table 21. Ambient air quality objectives

Pollutant	Environmental Values ^(a)	Averaging Period	Air Quality Objective ($\mu\text{g}/\text{m}^3$) ^(b)
NO ₂	Health and wellbeing	1-hour	250 / 164
		1-year	62 / 31
CO	Health and wellbeing	8-hour ^(c)	11,000

Table notes:

(a) As prescribed by the EPP (Air)

(b) At STP, 0°C and 1atm

(c) Rolling 8-hour average based on 1-hour averages

7.3.2 Existing Environment

7.3.2.1 Climate

The regional area surrounding the project area is characterised by hot summers and mild winters. Overnight temperatures can be cold however on average they tend to remain above zero degrees. Climate data has been sourced from the Bureau of Meteorology and Long Paddock SILO for Station 35063 (Latitude -24.2111;

Longitude 148.7403 GDA2020), located approximately 16 km south from the southern boundary of the project area.

Temperatures

Mean maximum temperatures at Somerby range between ~34°C in the summer months and ~22°C in the winter months. Mean minimum temperatures at Somerby range between ~21°C in the summer months and ~6°C in the winter months. Monthly averages of maximum and minimum temperatures are presented as **Figure 21**.

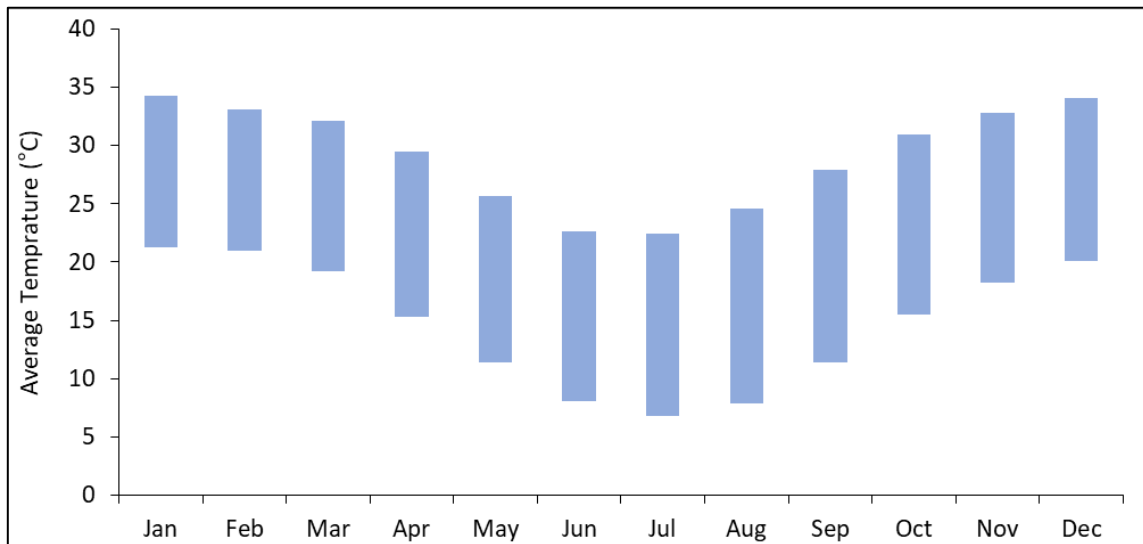


Figure 21. Daily average minimum and maximum temperatures – Station 35063 Somerby (1930-2022)

Source: BoM 2021; Queensland Government, 2021

Rainfall

The annual average rainfall at Somerby is 610 mm, with the majority falling between November and March, but rain does fall throughout the year. The average monthly rainfall is higher than the median indicating that periodic large rainfall events bias the average high. Rainfall statistics are presented in **Figure 22**.

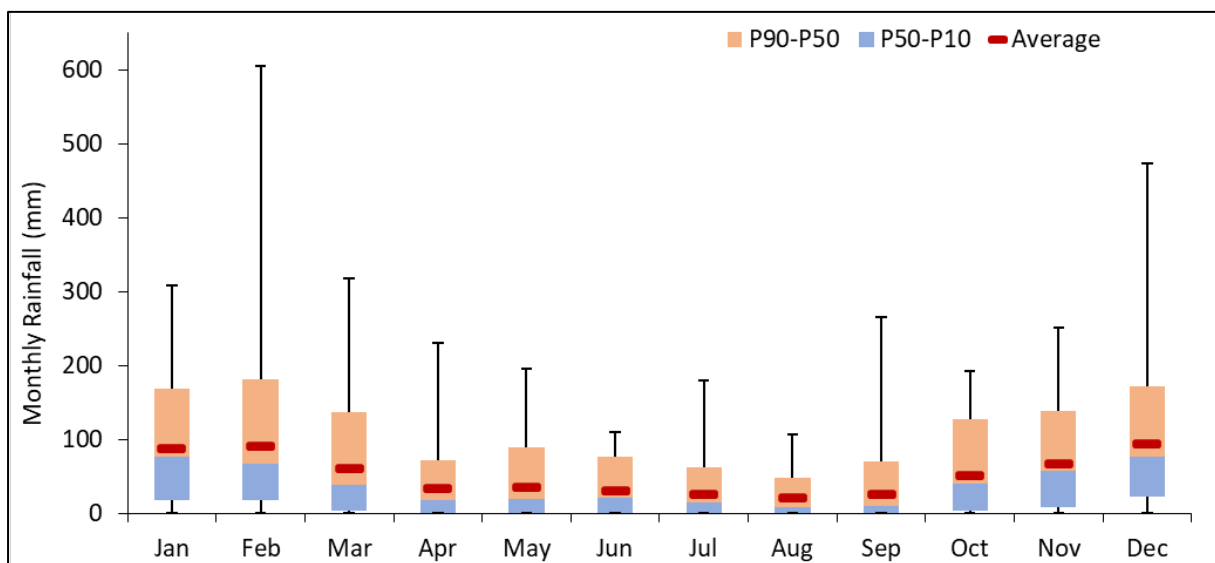


Figure 22. Monthly Rainfall Statistics – Station 35063 Somerby (1930-2022)

Source: BoM 2021; Queensland Government, 2021

Evaporation

Monthly evaporation rates at Somerby exceed rainfall in all months of the year. The median and average monthly evaporation rates are similar. The annual average evaporation rate 2,072 mm/year. Evaporation statistics are presented **Figure 23**.

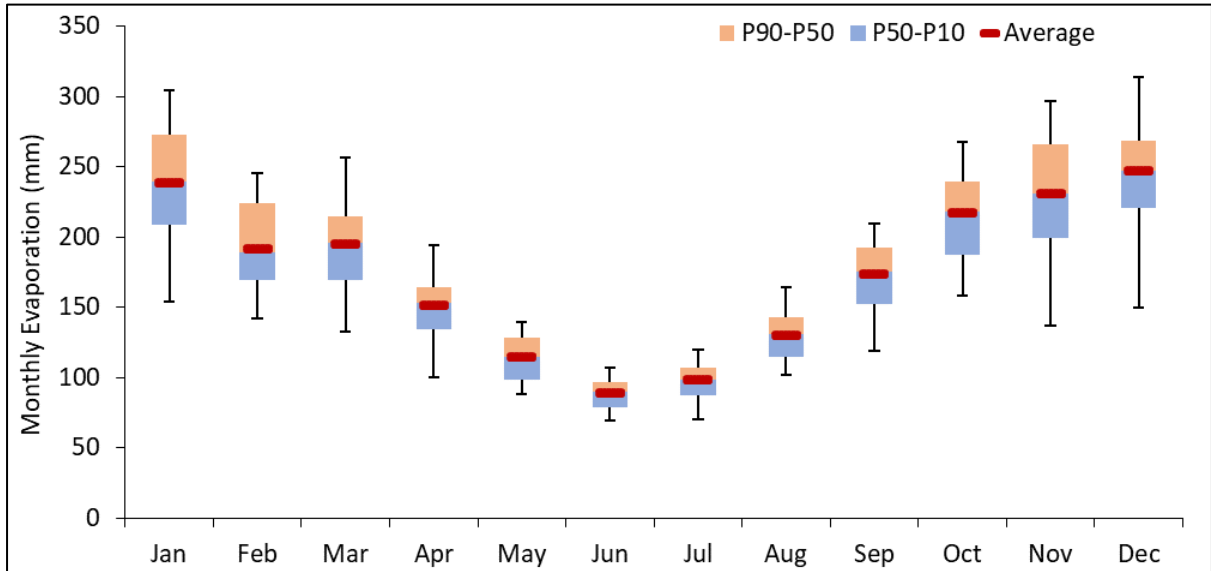
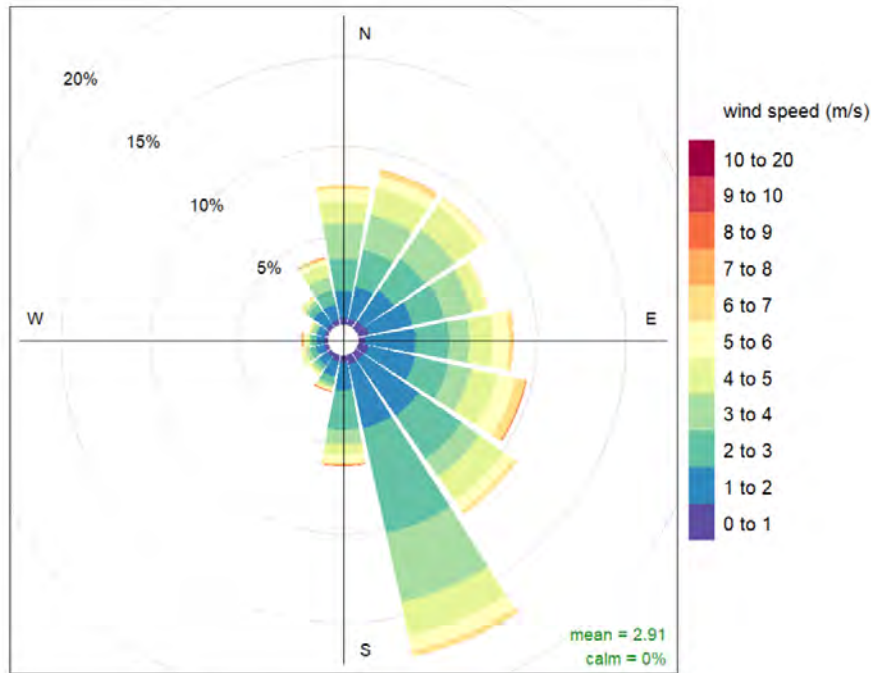


Figure 23. Monthly Evaporation Statistics – Station 35063 Somerby (1930-2022)

Source: BoM 2021; Queensland Government, 2021

Wind

The predicted annual average wind speed at the project area in 2021, as derived from the meteorological modelling carried out for the assessment, was 2.91 m/s, with winds most commonly coming from the south-east and north-east. Winds are rarely from the north-west or south-west, refer to **Figure 24**, which illustrates wind speed and direction. Annual average dispersion of pollutants can be expected to follow this general pattern.



Frequency of counts by wind direction (%)

Figure 24. Annual Wind Rose for the Project Area for 2021

Source: Katestone 2023, extracted from TAPM and CALMET

7.3.2.2 Sensitive Receptors

A desktop assessment of aerial imagery identified four potential sensitive receptors within the project area and surrounding properties, all of which are residential properties. These sensitive receptor locations were verified with the relevant landholders during landholder meeting conducted in 2022 by the Proponent. The sensitive receptors are described in **Table 23** and illustrated on **Figure 25**. The proposed activity with the greatest noise source potential is the GCF. The nearest sensitive receptor to the GCF is R2, located approximately 2.3 km to the east.

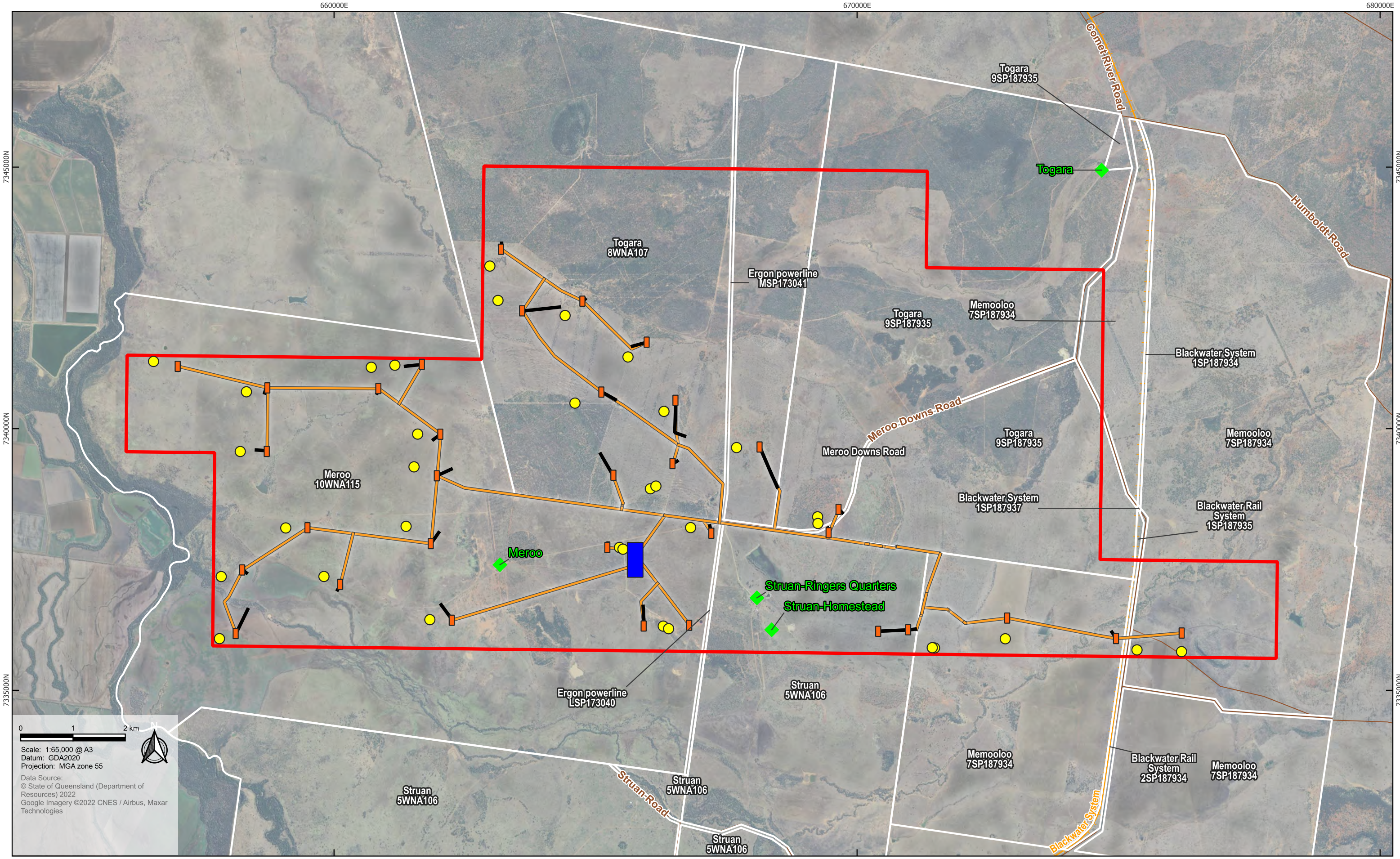
Table 22. Sensitive receptors

Receptor ID	Lot on Plan	Property Name	Location (GDA 2020)		Distance from GCF ^(a)	Tenure
			Latitude	Longitude		
R1	Lot 10 on WNA115	Meroo Downs	-24.06721	148.60497	2.6 km west ^(b)	Freehold
R2	Lot 5 on WNA106	Struan-Ringers Quarters	-24.07241	148.65335	2.3 km east ^(b)	Freehold
R3	Lot 5 on WNA106	Struan Homestead	-24.07788	148.65620	2.9 km east ^(b)	Freehold
R4	Lot 9 on SP187935	Togara	-23.99789	148.71717	11.6 km north-east	Freehold

Table notes:

(a) Centre of GCF is -24.06613,148.63032 (GDA 2020)

(b) Within the site boundary



Filepath: -BAA\BAA220014.01 Comet Ridge Mahalo North\Workspaces\BAA220014.01 Mahalo North\1. Petroleum Lease\5. EA\Rev 1\Figure 25 Sensitive receptors.qgz

0 1 2 km

Scale: 1:65,000 @ A3
 Datum: GDA2020
 Projection: MGA zone 55

Data Source:
 © State of Queensland (Department of Resources) 2022
 Google Imagery ©2022 CNES / Airbus, Maxar Technologies

Legend		
 Petroleum Lease Boundary	Infrastructure (Indicative only)	Gas production wells
Cadastre (DCDB)	 Gas compression facility	 Indicative lateral well
Roads and tracks	New access tracks	 Indicative vertical well
Railways	Indicative gathering lines	
◆ Sensitive receptors		



**Comet Ridge
 Mahalo North CSG Project
 Environmental Authority
 Supporting Information Report for a Petroleum Lease**

Figure 25
 Sensitive receptors

7.3.2.3 Existing Air Quality

The existing air quality environment is characterised by the nearby surrounding land uses, which includes mining resource activities, cattle grazing, feedlots and natural gas operations. **Table 24** lists all facilities that report oxides of nitrogen and carbon monoxide to the National Pollutant Inventory (NPI) in the financial year of 2020/21, within a 50 km radius of the project area. Though these industries operate in the regional airshed, there are no sources large enough to report to NPI within the model domain of the air quality assessment (25 km radius of the project area), refer **Appendix G**. Therefore, it can be concluded that the ambient air quality is generally good.

Table 23. Existing emissions sources and their emissions (kg) report to NPI

Facility Name	Land use	NOx	CO	Distance from GCF ^(a)
Blackwater Mine	Mining	2,592,000	3,016,000	41 km
Glencore Coal Rolleston Open Cut Mine	Mining	424,346	1,144,018	47 km
Goonoo Feedlot	Grazing	3,654	6,295	36 km
Meteor Downs Mine	Mining	68,611	154,422	48 km
North Denison	Natural gas	27,387	218,663	48 km

Table notes:

(a) Centre of GCF is -24.06613,148.63032 (GDA 2020)

7.3.2.4 Existing Ambient Air Quality

The ambient data of NO_x³, which is one of the key pollutants of concern for the project, is not recorded by the weather stations located closest to the project area, which means a comparable analysis relevant to the operational modelling for the project was not possible based on the weather station data closest to the project area.

To gain insight into potential background levels of air pollutants due to CSG activities, the ambient air quality data from the DES station at Hopeland in South East Queensland has been analysed. This station is located approximately 360 km south-east of the project area. The Hopeland station is located near intensive CSG production and coal mining operations in the region and therefore serves as a conservative representation of ambient air quality.

The ambient air quality data is presented in **Table 25** as well as the background levels used in the air quality assessment for the project.

Table 24. Background air quality measured at Hopeland DES monitoring station

Pollutant	Averaging Period	AQO (µg/m ³)	Concentration (µg/m ³)					Levels used in Assessment (µg/m ³)
			2017	2018	2019	2020	2021	
NO ₂	1-hour ^(a)	250 / 164	4.11	4.11	4.11	4.11	4.11	4.11
	Annual	62 / 31	4.05	4.05	3.81	3.68	3.43	4.05
CO	8-hour ^(a)	11,000	250	178	250	203	143	250

Table notes:

(a) Concentrations derived as the 70th percentile of data

³ NO_x in exhaust plumes is made up of both nitric oxide (NO) and nitrogen dioxide (NO₂). Typical NO:NO₂ ratios at the point of release to the atmosphere are around 90%:10%. Once in the atmosphere, NO can undergo chemical transformation to form NO₂.

7.3.3 Emissions and Releases

7.3.3.1 Construction

The key emissions to air during the construction phase of the project includes, but is not limited to:

- Dust emissions (particulate matter) from constructing new access tracks, handling of earth materials and vehicle movements along unsealed surfaces and operational vehicle movements and disturbances
- Combustion emissions associated with drilling activities (i.e., from drill rigs, vehicles, trucks, excavators, graders, dozers)
- Fugitive emissions from GCF and well heads (including associated infrastructure)
- Wind erosion of exposed areas

The gas wells will be progressively drilled over an 11-year period, equating to approximately four production wells drilled per year, refer to **Figure 25**. This means there will be four engines at different gas production well sites being operated simultaneously across the project area.

Each individual well site will comprise of drilling a vertical and horizontal well adjacent to one another (350-500 meters apart), requiring a maximum of 68 wells. The engines will be located at the vertical gas well site, where a diesel 20kVA engine (e.g., Staunch Yanmar or similar) will be operational for three to six months at 100% load to initially de-pressurise the well. The engine will then operate intermittently as needed. Post construction, the key potential air emissions that could be generated by the projects proposed activities would be emissions of products of CSG combustion from dewatering engines at the gas well sites.

7.3.3.2 Operations

The key emissions to air during the operational phase of the project includes, but is not limited to:

- Combustion emissions from equipment operating at the GCF and gas well sites
- Fugitive emissions from GCF and well heads (including associated infrastructure)
- Dust emissions from wheel-generated activities (i.e., vehicle movements)

During operations, gas will be gathered centrally at the GCF, where two natural gas-powered engines (e.g., Waukesha VHP – L7044GSI S5 or similar) will provide power to gas compression units, gas dehydrations, separation units and other ancillary equipment. The engines will run at 100% load, 24 hours per day for the lifetime of the project. A third contingency engine will be added within the first ten years of operations commencing, however, only two engines will ever be used simultaneously.

The GCF will have a flare but will only be used for emergency purposes.

7.3.4 Potential Impacts

7.3.4.1 Construction

Modelling of dispersion and deposition of air emissions during the construction phase of the project was not undertaken as the emissions from construction related activities are expected to be minimal and of little significance considering the distances between the activities and nearest sensitive receptors. Notwithstanding this, adoption of mitigation measures will assist in minimising potential air emissions which are described in **Section 7.3.5**.

7.3.4.2 Operations

In order to predict what may happen to pollutants after they are emitted to the air during operations, a dispersion model assessment was undertaken using the most recent version of CALPUFF model (version 7.2.1). The dispersion modelling was used to model emissions of oxides of nitrogen (NO_x) and carbon monoxide (CO), which are the key pollutants of concern to be generated by the project during operations.

Ground-level concentrations of these air pollutants have been predicted at nearby sensitive receptors (**Section 7.3.2.2**) and assessed against the relevant air quality objectives in the EPP Air (**Section 7.3.1.1**). Pollutant

concentrations were also predicted across a Cartesian grid of receptors (at 250 m resolution) to enable the production of contour plots of concentrations across the study area.

Twelve months of modelled meteorological data was used as input for the dispersion model to include all weather conditions likely to be experienced in the region during a typical year. These twelve months were chosen from the most representative year from analysis of 6 years of previous data.

All engines at each vertical gas well site has been modelled at 100% constant load. This is a conservative assumption, which overestimates the proposed emissions from this activity. The two engines at the GCF have also been modelled at 100% constant load, which is a representative assumption of maximum operations. The possible emission sources for the construction and operational phase of the project are summarised in **Section 7.3.3.1** and **Section 7.3.3.2**, respectively.

The proposed activity with the greatest potential source of air emissions during operations is the GCF, contributing more than 65% of the predicted ground-level concentrations at each sensitive receptor. This is due to the size of the GCF engines compared to the engines at the gas well sites.

Should impacts from air emissions occur as a result of the projects proposed activities, the greatest impacts are predicted to occur downwind of the project area under prevailing wind conditions, to the north-west to west-northwest of the project area. Sensitive receptors are located to the west, east and north-east of the GCF, which is not in a downwind direction.

The findings from the dispersion modelling which assessed the facility at maximum operations (i.e. all possible engines running continuously at 100% load) are summarised in **Table 26**. The results are presented in 'isolation' as well as 'cumulatively' with the ambient background air quality data listed in **Section 7.3.2.4**. The assessment has demonstrated that none of the AQOs will be exceeded. Thus, it is concluded that the project will not have a significant impact on local air quality.

Table 25. Dispersion modelling results at each sensitive receptor during operations

Receptor ID	Receptor Name	NO ₂ (µg/m ³)				CO (µg/m ³)	
		Isolation		Cumulative		Isolation	Cumulative
		1-hour (a)	Annual (b)	1-hour (a)	Annual (b)	8-hour (c)	8-hour (c)
AQO (EPP Air)		-	-	250 / 164	62 / 31	-	11,000
R1	Meroo Downs	50.2	1.0	54.3	5.0	42.7	292.8
R2	Struan-Ringers Quarters	16.8	0.3	20.9	4.3	10.7	260.8
R3	Struan Homestead	10.1	0.2	14.2	4.3	6.1	256.2
R4	Togara	20.2	0.05	24.3	4.1	10.0	260.1

Table notes:
(a) NO_x to NO₂ conversion assumed to be 30%
(b) NO_x to NO₂ conversion assumed to be 100%
(c) rolling 8-hour average based on 1-hour averages

The results of the dispersion modelling show that all predicted concentrations of all relevant pollutants are anticipated to comply with the relevant AQOs under the EPP Air during operations as summarised below:

- Predicted 1-hour average ground-level concentrations of NO₂ are below the relevant air quality objective at all sensitive receptors in isolation and with an ambient background. The highest cumulative concentration at any sensitive receptor is less than 22% of the EPP Air AQO.
- Predicted annual average ground-level concentrations of NO₂ are below the relevant air quality objective at all sensitive receptors in isolation and with an ambient background. The highest cumulative concentration at any sensitive receptor is less than 9% of the EPP Air AQO.
- Predicted 8-hour average ground-level concentrations of CO are below the relevant air quality objective at all sensitive receptors in isolation and with an ambient background. The highest cumulative concentration at any sensitive receptor is less than 2.8% the EPP Air AQO.

The resulting contour plants for cumulative concentrations are shown in **Plate 21** to **Plate 23**.

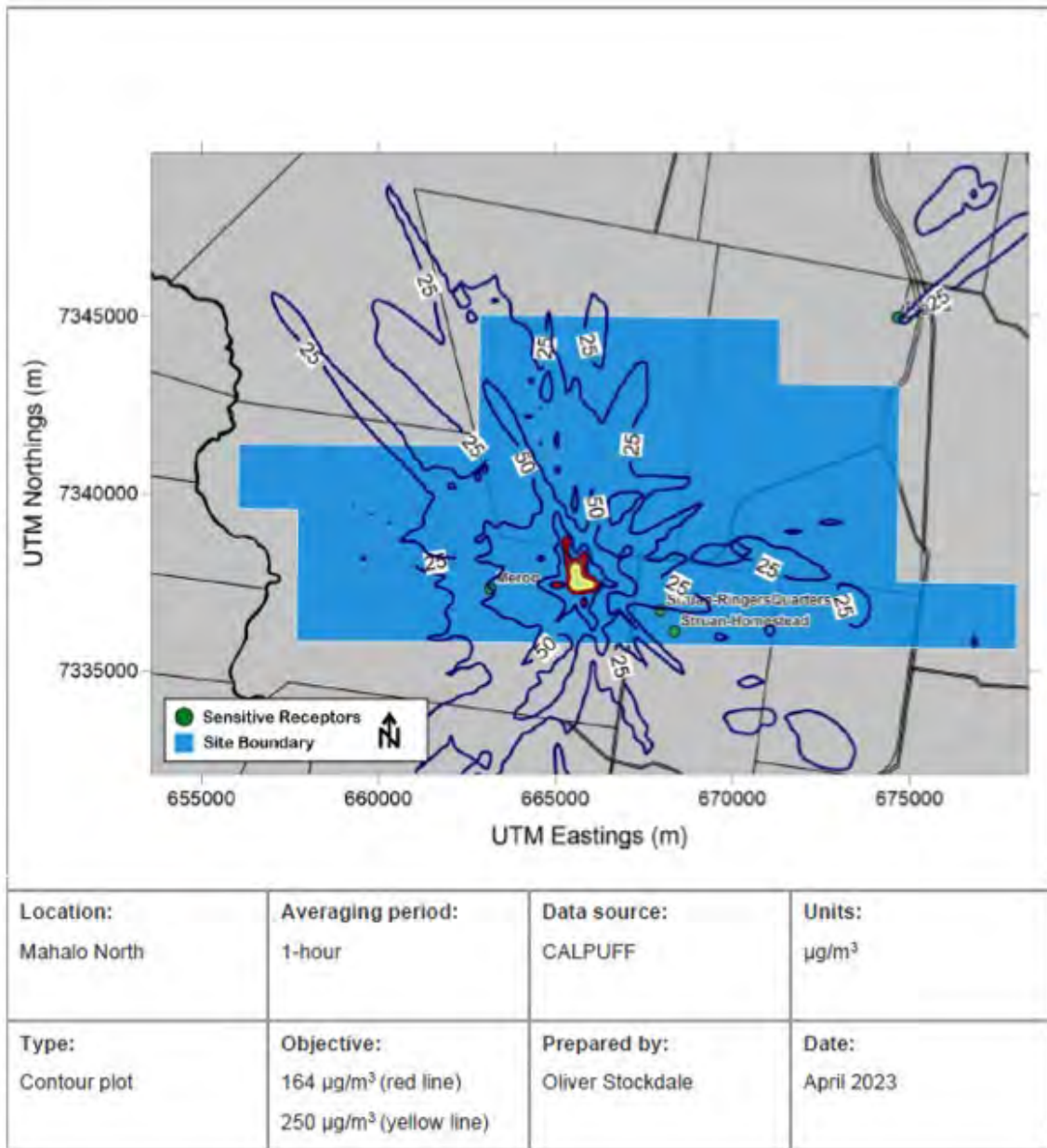


Plate 21: Predicted 1-hour average ground-level concentrations of NO₂ due to the project (cumulative)
 Source: Katestone 2023 (Appendix G)

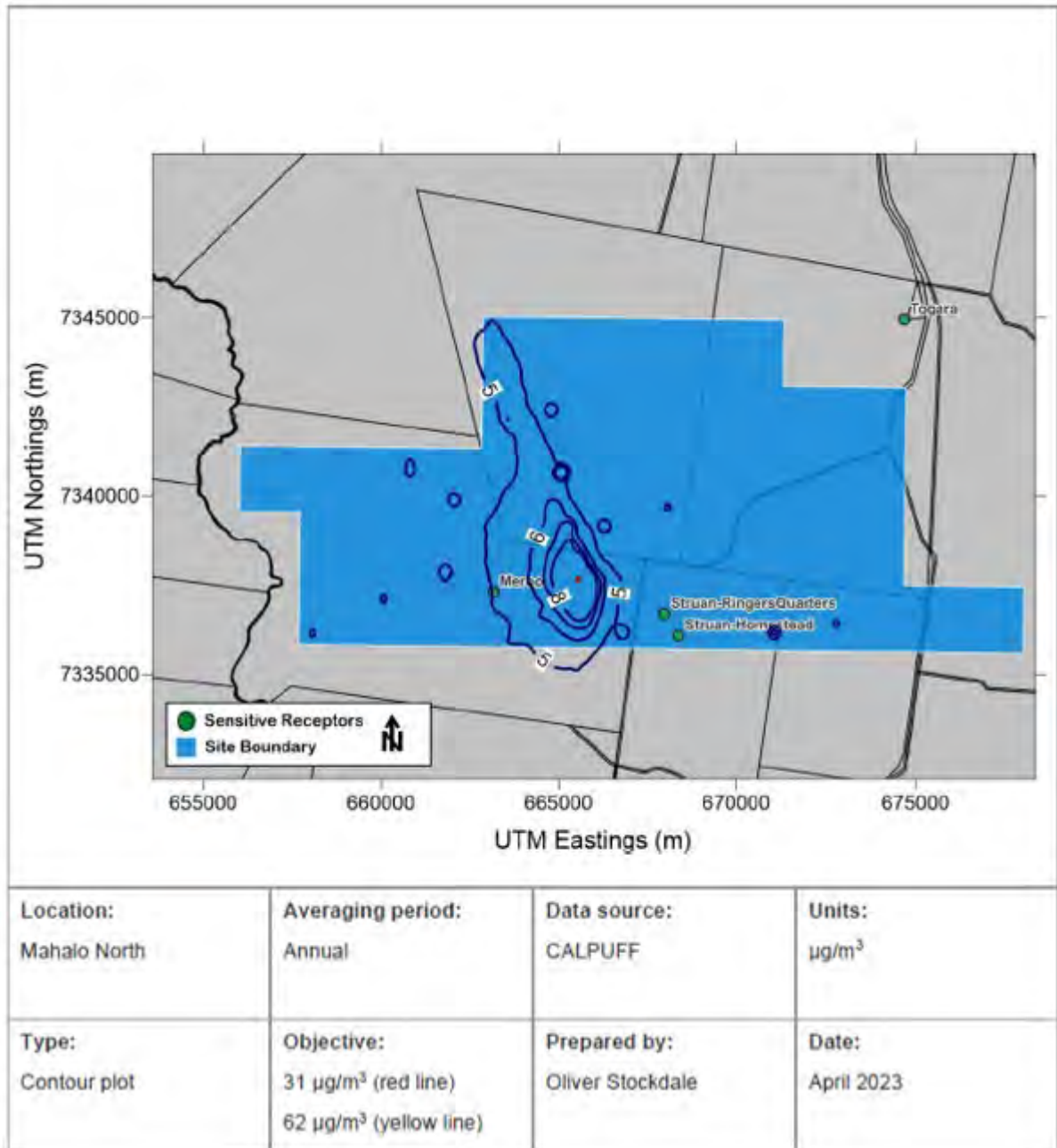


Plate 22: Predicted annual average ground-level concentrations of NO₂ due to the project (cumulative)

Source: Katestone 2023 (Appendix G)

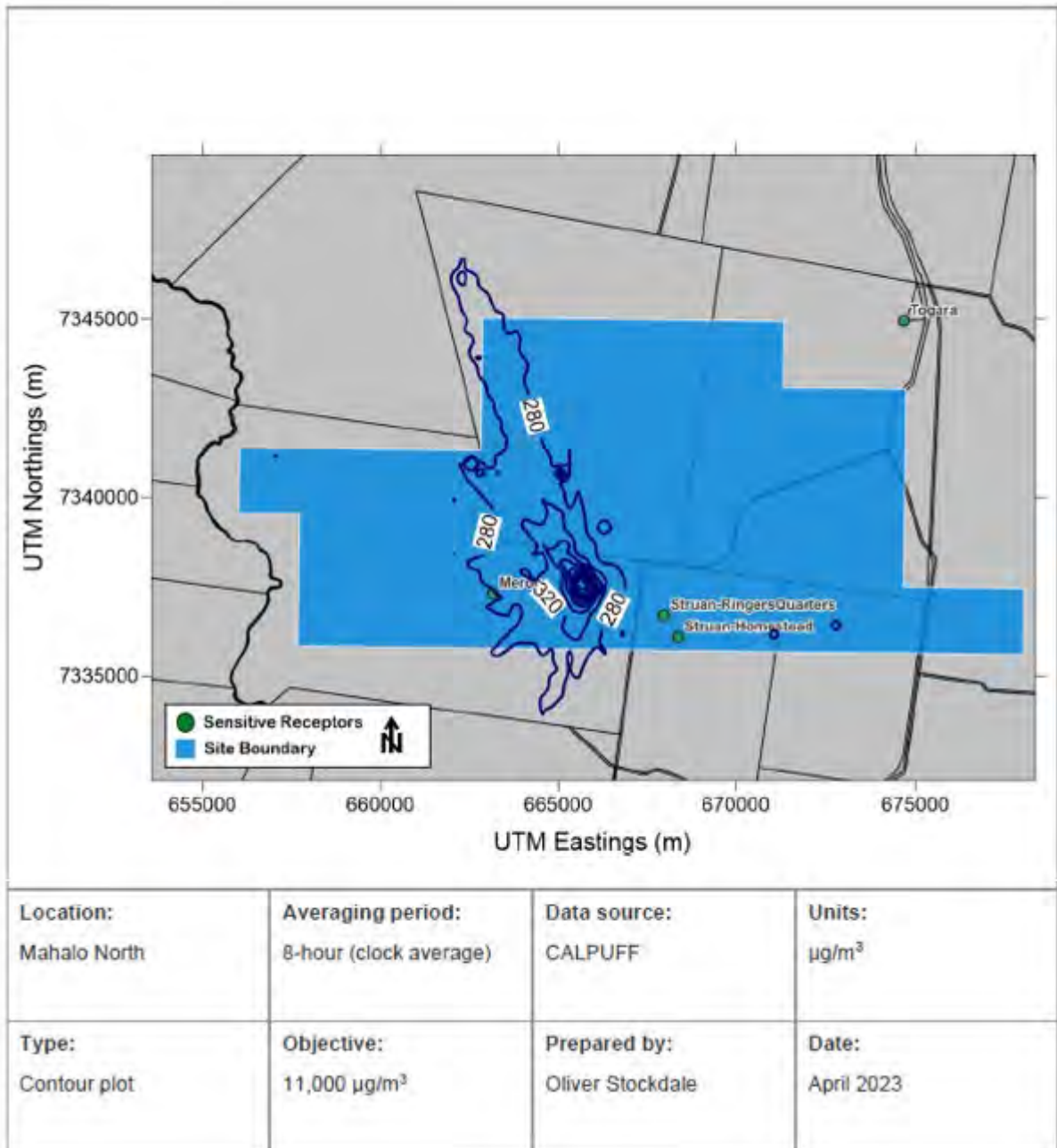


Plate 23: Predicted 8-hour average ground-level concentrations of CO due to the Project (cumulative)

Source: Katestone 2023 (Appendix G)

7.3.5 Management Practices

Despite compliance being predicted without the need for specific control measures to be implemented the Proponent will utilise a range of good practice management measures that will minimise potential impacts to air quality values, as outlined in **Table 27**.

As an overarching management tool, the Proponent will develop and implement a complaints management process for air nuisance, as outlined in **Section 7.3.5.1**.

Table 26. Recommended mitigation measures for potential impacts to air quality values

Impact	Management measure	Project timing
Dust emissions (particulate matter) during construction and operations from wheel-generated activities (i.e., vehicle movements)	Undertake activities in accordance with signed Conduct and Compensation Agreement's between the Proponent and key stakeholders	On-going
	Monitor air/dust emissions in accordance with EA conditions	On-going
	Dust from sources such as tracks and top soil stockpiles will be suppressed during construction using water trucks/wetting to keep dust related impacts to a minimum. Water used for dust suppression will be obtained from project-associated produced water where possible	During construction - as required
	Monitoring of weather conditions will be carried out to inform project activities and planning during high-wind weather conditions.	On-going
	Site induction program relating to air quality nuisance to be implemented for all project employees	On-going
	Areas subject to vegetation clearing and no longer required for construction will be subject to vegetation reinstatement as soon as is practicable.	On-going
	Onsite speed limits will be established to minimise dust caused by vehicle movements	On-going
Combustion emissions associated with drilling activities and equipment operating at the GCF and gas well sites	Vehicles to be operated in a fuel-efficient manner and not be left idling for long periods	On-going
	Low NOx combustion engines will be utilised during operations, where practicable	On-going
	A process for regularly reviewing new technologies will be implemented to identify opportunities to reduce emissions and use energy efficiently, consistent with leading practice environmental management	On-going
Fugitive emissions from GCF and well heads (including associated infrastructure)	Well heads to be designed to ensure integrity at the surface in accordance with DNRME Code of Practice (DNRME 2019) including: <ul style="list-style-type: none"> Undertake leak testing, cement integrity test around casing shoe to ensure the barrier has been properly placed Operators should ensure that during initial wellhead installation and subsequent well intervention workovers, wellhead seal tests are conducted to test the mechanical integrity of the wellhead sealing components and confirm they are capable of holding against well pressure to prevent fugitive emissions 	Detailed design, construction
Wind erosion of exposed areas	Monitor weather forecasts during any ground disturbance activities (primarily during the construction phase)	Construction

7.3.5.1 Complaints Management – Air Quality

Should a non-frivolous complaint regarding health concerns in regard to dust be received dust control measures will be implemented on site. Where requested by the administering authority, an investigation will be carried out, which may include monitoring at a site representative of the complainant's residence in accordance with the EA conditions. The duration of monitoring will be determined based on the duration of the activity.

7.4 Noise

A noise impact assessment has been carried out by Matrix Acoustics to identify the acoustic values of the project area, undertake noise modelling, and assess potential project impacts related to noise, refer to **Appendix H**. A summary of noise impact assessment is provided in **Section 7.4.2** to **Section 7.4.6**.

7.4.1 Environmental Values

The *Environmental Protection (Noise) Policy 2019* (EPP Noise) identifies the environmental values to be enhanced or protected relating to the qualities of the acoustic environment that are conducive to:

- Protecting the health and biodiversity of ecosystems
- Human health and wellbeing, including an individuals' ability to have sleep, study or learn, and recreation activities (including relaxation and conversation)
- Protect the amenity of the community

7.4.2 Existing Environment

7.4.2.1 Sensitive Receptors

Refer to **Section 7.3.2.2** for description of sensitive receptors identified for the project.

7.4.2.2 Baseline Noise Levels

A baseline noise monitoring survey was undertaken in February 2023 for a 7-day period at three locations. The purpose of the survey was to ascertain appropriate noise limits based on the existing ambient noise environment in the project area.

Noise monitoring equipment (noise loggers) were installed at three locations. These locations were chosen based on the sensitive receptors closest to the proposed GCF, which is predicted to be the greatest noise emitting source associated with the project's proposed activities. The locations of the noise loggers are provided in **Table 28**.

It is noted that noise monitoring at the sensitive receptor located on the Togara property was not undertaken. This is due to the distance of the Togara property being located approximately 11 km to the north-east and outside of the project area. The lowest monitored noise levels from the other noise monitoring locations has been assumed for the Togara sensitive receptor, which is further discussed in **Section 7.4.3.3**.

Table 27. Noise monitoring station locations

Logger no.	Sensitive Receptor	Lot on Plan	Location (GDA 2020)		Proximity to proposed GCF	Description of Monitoring Location
			Latitude	Longitude		
1	Struan Homestead	Lot 5 on WNA106	-24.07754	148.65477	2.6 km south-east	Located approximately 300 m north-west of the dwelling. Free field location within fenced area. No major reflecting surfaces within 3.5 m.
2	Struan Ringers	Lot 5 on WNA106	-24.07229	148.65331	2.2 km south-east	Located north-west of the dwelling. Free field location within fenced area. No major reflecting surfaces within 3.5 m.
3	Meroo Downs	Lot 10 on WNA115	-24.06703	148.60399	2.5 km west	Located north-east of dwelling. Free field location within fenced area. No major reflecting surfaces within 3.5 m.

The results of the noise monitoring survey are provided in **Table 29**.

Table 28. Noise monitoring survey results

Logger no.	Sensitive Receptor	Time Period	Average LA90	Average LAeq	Average LA10	Average LAmix	Rating Background Level ^(a)
1	Struan Homestead	Day	35.0	40.2	42.0	56.8	31.9
		Evening	47.1	51.1	52.9	59.4	41.3
		Night	44.6	48.4	50.1	57.4	34.9
		Morning	36.7	41.3	42.6	58.1	36.5
2	Struan Ringers	Day	33.5	41.0	42.4	60.7	30.8
		Evening	39.3	43.3	44.7	55.7	36.2
		Night	38.0	41.5	42.6	51.6	33.2
		Morning	32.5	43.9	43.1	67.0	32.4
3	Meroo Downs	Day	36.5	44.6	47.2	62.5	35.2
		Evening	48.1	52.2	54.4	62.3	42.3
		Night	45.7	50.6	53.0	60.9	41.8
		Morning	40.9	49.3	52.0	68.8	41.2

Table notes:

^(a) The Rating Background Level (RBL) has been calculated for all locations. The determination of the RBL was conducted in accordance with Ecoaccess guideline "Planning for Noise Control" 2004 (0804).

7.4.3 Noise Criteria

7.4.3.1 Acoustic Quality Objectives under the EPP Noise

An acoustic quality objective is a measurement of an acoustic descriptor at a sensitive receptor. **Table 30** shows the acoustic quality objective for a residential dwelling as listed under the EPP Noise, as only residential sensitive receptors have been identified as within the properties surrounding the project.

Table 29. Acoustic quality objectives for residential dwellings

Sensitive Receptor Type	Location	Time of day	Acoustic quality objectives (measured at the receptor) dB(A)			Environmental Value
			LAeq,adj,1hr	LA10,adj,1hr	LA01,adj,1hr	
Residence	Outdoors	Daytime (7 am to 6 pm) and Evening (6 pm to 10 pm)	50	55	65	Health and wellbeing
		Indoors	Daytime (7 am to 6 pm)	35	40	45
	Evening (6 pm to 10 pm)		35	40	45	Health and wellbeing
	Night (10 pm to 7 am)		30	35	40	Health and wellbeing, in relation to the ability to sleep

Source: EPP Noise

7.4.3.2 Streamlined Model Conditions and Deemed Background Noise Levels

The Streamlined Model Conditions (DES 2016) set noise nuisance limits for short, medium, and long term noise events. These conditions can be incorporated into an environmental authority to manage petroleum noise activities and meet the acoustic quality objectives under the EPP Noise.

Noise nuisance limits are defined under the Streamlined Model Conditions as follows:

- **Short term noise event:** a noise exposure, when perceived at a receptor premise, which persists for an aggregate period not greater than eight hours and does not re-occur for a period of at least seven days. Reoccurrence is deemed to apply where a noise of comparable level is observed at the same receptor location for a period of one hour or more, even if it originates from a different source or source location.
- **Medium term noise event:** a noise exposure, when perceived at a receptor premise, which persists for an aggregate period not greater than five days and does not re-occur for a period of at least four weeks. Reoccurrence is deemed to apply where a noise of comparable level is observed at the same receptor location for a period of one hour or more, even if it originates from a different source or source location.
- **Long term noise event:** a noise exposure, when perceived at a receptor premise, which persists for a period of greater than five days, even when there are respite periods when the noise is inaudible within those five days.

Long term noise event criteria is considered to be the most stringent criteria to be achieved. Therefore, if the project is able to be managed such that the long term noise event criteria can be achieved then all other noise criteria (short and medium term noise event criteria) will also be achieved.

The DES Guideline, *Prescribing noise conditions for petroleum activities ESR/2016/1935* (DES 2022b) (DES 1935 Guideline), provides indicative noise levels in the form of ‘deemed background noise levels’, which can be applied in the absence of noise monitoring data or can be used as the minimum background levels for projects where the ambient noise levels are very quiet (i.e. less than the deemed background noise levels). The Streamlined Model Conditions and Deemed Background Noise Levels are provided in **Table 31**.

Table 30. Streamlined model conditions noise nuisance limits and deemed background noise levels

Time Period	Metric	Deemed background noise levels (dB(A))	Short term noise event (dB(A))	Medium term noise event (dB(A))	Long term noise event (dB(A))
Daytime 7 am to 6 pm	L _{Aeq,adj,15 min}	35	45 (BG ^(a) + 10)	43 (BG ^(a) + 8)	40 (BG ^(a) + 5)
Evening 6 pm to 10 pm	L _{Aeq,adj,15 min}	30	40 (BG ^(a) + 10)	38 (BG ^(a) + 8)	35 (BG ^(a) + 5)
Night 10 pm to 6 am	L _{Aeq,adj,15 min}	25	28 (BG ^(a) + 3)	28 (BG ^(a) + 3)	28 (BG ^(a) + 3)
	Max L _{pA} , 15mins	-	55	55	55
Morning 6 am to 7 am	L _{Aeq,adj,15 min}	35	40 (BG ^(a) + 10)	38 (BG ^(a) + 8)	35 (BG ^(a) + 5)

Table Notes:

^(a) Refers to ‘Background’ which can either be the ‘deemed background noise level’ or the ‘monitored noise level’, whichever is greater.

Source: DES 2016; DES 2022b

7.4.3.3 Site Specific Noise Criteria

The project has undertaken noise monitoring, which means the monitored noise levels take precedence over the deemed background noise levels described above in **Section 7.4.3.2**. Site specific noise criteria is deemed most appropriate for the project as it is representative of the ambient noise conditions nearby the sensitive receptors. The method for determining the site specific noise criteria is based on the monitored noise levels at

each sensitive receptor (refer to the Rating Background Level column in **Table 29**), plus the allowance that is specified for each criteria above in **Table 31** (i.e. BG + allowance). The site-specific noise criteria for each sensitive receptor is provided in **Table 32**.

As noted in **Section 7.4.2.2** above, there is no noise monitoring data available at the sensitive receptor located on the Togara property. The lowest monitored noise levels from the other noise monitoring locations have been assumed for the Togara sensitive receptor.

Table 31. Site-specific noise criteria

Sensitive Receptor	Time Period	Metric	Short term noise event (dB(A))	Medium term noise event (dB(A))	Long term noise event (dB(A))
Struan Homestead	Day	LAeq,adj,15 min	45	43	40
	Evening	LAeq,adj,15 min	51	49	46
	Night	LAeq,adj,15 min	38	38	38
		Max LpA, 15mins	55	55	55
	Morning	LAeq,adj,15 min	46	44	41
Struan Ringers	Day	LAeq,adj,15 min	45	43	40
	Evening	LAeq,adj,15 min	46	44	41
	Night	LAeq,adj,15 min	36	36	36
		Max LpA, 15mins	55	55	55
	Morning	LAeq,adj,15 min	42	40	37
Meroo Downs	Day	LAeq,adj,15 min	45	43	40
	Evening	LAeq,adj,15 min	52	50	47
	Night	LAeq,adj,15 min	45	45	45
		Max LpA, 15 mins	55	55	55
	Morning	LAeq,adj,15 min	51	49	46
Togara	Day	LAeq,adj,15 min	45	43	40
	Evening	LAeq,adj,15 min	46	44	41
	Night	LAeq,adj,15 min	36	36	36
		Max LpA, 15 mins	55	55	55
	Morning	LAeq,adj,15 min	42	40	37

7.4.4 Emissions and Releases

The noise emissions from CSG activities that could pose potential risks to nearby sensitive receptors and general acoustic environmental values are broadly characterised into the following activity types:

- Site establishment/clearing of access tracks, and GCF area, including operating plant and vehicle movements
- Construction of GCF, including operating plant and vehicle movements
- Construction and workover of gas well sites, including operating plant and vehicle movements
- Operations of the wells and GCF, including operating plant and vehicle movements

There is no blasting or hydraulic stimulation associated with the proposed activities. The proposed activities and individual plant and equipment expected to generate noise emission are presented in **Table 33**.

Table 32. Estimated noise emissions

Project Activity	Fleet	Details	Quantity	Estimated noise emission (dB(A))
Site establishment	Grader	CAT 12H	1	102
	Excavator	CAT 320	1	108
	Bobcat	CAT 216	1	107
	Gravel truck	Hino body truck	1	92
	Light vehicles	Hilux	3	90
	Truck floats	Prime mover and float	1	107
	Water truck	20kl	1	94
Construction of GCF	Grader	CAT 12H	1	102
	Excavator	CAT 320	1	108
	Bobcat	CAT 216	1	107
	Gravel truck	Hino body truck	1	92
	Light vehicles	Hilux	4	90
	Truck floats	Prime mover and float	6	107
	Water truck	20kl	1	94
Construction and workover of gas well sites	Drill Rig	Operational Load 100% power for all items	1	112
	Mud pump		1	99
	SCUF tank		1	102
	Generator		1	85
	LED light tower		1	80
	Coil unit		1	96
Operations of the wells and GCF	Engine	L5794	2	102
	Engine Exhaust	L5794	2	125
	Engine Intake	L5794	2	102
	Recip Compressor	Ariel JCG6	2	125
	Metering Skid	Skid mounted	1	84
	Pumps	Electric	4	90
	Well Head Pack	All equipment at well	34	105

7.4.5 Potential Impacts

Noise modelling was undertaken using SoundPLAN 8.2 noise prediction software to predict noise levels at the sensitive receptors from potential noise emitting sources, including the areas around the gas well sites and GCF.

The ISO 9613-2:1996 Acoustics – *Attenuation of sound during propagation outdoors – Part 2: General method of calculation* (ISO 9613-2:1996) noise prediction methodology was used in the SoundPLAN software to predict the noise propagation from the various construction activities. ISO 9613-2:1996 assumes downwind conditions from the noise source towards the sensitive receptor, predicted noise levels at the sensitive receptors are therefore conservative predictions.

The noise modelling used the estimated noise emissions described in **Table 33** to calculate the predicted noise levels at each sensitive receptor for four different project scenarios, as listed below:

- Construction – Site establishment
- Construction – GCF
- Construction – Wells and workovers
- Operations – Wells and GCF

The most stringent noise criteria to be achieved is the long term noise event criteria. Therefore, if the project is able to be managed such that the long term noise event criteria can be achieved for that sensitive receptor location, then all other noise criteria (short and medium term noise event criteria) will also be achieved. With this in mind, the site-specific long term noise event criteria (listed in **Section 7.4.3.3**) was applied to the noise modelling to understand if the estimated noise emissions from project activities can achieve the site-specific noise criteria.

7.4.5.1 Unmitigated Predicted Noise Levels

The modelling results of unmitigated noise levels are listed in **Table 34**. The results shows that all modelled unmitigated construction scenarios are predicted to comply with the site-specific noise criteria (**Section 7.4.3.3**). However, the modelled unmitigated operational scenario shows exceedances of the site-specific noise criteria by 5 dB(A). Exceedances of the most stringent criteria are shown in red underlined text.

Table 33. Unmitigated predicted noise levels

Sensitive Receptor	Most Stringent Site-Specific Noise Criteria (Section 7.4.3.3)	Façade Direction	Construction Phase			Operational Phase
			Site Establishment	Construction of GCF	Construction of wells and workovers	Operations of wells and GCF
Struan Homestead	38	SW	16.0	20.7	29.4	<u>38.7</u>
		NW	29.2	20.7	28.4	<u>39.6</u>
		NE	25.7	5.5	25.6	35.4
		S	17.1	10.7	25.3	34.0
Struan Ringers	36	NE	27.3	7.7	28.8	<u>36.2</u>
		NW	20.4	22.9	29.7	<u>41.3</u>
		SE	27.3	7.5	28.9	34.8
		SW	18.6	22.7	29.7	<u>40.7</u>
Meroo Downs	40	N	10.2	22.0	31.3	<u>40.9</u>
		W	8.0	8.9	32.0	36.6
		E	10.9	22.1	24.6	40.0
		S	10.5	21.9	39.5	35.0
Togara	36	E	0.0	0.0	0.0	18.6
		N	0.0	0.0	0.0	17.6
		S	6.9	0.0	0.0	22.7
		W	6.9	0.0	0.0	22.4

7.4.5.2 Mitigated Predicted Noise Levels

A number of mitigation measures were applied to the operational noise model scenario to avoid the noise exceedances observed during the ‘unmitigated predicted noise level’ model (**Section 7.4.5.1**). The mitigation measures that were applied to the model are listed in **Section 7.4.6**.

The results of the mitigated noise levels are listed in **Table 35**. The results show that the noise levels are able to comply with the site-specific noise criteria at all times of the day with the mitigation measures applied. It is worth noting that while the noise mitigation measures have been applied to all the wells in the project area, it is not likely to be required at all wells, particularly those that are a significant distance away from sensitive receptors. The noise model has therefore predicted a ‘worst case’ scenario and the Proponent will look to undertake further noise modelling during detailed design phase to understand which wells require noise mitigation.

Table 34. Mitigated predicted noise levels

Sensitive Receptor	Most Stringent Site-Specific Noise Criteria (Section 7.4.3.3)	Façade Direction	Operations of wells and GCF
Struan Homestead	38	SW	28.1
		NW	28.5
		NE	19.1
		S	18.7
Struan Ringers	36	NE	20.7
		NW	31.0
		SE	18.8
		SW	30.8
Meroo Downs	40	N	30.4
		W	22.0
		E	29.9
		S	20.0
Togara	36	E	0.6
		N	0
		S	5.6
		W	5.4

7.4.6 Management Practices

Despite compliance being predicted for the construction phase without the need for specific control measures to be implemented, the Proponent will utilise a range of good practice management measures that will minimise potential impacts to acoustic values. These good practice management measures along with the mitigation measures that were applied to the noise model are outlined in **Table 36**. These measures aim to minimise impacts to sensitive receptors and general acoustic environmental values as well as achieve compliance with the site-specific noise criteria.

As an overarching management tool, the Proponent will develop and implement a complaints management process, as outlined in **Section 7.4.6.1**.

Table 35. Recommended mitigation measures for potential impacts to sensitive receptors and acoustic environmental values

Impact	Management Measure	Project Timing
Establishment/clearing of access tracks, and GCF area, including operating plant and vehicle movements	<ul style="list-style-type: none"> The final project design process will incorporate the use of low light spill lighting components and directional lighting where night lighting is considered necessary All construction machinery will be maintained as per manufacturer design specifications to ensure project noise is minimised A protocol for Constraints Planning and Field Development will be implemented to avoid placement of wells and disturbance activities in close proximity to sensitive receptors (refer Section 7.2.6.1) Undertake activities in accordance with signed Conduct and Compensation Agreement’s between the Proponent and key stakeholders 	Construction
Construction of GCF, including operating plant and vehicle movements		
Construction and workover of gas well sites		
Operations of the wells and GCF	<ul style="list-style-type: none"> Undertake further noise modelling during detailed design phase to understand which wells require noise mitigation 	Detailed design
	<ul style="list-style-type: none"> Undertake activities in accordance with signed Conduct and Compensation Agreement’s between the Proponent and key stakeholders All operational machinery will be maintained as per manufacturer design specifications to ensure project noise is minimised Well head packs sound powers set to 95dB(A) Exhaust noise levels from the compressor engines was set to 113.4dB(A) which represents the installation of a standard hospital grade muffler Noise from the Ariel JCG6 compressors was set to 119dB(A) which represents the typical reduction from panel attention structures or enclosures 	Operations

7.4.6.1 Complaints Management - Noise

Should a non-frivolous complaint regarding noise health concerns be received, noise control measures will be implemented on site. Where requested by the administering authority, an investigation will be carried out, which may include monitoring at a site representative of the complainant’s residence in accordance with the EA conditions. The duration of monitoring will be determined based on the duration of the activity.


7.5 Surface Water

Surface water assessments were carried out by RDMHydro and DPM as part of the groundwater and aquatic ecology studies to identify the surface water values of the project area and understand the potential project impacts to surface water. The technical assessments are provided in **Appendix C** (groundwater) and **Appendix E** (aquatic ecology). A summary of surface water assessment is provided in **Section 7.5.3** to **Section 7.5.6**.

7.5.1 Environmental Values

The environmental values relevant to surface waters to be protected for the Comet River Sub-basin (Comet eastern tributaries – developed area) are listed in the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (EPP Water) and provided in **Table 37**.

Table 36. Environmental values – Comet River sub-basin (Comet eastern tributaries – developed area)

Environmental Value	Description
 Aquatic Ecosystems	Maintaining or improving the ecological condition of waterbodies and their riparian zones, with contaminant trigger values selected from the ANZECC 2000 Guidelines depending on the location within the catchment.

Environmental Value		Description
	Irrigation	Suitability of water supply for irrigation, for example, irrigation of crops, pastures, parks, gardens and recreational areas.
	Farm Supply/Use	Suitability of domestic farm water supply, other than drinking water, for example, water used for laundry and produce preparation.
	Stock Water	Suitability of water supply for production of healthy livestock.
	Human Consumer	Protecting water quality to produce healthy aquatic foods such as fish, crustaceans and shellfish for human consumption and aquaculture activities.
	Primary Recreation	Health of humans during recreation which involves direct contact and a high probability of water being swallowed, for example, swimming, surfing.
	Secondary Recreation	Health of humans during recreation which involves indirect contact and a low probability of water being swallowed, for example, wading, boating.
	Visual Recreation	Aesthetic qualities of waters, including visual clarity and colour, surface films and debris, and nuisance organisms.
	Drinking Water	Refers to the quality of drinking water drawn from the raw surface and groundwater sources before any treatment.
	Industrial Use	Suitability of water supply for industrial use, for example, food, beverage, paper, petroleum, and power industries. Industries usually treat water supplies to meet their needs.
	Cultural and Spiritual Values	Indigenous and non-indigenous cultural heritage, for example, custodial, spiritual, cultural, and traditional heritage, lifestyles, symbols, landmarks.

7.5.2 Water Quality Objectives

The EPP Water provides defined water quality objectives (WQOs) to protect the environmental values in the Comet River Sub-basin (Basin No. 130), relevant to surface waters as provided in **Table 38**.

Table 37. Water quality objectives – Comet River Sub-basin

Management Intent (Level of Protection)	Water Quality Parameter	Unit	WQO
Comet River Sub-basin Waters: Aquatic Ecosystem – Moderately Disturbed (WQ1307)	Ammonia N	µg/L ^(a)	<20
	Oxidised N	µg/L ^(a)	<60
	Organic N	µg/L ^(a)	<420
	Total nitrogen	µg/L ^(a)	<500
	Filterable reactive phosphorus (FRP)	µg/L ^(a)	<20
	Total phosphorus	µg/L ^(a)	<50
	Chlorophyll a	µg/L ^(a)	<5.0
	Dissolved Oxygen	% saturation ^(a)	85-110
	Turbidity	NTU ^(a)	<50
	Suspended solids	mg/L ^(b)	<30
	pH	pH unit ^(b)	6.5-8.5
	Conductivity (baseflow)	µS/cm ^(b)	<375
	Conductivity (high flow)	µS/cm ^(b)	<210
	Sulfate	mg/L ^(b)	<5

Table notes:

Management Intent (Level of Protection)	Water Quality Parameter	Unit	WQO
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^(a) The values for these indicators are based on the QWQG Central Coast regional water quality guidelines.
^(b) The values for these indicators are based on sub-regional low flow water quality guidelines derived by the department as part of the process to establish environmental values and WQOs in the Fitzroy Basin. Refer to 'sources' below for more details.

7.5.3 Existing Environment

7.5.3.1 Catchment and Waterways

The project area is located within the Comet River catchment of the Fitzroy Basin. The Comet River catchment (to the junction with the Nogoia River) accounts for approximately 12% of the overall Fitzroy Basin (DES 2023d).

The topography across the project area generally falls from east to west, towards the Comet River, which is the main river in the region, located approximately 800 m west of the project area. Humboldt Creek transects the south-west corner of the project area and flows into the Comet River.

Comet River continues in a general northern direction for approximately 80 km to where the Comet River converges with the Nogoia River to form the Mackenzie River just north of the township of Comet. The Mackenzie River ultimately joins the Fitzroy River, which flows initially north and then east towards the east coast of Queensland and discharges into the Coral Sea south-east of Rockhampton near Port Alma.

The waterways and watercourses mapped within the project area are described in **Section 7.2.2.9**.

7.5.3.2 Surface Water Flows

Flow in the Comet River is seasonal, alternatively wet and dry most years, according to season. Stream flows are highly variable, with the channel typically drying during winter to early spring when rainfall and runoffs is historically low, although some pools may persist in deeper sections and on substrates with high clay content. Surface flows are more likely in the wetter months from November to March.

Historical flow monitoring data provides an indication of the local surface water flows. The Comet River Springsure Creek monitoring data from 2007-2023 (monitoring station 130510A) is located approximately 25 km downstream of the project area, a summary of the surface water flows is provided in **Figure 26**.

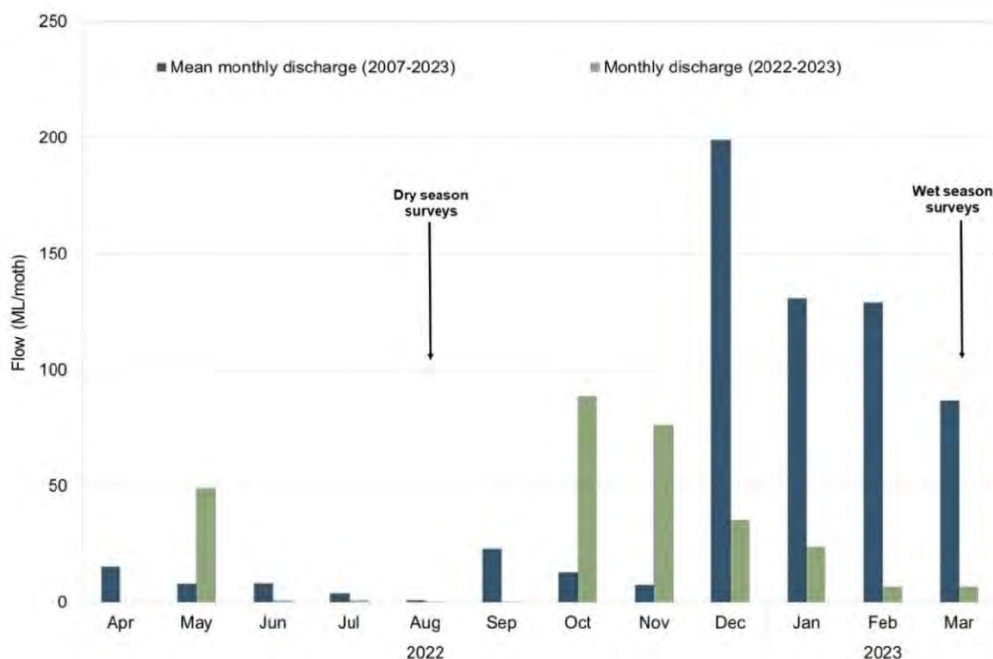


Figure 26. Monthly Flow Volume Data – Comet River at Springsure Creek

Source: DRDMW 2023b

7.5.3.3 Surface Water Users

The Water Entitlement Viewer (Queensland Government 2023) was used to identify existing water licences in the vicinity of the project area. There are 14 surface water licences within 25 km radius of the project area, refer to **Table 39**. This includes authorised purposes for irrigation, stock, impound water, water harvesting and agriculture. Water licences are shown on **Figure 27** in **Section 7.6.3.5**.

A range of privately owned dams are located within the project area. Based on the surrounding land uses and environmental values, dam water may be used for stock watering, irrigation, and farm supply.

Table 38. Surface water licences

Authorisation number	Authorisation Type	Expiry Lapse Date	Water Plan Area	Authorised Purpose	Location Lot/Plan	Unique Water Code	Name of Water Entity/ water type	Nominal Entitlement per Water Year (ML)	Approximate distance from project area (Closest project boundary)
Water Licence – Watercourse									
04830F	Licence to interfere by impounding embankment or wall	30/06/2111	Fitzroy Basin	Impound water	5/WNA106	130.01.31.12	Humboldt Creek, Water course	Unknown	Within project area (Lot 5/WNA106)
603641	Licence to take water	30/06/2111	Fitzroy Basin	Stock; Water harvesting	1/SP203781	130.01.31.12.02	Shotover Creek, Water course	Unknown	4 km south
48430F	Licence to interfere by impounding embankment or wall	30/06/2111	Fitzroy Basin	Impound water	9/DSN706	130.01.31.00+Z	Comet River (Anabranch), Watercourse	Unknown	800 m west
48431F	Licence to take water	30/06/2111	Fitzroy Basin	Agriculture	9/DSN706	130.01.31.00+Z	Comet River (Anabranch), Watercourse	1200.00	800 m west
57741WF	Licence to take water	30/06/2111	Fitzroy Basin	Irrigation	9/RP620356	130.01.31.00+Z	Comet River (Anabranch), Watercourse	Unknown	800 m west
57775F	Licence to interfere by impounding embankment or wall	30/06/2111	Fitzroy Basin	Impound water	9/RP620356	130.01.31.00+Z	Comet River (Anabranch), Watercourse	Unknown	1 km west
52650F	Licence to interfere by impounding embankment or wall	30/06/2111	Fitzroy Basin	Impound water	13/WNA75	130.01.31.12.02	Shotover Creek, Watercourse	Unknown	1.5 km east
52648F	Licence to take water	30/06/2111	Fitzroy Basin	Stock; Water harvesting	13/WNA75	130.01.31.12.02	Shotover Creek, Watercourse	Unknown	1.5 km east
52649F	Licence to take water	30/06/2111	Fitzroy Basin	Stock; Water harvesting	13/WNA75	130.01.31.12.02	Shotover Creek, Watercourse	Unknown	1.5 km east
57711WF	Divert the course of flow	30/06/2111	Fitzroy Basin	Licence to interfere by diversion-Other	12/SP185512; 13/WNA75	130.01.31.12.01	Rockland Creek	Unknown	8.5 km east

Authorisation number	Authorisation Type	Expiry Lapse Date	Water Plan Area	Authorised Purpose	Location Lot/Plan	Unique Water Code	Name of Water Entity/ water type	Nominal Entitlement per Water Year (ML)	Approximate distance from project area (Closest project boundary)
52652F	Divert the Course of Flow	30/06/2111	Fitzroy Basin	Licence to interfere by diversion-Channel	12/SP185512	130.01.31.09	Sirius Creek	Unknown	12 km north-east
W35689F	Licence to interfere by impounding-Embankment or Wall	30/06/2111	Fitzroy Basin	Impound Water	11/HT526	130.01.29	Blackwater Creek	Unknown	13.3 km east
W34609F	Licence to interfere by impounding-Embankment or Wall	30/06/2111	Fitzroy Basin	Impound Water	1/CP897249	130.01.29	Blackwater Creek	Unknown	24.5 km north-east
57763F	Licence to interfere by impounding-Embankment or Wall	30/06/2111	Fitzroy Basin	Impound Water	11/RP867919	130.01.31	Comet River	Unknown	23 km north

7.5.4 Emissions and Releases

There are no proposed releases of produced water as part of the proposed activities. However, there is potential for environmental values as they relate to surface water to be impacted through uncontrolled or accidental releases of contaminated materials, chemicals, or waste to the environment.

The proposed project activities that could result in uncontrolled or accidental releases to surface waters include:

- CSG drilling and well completion activities
- Raw CSG water
- Water treatment processes
- Re-use of CSG water for project activities and irrigation

7.5.5 Potential Impacts

If not managed appropriately, the potential impacts to surface water as a result of proposed activities may include, but not limited to:

- Reduces bank stability, erosion, and degradation of local water quality from waterway crossings
- Altered stream flow and flood regime from the placement of infrastructure, plant, and equipment within and surrounding waterways
- Erosion, salting, vegetation dieback and degraded water quality from the runoff or surface ponding from cleared areas, the re-use of CSG water for project activities or irrigation
- Degraded water quality within surrounding waterways from spills of fuel, oil, or chemicals
- Waterway barriers that prevent or impede movements of aquatic fauna from poorly designed and constructed waterway crossings
- Impact on water quality and sedimentation of downstream environments including the Comet River and associated habitat for EVNT species such as the white-throated snapping turtle

7.5.6 Management Practices

The Proponent commits to a range of measures to minimise impacts to surface water environmental values, as outlined in **Table 38**.

Table 39. Recommended mitigation measures for potential impacts to surface water environmental values

Impact	Management Measure	Project Timing
Reduced bank stability, erosion and degradation of water quality from waterway/watercourse crossings	The disturbance footprint reduced to the greatest extent possible to avoid waterways/watercourses	Detailed design
	Design and construct waterway crossings consistent with the <i>Riverine Protection Permit Exemption Requirements</i> (DRDMW 2023a)	Detailed design
	Construction disturbance to be reduced to 6 m wide in areas associated with waterways/watercourse crossings. Utilise existing access tracks where possible. Access tracks would be co-located with gathering lines, to reduce the disturbance footprint.	Detailed design
	Develop and implement a Rehabilitation Management Plan (Section 7.8)	Prior to clearing
	Use HDD construction method as a preference for waterway/watercourse crossing to limit open trench excavations	Detailed design
	Where open cut trenching in waterway/watercourse is required, stockpile soil away from the streambed. Apply erosion control rip rap (rock size to withstand predicted flow rates) to minimise the risk of encountering flow events whilst sediments/soils are exposed.	Construction
	Water quality will be monitored on a regular basis in accordance with any EA conditions	On-going
Altered stream flow	The disturbance footprint reduced to the greatest extent possible to avoid waterways/watercourses	Detailed design

Impact	Management Measure	Project Timing
	Utilise existing access tracks where possible	Detailed design
	No wells positioned within waterways/watercourses	Detailed design
	Co-locate infrastructure across waterways/watercourse to reduce disturbance	Detailed design
	Wherever possible watercourse crossing will avoid instream works including through the use of directional drilling to locate pipelines under the watercourse. Where this is not possible (such as for new access tracks) works within a watercourse will be conducted in the following order of preference: <ul style="list-style-type: none"> • Conducting works when no water is present • Conducting works in times of no flow • Conducting works in times of flow but in a way that does not negatively impact the flow of water within the watercourse, permanently impound water or permanently divert the flow of water 	Construction
Re-use of CSG water for project activities and irrigation	<ul style="list-style-type: none"> • The re-use of CSG water for Project activities will be carried out in accordance with: <ol style="list-style-type: none"> <i>End of Waste Code Associated Water (including coal seam gas water)</i> (ENEW07547018) <i>End of Waste Code Irrigation of Associated Water (including coal seam gas water)</i> (ENEW07546918) <i>Streamlined Model Conditions for Petroleum Activities</i> (ESR/2016/1989) • Undertake activities in accordance with the CSG water management plan (refer Appendix B) • An operational water balance model has been developed for the project (refer Appendix B). The water balance model will be updated throughout the life of the Project to ensure that sufficient on-site CSG water and brine storage capacity is available • Brine will be stored in tanks prior to being transferred to an appropriately licenced facility for disposal • Site induction program relating to spill response and emergency incidents to be implemented for all project employees 	On-going
Spills of fuel, oil or chemicals	Develop and implement the following management plans relating to chemical storage, waste and CSG water: <ul style="list-style-type: none"> • EMP (Section 7.1.5.1) • ESC Plan (Section 7.1.5.3) • Spill response plan (Section 7.1.5.5) • Environmental contingency plan (Section 7.1.5.6) • CSG water management plan (Appendix B) • Waste management plan (Section 7.7.4.1) 	Pre-Construction
	Storage of chemicals and refuelling of plant and machinery to be a minimum of 200 m away from nearest waterway/watercourse	On-going
	Spills response kits available on site	On-going
	Site induction program relating to spill response management for all project employee	On-going
	Store project materials and chemicals in accordance with: <ul style="list-style-type: none"> • AS 3780:2008 – <i>The storage and handling of corrosive substances</i> • AS 1940:2004 – <i>The storage and handling of flammable and combustible liquids</i> • AS 3833:2007 – <i>Storage and handling of mixed classes of dangerous goods in packaged and intermediate bulk containers</i> 	On-going
	Onsite washdown areas for project vehicles/machinery will be located and clearly demarcated to prevent contaminated run-off from entering waterways	On-going
	Water quality will be monitored on a regular basis in accordance with the EA conditions	On-going
	Waterway barriers	The disturbance footprint reduced to the greatest extent possible to avoid waterways/watercourses

Impact	Management Measure	Project Timing
	Design and construct waterway crossings consistent with the <i>Accepted Development Requirements for Operational Work that is Constructing or Raising Waterway Barrier Works</i> (DAF 2018). In the unlikely instance that waterway crossings cannot meet the DAF (2018) design criteria, alternative waterway crossings would be designed in consultation and agreement with DAF.	Detailed design
Impact on downstream environments	Water quality will be monitored on a regular basis in accordance with the EA conditions	On-going
	Develop and implement an ESC Plan (Section 7.1.5.3)	Pre-construction









7.6 Groundwater

A groundwater impact assessment has been carried out by RDMHydro to identify the groundwater values of the project area and understand the potential project impacts to groundwater. The technical assessment is provided in **Appendix C**. A summary of the groundwater impact assessment is provided in **Section 7.6.2** to **Section 7.6.6**.

7.6.1 Environmental Values

The environmental values relevant to groundwater to be protected for the Comet River Sub-basin (groundwater) is listed in the EPP Water and provided in **Table 41**.

Table 40. Environmental values – Comet River sub-basin (groundwater)

Environmental Value	Description
 Aquatic Ecosystems	Maintaining or improving the ecological condition of waterbodies and their riparian zones, with contaminant trigger values selected from the ANZECC 2000 Guidelines depending on the location within the catchment.
 Irrigation	Suitability of water supply for irrigation, for example, irrigation of crops, pastures, parks, gardens and recreational areas.
 Farm Supply/Use	Suitability of domestic farm water supply, other than drinking water, for example, water used for laundry and produce preparation.
 Stock Water	Suitability of water supply for production of healthy livestock.
 Primary Recreation	Health of humans during recreation which involves direct contact and a high probability of water being swallowed, for example, swimming, surfing.
 Drinking Water	Refers to the quality of drinking water drawn from the raw surface and groundwater sources before any treatment.
 Industrial Use	Suitability of water supply for industrial use, for example, food, beverage, paper, petroleum, and power industries. Industries usually treat water supplies to meet their needs.
 Cultural and Spiritual Values	Indigenous and non-indigenous cultural heritage, for example, custodial, spiritual, cultural, and traditional heritage, lifestyles, symbols, landmarks.

7.6.2 Water Quality Objectives

The EPP Water provides defined WQOs to protect the environmental values in the Comet River Sub-basin (Basin No. 130), relevant to groundwater as provided in **Table 42**.

Table 41. Water quality objectives – Comet River sub-basin (groundwater)

Management Intent (Level of Protection)	WQO to protect environmental values
Aquatic ecosystem—high ecological value (WQ1307)	Where groundwaters interact with surface waters, groundwater quality should not compromise identified EVs and WQOs for those waters ^(a) .

Table notes:

^(a) refer to Section 7.5.2 for WQOs relevant to surface waters as defined under the EPP Water.

7.6.3 Existing Environment

7.6.3.1 Regional Geology

The regional geology of the project area comprises sediments from the Early Permian to Middle Triassic age Bowen Basin. The Bowen Basin is an elongated, north to south trending basin extending over 160,000 km² from Central Queensland, south beneath the Surat Basin, and into New South Wales, where it connects with the Gunnedah and Sydney basins. The project is located on the southern end of the Comet Ridge outcrop and is flanked by the Taroom Trough to the east and the Denison Trough to the west. CSG production at the project will target the Bandanna Formation of the Bowen Basin. The Bandanna Formation is also known as the Baralaba or Rangal Coal Measures.

The surface geology in the vicinity of the project area (within 25 radius) and the underlying solid geology is shown in **Figure 8** and **Figure 9**, respectively.

7.6.3.2 Hydrostratigraphy

Quaternary and Tertiary (Cainozoic) deposits overlay the Bowen Basin units. The Tertiary deposits comprise basalts with interbedded tuff and volcanolithic fragments. The Quaternary deposits predominantly comprise alluvial sediments associated with the major drainage features. The local hydrostratigraphic column for the geological units within the project area is provided in **Table 43**.

Table 42. Stratigraphy and Hydrostratigraphy

Age		Formation		Hydrostratigraphic Description (after Office of Groundwater Impact Assessment (OGIA) 2021)	Location in project area	
Quaternary		Alluvium		Partial aquifer	Associated with the Comet River and Humboldt Creek. Distribution within the project area limited to the southeastern and southwestern corners.	
		Colluvium		Aquitard*	Extensively present to the west of the Comet River, associated with the lower slopes of Tertiary Basalt outcrop.	
Tertiary		Tertiary Sediments		Aquitard*	Surficial deposits across the majority of the project area and to the north and east.	
		Tertiary Basalt		Partial aquifer*	Small areas of outcrop throughout the project area, predominantly in the west.	
Triassic	Middle	Moolayember Formation		Tight aquitard	Does not outcrop or subcrop within 25 km of the project area	
		Showground Sandstone	Clematis Group		Regional aquifer	Outcrops as the Expedition Ranges to the east of the project area, with a small inlier of outcrop to the south of the project area adjacent to the Inderi Fault.
	Early	Rewan Group		Tight aquitard	Outcrops to the northeast of the project area and subcrops beneath the Tertiary strata within the project area, forming the primary aquitard.	
Permian	Late	Bandanna Formation/Rangal Coal Measures		Interbedded aquitard	Target formation. Subcrops beneath the Tertiary Strata within the project area and outcrops to the northeast within the Blackwater mine tenements.	
		Back Creek Group	Black Alley Shale		Tight Aquitard*	Outcrop and subcrop within the Comet Anticline to the north of the project area. Also subcrops with a small amount of outcrop to the southwest of the project area.
			Peawaddy Formation			
			Burngrove Formation			
			Fair Hill Formation			
			MacMillan Formation			
			Crocker Formation			
			Maria Formation			
			Catherine Sandstone			
	Ingelara Formation Freitag Formation					
Early	Upper Aldebaran Sandstone			Does not outcrop or subcrop within the project area.		
	Lower Aldebaran Sandstone		Interbedded aquitard*			
	Cattle Creek Formation		Tight Aquitard*			
		Reids Dome Beds		Tight Aquitard*		

* No hydrostratigraphic designation by OGIA (2021)

7.6.3.3 Groundwater Dependent Ecosystems – Subterranean Fauna

Subterranean fauna includes stygofauna which are predominantly crustaceans that are between 0.3 mm and 15 mm in length. They are predominantly found in aquifers with large (mm or greater) pore spaces, especially alluvial, karstic and some fractured rock aquifers. The size of the pore spaces is a key determinant of the suitability of an aquifer as stygofauna habitat. Stygofauna have been recorded occasionally in coal seam aquifers, particularly where those aquifers are hydrologically connected to a shallow alluvial aquifers.

It is unlikely that stygofauna will be present within the target coal seams for the project due to the depth below ground level. However, there is the potential for stygofauna to be present within the alluvial and basalt aquifers, which are shallower in depth, and likely be a more favorable habitat for stygofauna (e.g. more suitable water quality and nutrients available and larger pore spaces).

Refer to **Section 7.2.2.10** for information about terrestrial and aquatic GDEs.

7.6.3.4 Groundwater Bores

A search of the Queensland Groundwater bore database (GWBD) identified 426 bores on or within a 25 km radius of the project area, including:

- 21 petroleum or CSG wells
- 52 monitoring or investigation bores
- 352 presumed to be used for water supply purposes, of which 277 are still active and 75 are inactive

The number of active water supply bores per attributed formation is listed in **Table 44**.

Table 43. Groundwater bores – aquifer attribution of active water supply bores within 25 km of the project area

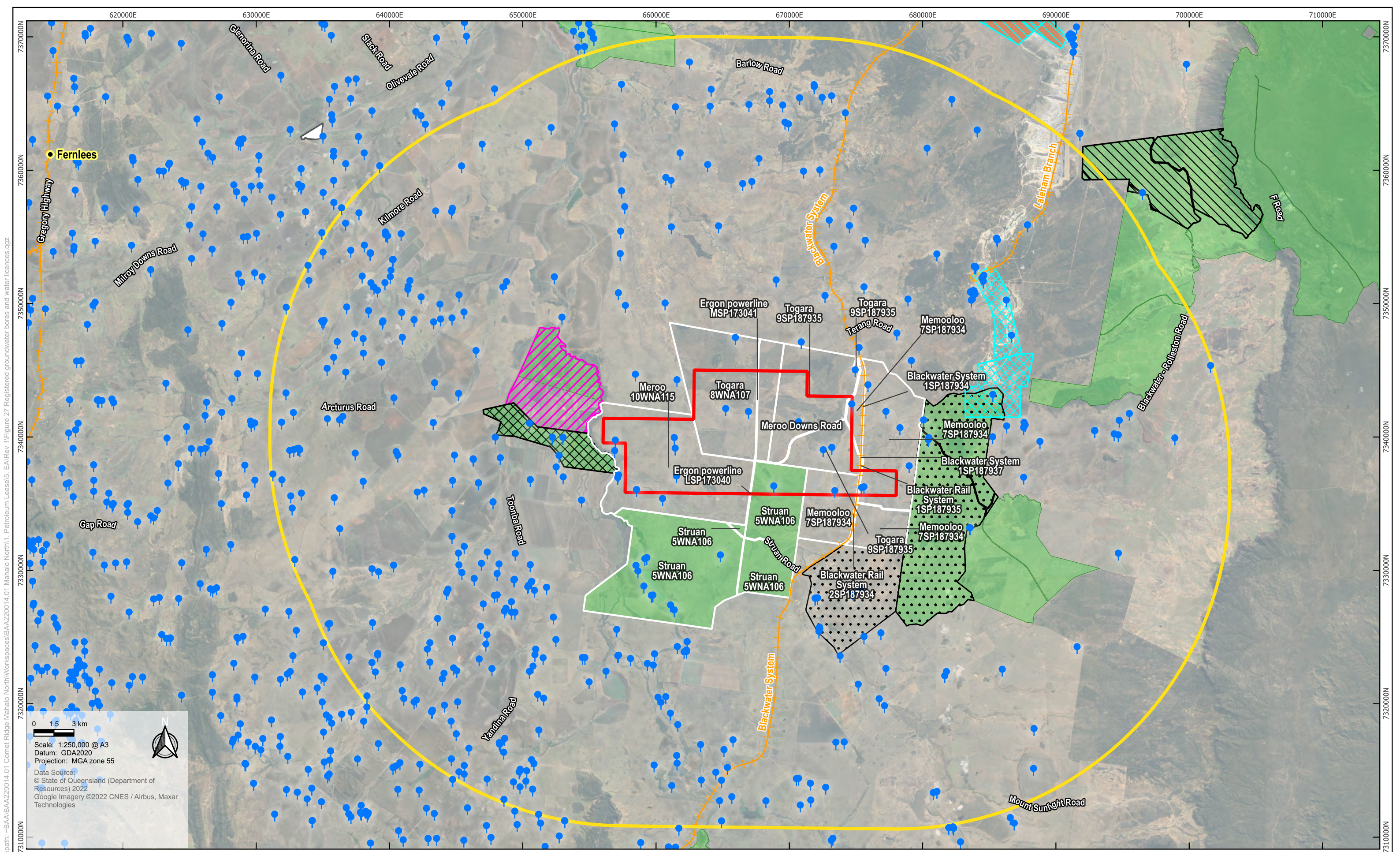
Unit	Number of bores
Alluvium	35
Tertiary Sediments	5
Basalt	168
Rewan Group	17
Upper Permian	7
Bandanna Formation	23
Lower Permian	22
Total	277

7.6.3.5 Groundwater Users

The Water Entitlement Viewer (QG 2023) was used to identify existing water licences within a 15 km radius of the project area. There are no groundwater licences within the project area but there are three groundwater licences that adjoin the northern project boundary for an authorised purpose of ‘Petroleum and Gas – Non Associated Water’, refer **Table 45**.

Table 44. Groundwater licences within 25 km of the project area

Authorisation number	Authorisation Type	Expiry Lapse Date	Water Plan Area	Authorised Purpose	Location Lot/Plan	Unique Water Code	Name of Water Entity/ water type	Nominal Entitlement per Water Year (ML)	Approximate distance from project area (km)
625417	Licence to take water	31/7/2027	Fitzroy Basin	Petroleum and Gas – Non Associated Water	ATP684	1300.QUAT	Quaternary-Undefined, Underground	5.00	Adjoins northern project boundary
625419	Licence to take water	31/7/2027	Burdekin Basin	Petroleum and Gas – Non Associated Water	ATP684	1203.BETTS	Betts Creek Beds, Underground	5.00	Adjoins northern project boundary
625418	Licence to take water	31/7/2027	Fitzroy Basin	Petroleum and Gas – Non Associated Water	ATP684	1304.REWAN	Rewan Formation, Underground	5.00	Adjoins northern project boundary



Legend	
Petroleum Lease Boundary	Groundwater water licences
25 km buffer of project area	Irrigation
Cadastre (DCDB)	Site water management
Railways	Registered water bores
Impound water	Stock
Water harvesting	Stock; Water harvesting
Agriculture	Divert the course of flow



Comet Ridge
Mahalo North CSG Project
Environmental Authority
Supporting Information Report for a Petroleum Lease

Figure 27
 Registered groundwater bores and water licences

7.6.3.6 Groundwater Trends

The GWDB identifies bores with temporal water level data within the project area and surrounds. There are no bores within the project area with timeseries water level data available. The hydrograph data for the groundwater bores in the Rolleston area contained in the GWDB provides the nearest groundwater data trends, and are summarised below:

- There is a strong correlation between rainfall and water level response in bore constructed in the alluvium (e.g. RN15866)
- The Tertiary Strata show similar behaviour to those bores closer to the project area, with variable connection to surface recharge processes and differing storage capacities (e.g. RN15871 vs RN13050020). In addition, some of the hydrographs show strong seasonal responses (e.g. RN62599) which may be related to nearby groundwater extraction. Ranges in water level fluctuation between the minimum and maximum water level can be in excess of 20 m (e.g. RN158572)
- The Bandanna Formation monitoring bores are heavily influenced by mining operations (e.g. RN24255, RN158160, RN165001) showing rapid and significant declines in water levels over a sustained period of time
- The low permeability of the Bandanna Formation is clearly evident in the recovery response of RN158158, which require approximately 6 months to recover from a 20 m drawdown

7.6.3.7 Groundwater Quality

Groundwater quality data has been sourced from the GWDB, Comet Ridge baseline assessment samples and from Comet Ridge samples of produced water from gas production pilots. Where multiple samples were available for a particular bore, the most recent sample with a suitable balance of major ions (+/- 10%) was used. Surface water samples collected by DPM for the project were also incorporated.

Observations of the water quality characteristics include:

- The surface water samples and the samples from the alluvium generally show similar major ion composition, with a predominance of the bicarbonate anion (some chloride) and a more variable and mixed cation composition. Overall, the surface water and alluvium samples have the lowest salinities. The general similarity between the alluvium and surface water samples suggests limited geochemical evolution of the rainfall recharge as it enters the alluvial aquifer.
- The Tertiary Strata exhibit a wide range in water types, generally showing an evolution from mixed cations to a sodium dominance and an associated increase in chloride. There is no clear spatial pattern to this trend, with most of the samples south-west of the project area. The variability in major ion composition and no clear spatial pattern suggest that the Tertiary Strata are internally heterogeneous with limited lateral connectivity between water-bearing zones. The Tertiary Strata generally have a brackish salinity, higher than the alluvium and surface water, but much fresher than the underlying Permian Strata. The relatively low salinity suggests relatively short residence time and a reasonably active hydrodynamic regime.
- Only three samples were available for bores attributed to the Rewan Group. These showed water chemistry tending towards sodium-bicarbonate-chloride, but with some variability and no discernible spatial trend. While the range in salinity of the Rewan Group samples was similar to the alluvium (and fresher than the Tertiary Strata), it is likely that this was affected by the small number of samples and the relatively shallow bore depths (21 - 100 m).
- Groundwater quality in the Bandanna Formation can be separated into two distinct groups:
 - Higher salinity (~4,000 – 10,000 mg/L TDS) sodium-chloride waters present in the central part of the project area, where the Bandanna is separated by the Rewan Group and/or Upper Permian Formations
 - Lower salinity (<1,000 mg/L) sodium-bicarbonate waters in the south-western portion of the project area and surrounds where the Bandanna Formation subcrops directly beneath Quaternary or Tertiary Strata.

- It is likely that there is direct hydraulic connection between the cover and the Bandanna Formation south-west of the project area that allows recharge of fresher water to the Bandanna Formation. The higher salinity samples are mostly from CSG pilot wells that are also deeper than surrounding water bores. This indicates long residence times and limited hydraulic connection with fresher, surficial waters.
- There are only seven samples from the Upper and Lower Permian Formations combined. Their major ion chemistry is relatively similar with sodium-bicarbonate-chloride water, however the Upper Permian formations appear to be fresher than the Lower Permian formations.

7.6.4 Emissions and Releases

There are no proposed releases of produced water as part of the proposed activities. However, there is potential for environmental values as they relate to groundwater to be impacted through uncontrolled or accidental releases of contaminated materials, chemicals, or waste to the environment.

The proposed project activities that could result in uncontrolled or accidental releases to groundwaters include:

- CSG drilling and well completion activities
- Raw CSG water
- Water treatment processes
- Re-use of CSG water for project activities and irrigation

7.6.5 Potential Impacts

7.6.5.1 Prediction of Groundwater Impacts

If not managed appropriately, the exercise of underground water rights has the potential to impact on groundwater environmental values through the degradation of water quality or the reduction in water availability through depressurisation. Potential impacts due to CSG water production include:

- Decline in groundwater level / pressure at water bores, reducing water availability for its authorised use
- Reduction in groundwater head resulting in a reduction of groundwater discharge at springs, potentially causing degradation of GDEs
- Increase in water table depth resulting in a reduction of the availability of groundwater to terrestrial GDEs
- Reduction of baseflow to watercourses, potentially resulting in degradation of GDEs and reduced water availability to potential users downstream

These potential impacts, where receptors exist within the vicinity of the project, have been assessed against the Water Act trigger thresholds.

Other potential impacts to groundwater associated with the proposed development are provided below:

- Potential to introduce a connection between hydrostratigraphic units, which were previously isolated units, through drilling and construction of CSG production wells, resulting in the potential for alteration of groundwater flow regimes and quality,
- Degradation of groundwater quality from:
 - drilling fluids and additives used during the drilling process,
 - seepage or unplanned releases from CSG water surface storages,
 - fuel or chemicals leaks and spills resulting in localised potential impacts to soil and groundwater
- Salinisation or waterlogging in CSG water is used to irrigate in an inappropriate manner

7.6.5.2 Conceptual Hydrogeological Model

A conceptual hydrogeological model has been developed for the project and provides the basis of the assessment of potential impacts associated with the project on the groundwater environment and its associated users.

The project will target CSG development at depths of roughly 200-250 mbgl. Conceptualisation of the hydrogeological units relevant to the project area are summarised below:

- Tertiary-aged strata comprises basalt and sediments, which cover the majority of the project area. The Tertiary Strata forms the main productive aquifer in the region. The aquifer is heterogeneous with limited lateral and vertical connectivity between individual water beds as evidenced by the variability in groundwater chemistry and water level responses to rainfall recharge.
- Quaternary-aged alluvium is associated with the Comet River and its larger tributaries. The alluvium is hydrogeologically dynamic, with fluctuations in water level (observed up to 1 m) directly related to rainfall events, and water quality similar to surface water.
- The Rewan Formation, a regional scale aquitard, separates the Bandanna Formation from the overlying Tertiary Strata downdip of the sub-crop. At depth, the Bandanna Formation is significantly more saline than the Tertiary Strata, providing evidence of the low permeability of the Rewan Formation on sub-regional scale.

There is a fault (Arcturus fault) to the southwest of the project area. This fault may provide a conduit between the production zone and the Tertiary Strata. The hydraulic nature (sealing or conductive) of the fault is uncertain. A schematic conceptual hydrogeological model is shown in **Figure 28**.

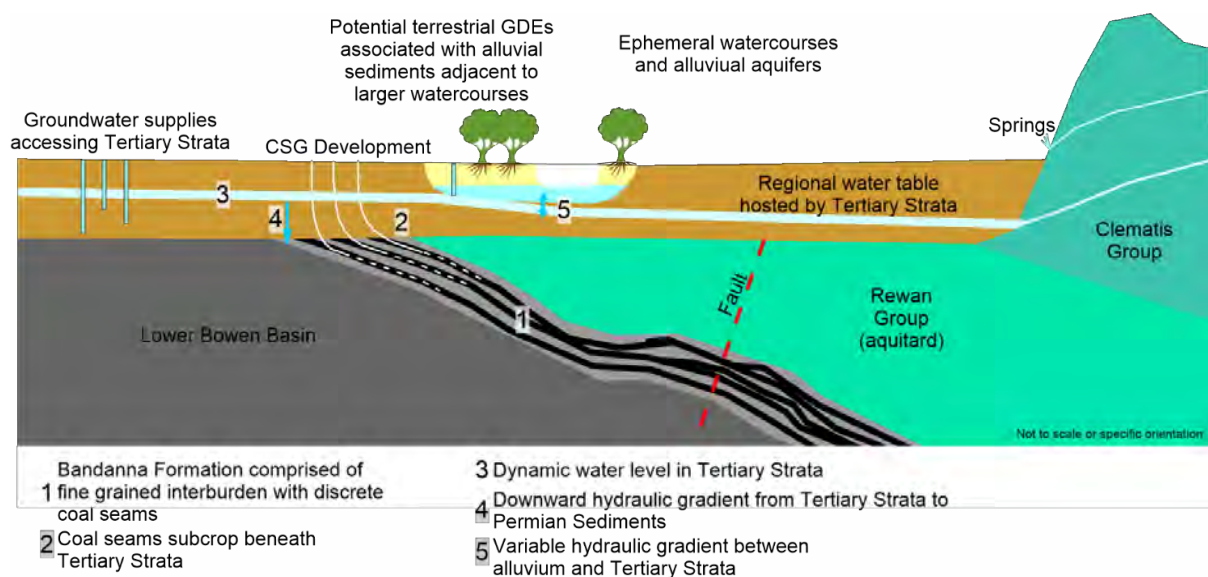


Figure 28. Schematic conceptual hydrogeological model

Source: RDM Hydro, 2023 (Appendix C)

7.6.5.3 Numerical Groundwater Flow Model(s)

Potential groundwater level drawdown associated with the project has been assessed using multilayered numerical groundwater flow models.

The project area is in the northern extent of the Surat CMA where there is lower confidence in the Surat CMA UWIR model (refer to **Section 3.2.5** for definition of UWIR model) due to the sparsity of data with which to

construct it. To address the lower confidence, a multi-model approach has been employed to assess predicted drawdowns:

- The 2021 Surat CMA UWIR model was used as a base case to assess the potential project case and Cumulative case drawdown predictions. OGIA ran the model based on the development scenario provided by the Proponent
- OGIA used the Surat CMA UWIR model to perform uncertainty analysis of drawdown predictions utilising 550 stochastic parameter sets and model files from the 2021 UWIR numerical groundwater model. Model output was provided as 5th (best case), 50th (most likely case) and 95th percentile (worst case) probability predictions and was only provided for the Cumulative Case
- A site-specific numerical groundwater flow model constructed using the Proponents geological model through the heart of the development and calibration to the pilot data. This model was only used to assess the potential drawdown associated with the potential effects of the local faulting and the hydraulic properties of the Tertiary Strata on the surficial aquifers.

For the Surat CMA, OGIA has developed a regional scale numerical groundwater flow model to predict groundwater level drawdown resulting from the cumulative development of multiple CSG, conventional petroleum and coal mining within the Surat and southern Bowen Basins. OGIA was engaged by the Proponent to assess the water level drawdown associated with the project in isolation and through its incremental increase in water level drawdown associated with the cumulative regional development.

7.6.5.4 Predicted Groundwater Drawdown

The model results show that groundwater levels were predicted to decline by over 200 m in the Bandanna Formation. However, in all cases, groundwater level drawdown in the Tertiary Strata and alluvium (surficial model layers) were predicted to be less than 0.2 m.

Potential impacts to environmental values (groundwater bores and GDEs) were assessed with respect to the Queensland Water Act trigger thresholds, and can be summarised as follows:

- One active water supply bore may be impacted by the project as a standalone development
- Two registered active water supply bores were predicted to be impacted by the cumulative development
- No springs are predicted to be impacted
- Potential watercourse springs and associated aquatic GDEs are unlikely to be impacted
- Potential terrestrial GDEs are unlikely to be impacted
- Stygofauna are unlikely to be impacted
- Impacts to water quality are considered unlikely
- The predicted magnitude of surface subsidence from the project as a standalone development is approximately 2 mm, and 10 mm for the Cumulative Case within the project area. The potential for impacts to formation integrity and the water resource is considered negligible.

It is concluded that the project will not have a significant impact on water resources.

7.6.6 Management Practices

The Proponent commits to a range of measures to minimise impacts to groundwater environmental values, as outlined in **Table 46**.

Table 45. Recommended mitigation measures for potential impacts to groundwater environmental values

Impact	Management Measure	Project Timing
Degradation of groundwater quality and quantity	<ul style="list-style-type: none"> • CSG production wells will be designed, constructed, operated and decommissioned in accordance with the DNRME Code of Practice (DNRME 2019) 	Detailed design, construction

Impact	Management Measure	Project Timing
from exercising underground water rights	<ul style="list-style-type: none"> Comply with Water Act requirements for bore baseline assessments. Baseline assessments for all on-tenure bores will be completed in accordance with the EA conditions and the project's baseline assessment plan 	Pre-construction
	<ul style="list-style-type: none"> When identified as a responsible tenure holder in a UWIR, comply with obligations under the Water Monitoring Strategy and Springs Impact Mitigation Strategy, 'make good' obligations, and any other obligations identified in an approved UWIR 	On-going
Alteration of groundwater flow regimes and quality between hydrostratigraphic units	<ul style="list-style-type: none"> CSG production wells will be designed, constructed, operated and decommissioned in accordance with the DNRME Code of Practice (DNRME 2019) 	Detailed design, construction
Below ground chemical spills and leaks	<ul style="list-style-type: none"> CSG production wells will be designed, constructed, operated and decommissioned in accordance with the DNRME Code of Practice (DNRME 2019) 	Detailed design, construction
	<ul style="list-style-type: none"> Well siting will be determined through adoption of the Proponent's protocol (Section 7.2.6.1) for all cases where activities for the project involves significant disturbance to land 	Detailed design
	<ul style="list-style-type: none"> A review of available geological information will be undertaken prior to drilling commencing to aid in informing method and materials to be used 	Pre-construction
	<ul style="list-style-type: none"> A suitably licenced, and experienced drilling contractors will be engaged to undertake the drilling program and will adopt currently accepted best industry practice throughout the engagement 	Construction
	<ul style="list-style-type: none"> Ensure all products are used in accordance with the manufacturer's recommendations and relevant SDS 	On-going
Salinisation or waterlogging in CSG water is used to irrigate in an inappropriate manner	<ul style="list-style-type: none"> Treated produced water will be beneficially used to support irrigation in accordance with the DES <i>End of Waste Code Associated water for irrigation (including coal seam gas water)</i> (ENEW07546918) 	On-going

7.7 Waste

7.7.1 Environmental Values

There are no prescribed environmental values relating to waste management under the EP Act. Nevertheless, in general, environmental values that can be impacted by waste from the proposed activities include:

- Human health and wellbeing
- Air quality
- Land quality and land use
- Surface and groundwater quality
- Visual amenity
- Biodiversity and ecological processes

7.7.2 Emissions and Releases

There are four general activities that have the potential to generate waste from the project, these include:

- CSG extraction (drilling and completing wells) which creates wastes such as drilling fluids and cuttings
- Produced CSG water
- Treated CSG water which includes the operation of a reverse osmosis (RO) plant and requires brine and salt management as well as beneficial use
- CSG operations (including construction) which includes all other activities, other than gas wells, which is covered in CSG extraction activities. Waste from CSG operations and construction can be categorised as:
 - General waste: waste that is not defined as regulated waste under legislation and can include putrescible waste (easily decomposed) and non-putrescible wastes (not easily decomposed)
 - Recyclable waste: waste that is not defined as regulated waste under legislation and is able to be reconditioned, reprocessed, or reused
 - Regulated waste: waste that is regulated under legislation and requires specific controls including handling and disposal requirements in order to manage the associated hazard

Waste that is expected to be generated by the project is presented in **Table 47**.

Table 46. Expected waste generation from the project

Waste Type	Description	Activity ⁽¹⁾	Volumes	Management Measures
General Waste				
Green waste	Whole or parts of trees, bushes or similar	Construction	Land disturbance is primarily within existing cleared land (grazing). Therefore, volumes of whole or parts of tree or bushes is expected to be minimal.	Where possible use in the rehabilitation activities
Domestic waste	<ul style="list-style-type: none"> • Soft plastics and film • Food wastes • Contaminated recyclables • Food wrappers and containers • Polystyrene / coffee cups • Aluminium foil, waxed paper /cardboard • Non-recyclable plastics 	All activities	Based on workforce personnel numbers, current estimate is a 40 person workforce (35 construction, 5 operations)	Dispose to a licensed waste facility
Pipeline tape wrap	Tape used to wrap pipeline for protection	Construction and operational activities	Based on length of pipeline network, current estimate is 52 km of gas and water gathering pipeline	Dispose to a licensed waste facility
Timber	Untreated timber derived from packaging and uses that cannot be reused or recycled	All activities	Bulk volumes expected during construction and CSG drilling activities and will then reduce to lower volumes delivered on a monthly basis during operations	Recycled / reused where practical otherwise dispose to a licensed waste facility

Waste Type	Description	Activity ⁽¹⁾	Volumes	Management Measures
Treatment filters and membranes	Cartridge filters generated from water treatment process	Treated CSG water activities	Based on the filter life, expected to be replaced between 5-7 years	Dispose to a licensed waste facility
Recyclable Waste				
General recycling	<ul style="list-style-type: none"> Plastic bottles and clean food containers Glass bottles, jars milk cartons Aluminium cans & bottles Metal lids Paper cups Cardboard and paper packaging Paper (office paper, magazines, envelopes, food boxes) 	All activities	Based on workforce personnel numbers, current estimate is a 40 person workforce (35 construction, 5 operations)	Recycled at a licensed waste facility where feasible
Intermediate bulk containers	Containers used for transport of fluids and bulk materials	All activities	Bulk volumes expected during construction and CSG drilling activities and will then reduce to lower volumes delivered on a monthly basis during operations	Returned to supplier once no longer required
Plastic (high density poly ethylene) (HDPE)	Waste HDPE includes dam liner material, flowlines and drip tubes from irrigation activities	Treated CSG water activities	Based on the location and distances required for irrigation activities	Reuse or recycle wherever practicable
Scrap metal	Untamminated scrap metals and wiring. No pressurised cylinders or drums with chemical or oily residue.	All activities	Bulk volumes expected during construction and CSG drilling activities and will then reduce to lower volumes as required by maintenance activities	Reuse, sell or return to supplier wherever practicable
Regulated Waste				
Batteries	Lead, gel, nickel-cadmium and alkaline type batteries generated from equipment, vehicles, generators and electronics	All activities	Based on the individual battery life and volume of plant and equipment requiring battery operation	Transported by appropriately licensed transporter to a licensed waste facility
Chemical waste and chemical containers	Chemical wastes may include herbicides, pesticides, water treatment chemicals (biocides), paints, solvents. Regulated chemical containers are those containing any volume of free chemical that is regulated.	All activities	Larger chemical volumes expected during CSG drilling activities and will then reduce to lower volumes delivered on	Transported by appropriately licensed transporter to a licensed waste facility

Waste Type	Description	Activity ⁽¹⁾	Volumes	Management Measures
	These may include waste oil containers and aerosol cans containing solvent or paint.		a monthly basis during operations	
Contaminated soil	Contaminated soils are generated where local spills of hydrocarbons and other contaminants may occur.	Incidental activities	If managed appropriately, the volume of chemical spills to soil is expected to be minimal	Transported by appropriately licensed transporter to a licensed waste facility
Sewerage	Excess sewerage unable to be treated within an onsite sewage treatment facility	Construction	Based on workforce personnel numbers, current estimate is a 35 person workforce	Transported by appropriately licensed transporter to a licensed waste facility
Drill muds and cuttings	Waste drilling muds are generated from the drilling process	CSG extraction	Approximate quantities include 22 cubic meters (m ³) per vertical well and 157 m ³ per lateral well	If it meets the approved quality criteria, and agreed in a Code and Conduct Agreement (CCA) with the landholder, disposed of onsite, via burial, land spraying or land spreading in accordance with DES End of waste code Coal Seam Gas Drilling Mud (ENEW07543018) Otherwise, dispose to a licensed waste facility
Treated produced water	Treated water generated from water treatment process	Treated CSG water activities	Nominal treatment rate of up to approximately 1.0 megalitre (ML)/day	Beneficially used to support irrigation and industrial activities in accordance with <i>DES End of Waste Code Associated water (including coal seam gas water) (ENEW07547018) and End of Waste Code Associated water for irrigation (including coal seam gas water) (ENEW07546918)</i>

Waste Type	Description	Activity ⁽¹⁾	Volumes	Management Measures
Salt or brine	Salt or brine is generated because of treating produced water using RO technology	Treated CSG water activities	Brine from any treatment process will be stored in up to 100 ML of above-ground storages where it may be further concentrated via solar and mechanical evaporation to a concentrated slurry or solid salt	Concentrated waste product will be disposed of at a licensed waste facility
Medical or clinical waste	Sharps and biohazard wastes are generated at camps during routine medical care and treatment	Incidental activities	Based on workforce personnel numbers, current estimate is a 40 person workforce (35 construction, 5 operations)	Transported by appropriately licensed transporter to a licensed waste facility
Oily filters, rags, absorbents	Oily filters, rags and absorbents are generated from routine equipment sand vehicle servicing, repair and filter changes	All activities	As required during all activities	Transported by appropriately licensed transporter to a licensed waste facility
Tyres	Tyres and tubes are generated from tyre change on work vehicles and equipment	All activities	Based on plant and fleet numbers. Current estimate is approximately 15 construction fleet at any one time and light vehicle use during operations	Transported by appropriately licensed transporter to a licensed waste facility
Used spill kits	Used spill kits are generated from spill clean-up of chemicals and hydrocarbons	Incidental activities	If managed appropriately, the volume of spill kits is expected to be minimal	Transported by appropriately licensed transporter to a licensed waste facility
Waste oil	Small quantities of waste oil are generated routinely from vehicle and equipment oil changes	All activities	As required during all activities	Transported by appropriately licensed transporter to a licensed waste facility

Table notes:

⁽¹⁾ Activity listed in Section 7.7.2.

7.7.3 Potential Impacts

If not managed appropriately, the potential impacts to environmental values as a result of proposed activities that may generate waste include, but not limited to:

- Land contamination and groundwater and surface water pollution
- Reduced biodiversity and ecological processes including wildlife injury/death or vegetation dieback
- Reduced air quality from waste odours
- Reduced visual amenity

7.7.4 Management Practices

The Proponent commits to a range of measures to minimise the waste generated by the project as well as minimise the potential impacts from improper management or storage of waste, as outlined in **Table 48**.

Table 47. Recommended mitigation measures for potential impacts from waste

Impact	Management Measure	Project Timing
General	<ul style="list-style-type: none"> Waste will be managed in accordance with the waste management hierarchy as required by the WRR Act, to avoid or minimise the potential for inadequate waste management, release of waste to land or waters and potential impacts to the environment, land use or well-being of people. In addition to the WRR Act, the EP Regulation also requires that CSG activities address the requirements of the CSG Water Policy (ESR/2016/2381) to manage CSG water, including the management hierarchy described in Section 3.2.8. The project will undertake activities in accordance with the CSG water management plan (Appendix B) Develop and implement a Waste Management Plan to manage waste generated by the project for general, recyclable and regulated waste (refer Section 7.7.4.1) 	On-going
Land contamination and groundwater and surface water pollution	<ul style="list-style-type: none"> Store project materials and hazardous chemicals in accordance with: <ol style="list-style-type: none"> AS 3780:2008 – <i>The storage and handling of corrosive substances</i> AS 1940:2004 – <i>The storage and handling of flammable and combustible liquids</i> AS 3833:2007 – <i>Storage and handling of mixed classes of dangerous goods in packaged and intermediate bulk containers</i> Drilling fluids are selected and managed to ensure all products are used in accordance with the manufacturer’s recommendations and relevant SDS. The name, type and quantity of each drilling fluid additive used on each well is recorded Manage drill muds and cuttings in accordance with the DES <i>End of waste code Coal Seam Gas Drilling Mud</i> (ENEW07543018) Concentrated waste product (brine and salt) from water treatment processes will be disposed of at a licensed waste facility Treated produced water will be beneficially used to support irrigation and project activities in accordance with the DES <i>End of Waste Code Associated water (including coal seam gas water)</i> (ENEW07547018) and <i>End of Waste Code Associated water for irrigation (including coal seam gas water)</i> (ENEW07546918) 	On-going
Reduced biodiversity and ecological processes including wildlife sickness/death or vegetation dieback	<ul style="list-style-type: none"> Storage of chemicals and refuelling of plant and machinery to be a minimum of 200 m away from nearest waterway/watercourse Waste bins to be sealed with lids to reduce animal attraction and consumption of waste Regular waste transport schedule to reduce volumes of waste stored on site 	On-going
Reduced air quality from waste odours	<ul style="list-style-type: none"> Waste will be transported off-site as soon as required and on a regular basis to avoid duration of waste odours 	On-going
Reduced visual amenity	<ul style="list-style-type: none"> Waste will be stored in required bins and transported off-site as soon as required and on a regular basis to avoid visual amenity impacts 	On-going

7.7.4.1 Waste Management Plan

A waste management plan will be developed and implemented throughout the project. The waste management plan will identify the waste streams to be generated by the projects proposed activities and

detail management practices in accordance with the waste management hierarchy listed under the WRR Act. It will also provide measures to be implemented to minimise the likelihood of contamination.

7.8 Rehabilitation

A rehabilitation management plan will be developed for the project. Rehabilitation activities to be undertaken for the project will reinstate areas disturbed as part of the construction or operational activities, to the previous landforms, as far as practicable. At a minimum, rehabilitated areas must meet the following goals in accordance with the EP Act:

- The site must be made safe for humans and animals
- The site must be non-polluting, with appropriate erosion and sediment control measures
- The site must be stable
- The site must be self-sustaining

The Proponent will comply with the standard conditions as they apply to site rehabilitation and those required under the EP Act.

Control strategies to be considered in the rehabilitation management plan include but are not limited to:

- Detailed planning before any disturbance, such as topsoil stockpile locations
- Maximise the use of previously disturbed areas and avoid areas of environmental sensitivity wherever possible
- Minimise clearing of vegetation where feasible
- Maintain the required buffer distances between petroleum activities and environmentally sensitive areas
- Identification of practical landform designs which aim to establish final landform stability and prevent erosion
- Identification of appropriate land uses which are consistent with the location environmental constraints and values
- Implementation of best practice erosion control measures
- Progressive rehabilitation of disturbed areas, using appropriate rehabilitation procedures for the areas having been disturbed
- Regular monitoring and visual inspection of rehabilitated areas will be undertaken to ensure the land meets minimum rehabilitation goals
- A corrective action program to address fail areas of rehabilitation

Rehabilitation will be undertaken progressively as infrastructure is no longer required and include the following stages:

- Consultation with landholders to ensure appropriate rehabilitation objectives are developed
- Decommissioning of infrastructure including well sites and pipelines in accordance with the relevant provisions of the P&G Act and subordinate regulation
- Rehabilitation of disturbed areas
- Monitoring of rehabilitation areas

Where infrastructure is to be left for the landholder, this will be through a written agreement with each applicable landowner.

8 RISK ASSESSMENT

8.1 Method

A risk assessment was undertaken for the project to understand the inherent risk the potential project impacts pose to the identified environmental values as well as the residual risk once mitigation and management measures are applied. The risk assessment was undertaken in accordance with Australian Standard AS-ISO31000:2018 Risk Management-Guidelines.

Risk to environmental values has been assessed in accordance with the magnitude, severity, and duration of activities to occur within the project area, as well as potential impacts and the implementation of proposed management measures.

The risk assessment considered the likelihood of exposure of each risk and allocated a rating of the consequence of the exposure. The likelihood of exposure ranking used in the risk assessment is provided in **Table 49**.

Table 48. Likelihood of exposure

Magnitude	Description	Example
A	Rare	This event has never been known to occur or is extremely unlikely this could ever occur
B	Unlikely	This event may occur at some time
C	Possible	This event is likely to occur at some time
D	Likely	This event will probably occur in most circumstances
E	Almost Certain	This event is likely to occur in most circumstances

The consequence levels for the project area provided in **Table 50**.

Table 49. Consequence levels

Rank	Description	Example
1	Insignificant	<ul style="list-style-type: none"> Short term disturbance with minor environmental release or damage that is not reportable No impact outside site boundary No community complaints
2	Minor	<ul style="list-style-type: none"> Minor violation of regulation or guideline with minimal damage to the environment and small clean up Immediately contained on site Local government action, minor community complaints
3	Moderate	<ul style="list-style-type: none"> Violation of regulation or guideline with moderate damage to the environment and significant clean-up costs Release of pollution off site Community concerns and complaints
4	Major	<ul style="list-style-type: none"> Significant environmental damage – potentially permanent Release of pollution off site. Significant loss of environmental sources Organised community concern
5	Catastrophic	<ul style="list-style-type: none"> Long term environmental damage Permanent irreparable damage to the environment Sustained detrimental state and community outrage

The risk assessment matrix adopted for the project is provided in **Table 51**.

Table 50. Risk assessment matrix

		Likelihood				
		Rare (A)	Unlikely (B)	Possible (C)	Likely (D)	Almost Certain (E)
Consequence	Catastrophic (5)	Medium (5)	Medium (10)	High (15)	Very High (20)	Very High (25)
	Major (4)	Low (4)	Medium (8)	High (12)	Very High (16)	Very High (20)
	Moderate (3)	Low (3)	Medium (6)	Medium (9)	High (12)	High (15)
	Minor (2)	Low (2)	Low (4)	Medium (6)	Medium (8)	Medium (10)
	Insignificant (1)	Low (1)	Low (2)	Low (3)	Low (4)	Medium (5)

8.2 Environmental Risk Assessment

The risk assessment of potential project impacts to the identified environmental values is provided in **Table 52**.

Table 51. Environmental risk assessment

Environmental Value	Potential impact	Inherent Risk		Unmitigated Risk Rating	Mitigation, management or avoidance controls	Residual Risk		Mitigated Risk Rating
		Likelihood	Consequence			Likelihood	Consequence	
Land	Loss of agricultural land	D	3	12	<ul style="list-style-type: none"> Disturbance footprint reduced to the greatest extent possible Gas and water gathering lines will be buried underground and to a suitable depth to allow existing grazing and cropping land to continue throughout the life of the project Clearing to only occur within designated/approved areas to minimise loss of agricultural land Utilise existing access tracks where possible Co-locate infrastructure to reduce disturbance 	D	1	4
	Disturbance to chemical, biological and structural composition of soil	C	2	6	<ul style="list-style-type: none"> Develop and implement a top soil management plan (Section 7.1.5.2) Clearing to only occur within designated/approved areas to minimise changes to soils and land profile Complete backfilling activities as soon as possible after excavation activities 	B	2	4
	Changes to land profile	B	2	4	<ul style="list-style-type: none"> Disturbance footprint reduced to the greatest extent possible Develop and implement an ESC Plan (Section 7.1.5.3) 	B	1	2
	Disruption to existing landholder operations	C	2	6	<ul style="list-style-type: none"> Disturbance footprint reduced to the greatest extent possible Undertake activities in accordance with signed Conduct and Compensation Agreement's between the Proponent and key stakeholders Record, investigate and resolve complaints and incidents relating to project activities 	B	2	4

Environmental Value	Potential impact	Inherent Risk		Unmitigated Risk Rating	Mitigation, management or avoidance controls	Residual Risk		Mitigated Risk Rating
		Likelihood	Consequence			Likelihood	Consequence	
					<ul style="list-style-type: none"> Notify the administering authority and landholders of any release of contaminants not in accordance with EA or where environmental harm, or the potential for environmental harm has occurred Decommission and rehabilitate any disturbed areas that are not required for operations as soon as possible 			
	Introduction and spread of pest species due to human, vehicle and machinery movement and disturbance of land in pest infestation areas	D	3	12	<ul style="list-style-type: none"> Develop and implement a weed and pest management plan prior to construction works being carried out in line with the <i>Central Highlands Regional Council biosecurity plan 2020-2025 (CHRC 2019) (Section 7.1.5.4.)</i> Mapping of the extent of weed/pest occurrence within the project area Undertake activities in accordance with signed Conduct and Compensation Agreement's between the Proponent and key stakeholders Vehicle wash downs required for all plant and machinery Complete a weed hygiene declaration/Vehicle Hygiene Inspection Report for all vehicles / plant / machinery entering the project area Site induction program relating to weed management for all project employees Appropriate disposal and storage of putrescible waste to reduce attraction by feral animals Regular monitoring of weed and pests Respond to complaints from adjacent landowners relating to weeds and pests 	B	2	4
	Contamination of land including the uncontrolled release of chemicals, contaminated waste or produced water	C	3	9	<ul style="list-style-type: none"> Develop and implement the following management plans relating to chemical storage and CSG water: <ol style="list-style-type: none"> EMP (Section 7.1.5.1) ESC Plan (Section 7.1.5.3) Spill response plan (Section 7.1.5.5) 	B	2	4

Environmental Value	Potential impact	Inherent Risk		Unmitigated Risk Rating	Mitigation, management or avoidance controls	Residual Risk		Mitigated Risk Rating
		Likelihood	Consequence			Likelihood	Consequence	
					<ul style="list-style-type: none"> d) Environmental contingency plan (Section 7.1.5.6) e) CSG water management plan (Appendix B) f) Waste management plan (Section 7.7.4.1) • Spills response kits available on site • Site induction program relating to spill response management for all project employees • Store project materials and hazardous chemicals in accordance with: <ul style="list-style-type: none"> a) AS 3780:2008 – The storage and handling of corrosive substances b) AS 1940:2004 – The storage and handling of flammable and combustible liquids c) AS 3833:2007 – Storage and handling of mixed classes of dangerous goods in packaged and intermediate bulk containers 			
Ecology	Vegetation clearing (including habitat fragmentation and loss of connectivity)	C	2	6	<ul style="list-style-type: none"> • Disturbance footprint reduced to the greatest extent possible • Vegetation clearing protocols will be established within the CEMP • Develop and implement a Rehabilitation Management Plan (Section 7.8) • Site induction program relating to vegetation clearing for all project employees • Vegetation clearing extents clearly demarcated with flagging or bunting prior to clearing • Targeted pre-clearance surveys will be carried out prior to vegetation clearing • Topsoil stockpiled in wind rows and used for rehabilitation • Decommission and rehabilitate any disturbed areas that are not required for operations as soon as possible 	B	1	2

Environmental Value	Potential impact	Inherent Risk		Unmitigated Risk Rating	Mitigation, management or avoidance controls	Residual Risk		Mitigated Risk Rating
		Likelihood	Consequence			Likelihood	Consequence	
	Fauna mortality	C	2	6	<ul style="list-style-type: none"> Develop and implement a Fauna and Flora Management Plan (Section 7.2.6.2) Develop a fauna register to record all fauna encountered during clearing works Pre-clearance survey by fauna-spotter catcher including on-going inspections of disturbed areas (such as open trenches for stranded species) Onsite speed limits will be established Local wildlife carer and/or veterinarian to be identified of proposed clearing activities Site induction program relating to species of significance for all project employees Notify fauna spotter/catchers when a species of significance is observed in the project area and recorded in the project fauna register 	B	2	4
	Noise and lighting	B	2	4	<ul style="list-style-type: none"> Use of low light spill lighting components and directional lighting Construction/operational machinery will be maintained as per manufacturer design specifications Onsite speed limits will be established Site induction program relating to noise and lighting for all project employees Develop and implement a complaints management process for noise nuisance (Section 7.4.6.1) 	B	1	2
	Airborne dust	B	2	4	<ul style="list-style-type: none"> Monitor air/dust emissions in accordance with EA conditions Dust suppression using water trucks/wetting Monitor weather conditions to inform scheduling of proposed activities to avoid high wind conditions Site induction program relating to dust minimisation for all project employees 	B	1	2

Environmental Value	Potential impact	Inherent Risk		Unmitigated Risk Rating	Mitigation, management or avoidance controls	Residual Risk		Mitigated Risk Rating
		Likelihood	Consequence			Likelihood	Consequence	
					<ul style="list-style-type: none"> Reinstate disturbed areas as soon as possible to limit exposed soils being blown away Onsite speed limits will be established Develop and implement a complaints management process for air nuisance (Section 7.3.5.1) 			
	Weeds and pests	D	3	12	<ul style="list-style-type: none"> Develop and implement a weed and pest management plan prior to construction works being carried out in line with the <i>Central Highlands Regional Council biosecurity plan 2020-2025</i> (CHRC 2019) Mapping of the extent of weed/pest occurrence within the project area Undertake activities in accordance with signed Conduct and Compensation Agreement's between the Proponent and key stakeholders Vehicle wash downs required for all plant and machinery Complete a weed hygiene declaration/Vehicle Hygiene Inspection Report for all vehicles / plant / machinery entering the project area Site induction program relating to weed management for all project employees Appropriate disposal and storage of putrescible waste to reduce attraction by feral animals Regular monitoring of weed and pests Respond to complaints from adjacent landowners relating to weeds and pests 	B	2	4
	Fire	C	5	15	<ul style="list-style-type: none"> Monitor weather conditions to inform planning of proposed activities to avoid high fire-risk weather conditions Maintain communications with local QFES regarding project activities and bushfire hazard conditions Establish and maintain appropriate fire breaks Designated smoking areas 	B	3	6

Environmental Value	Potential impact	Inherent Risk		Unmitigated Risk Rating	Mitigation, management or avoidance controls	Residual Risk		Mitigated Risk Rating
		Likelihood	Consequence			Likelihood	Consequence	
				6	<ul style="list-style-type: none"> Onsite fire fighting equipment regularly maintained and staff trained in fire emergency response 			1
	Aquatic habitat clearing at waterways/watercourses	C	2	6	<ul style="list-style-type: none"> Disturbance footprint reduced to the greatest extent possible Design and construct waterways crossings consistent with the <i>Riverine protection permit exemption requirements</i> (DRDMW 2023a) Design and construct waterway crossings consistent with the <i>Accepted Development Requirements for Operational Work that is Constructing or Raising Waterway Barrier Works</i> (DAF 2018) Reduce construction disturbance to 6 m in areas associated with waterways/watercourse crossings Utilise existing access tracks where possible Co-locate infrastructure across waterways/watercourse to reduce disturbance No wells positioned within waterways/watercourses Apply a 200 m buffer from HES wetland Use HDD construction method as preference for waterway/watercourse crossings to limit open trench excavations Where open cut trenching in waterway/watercourse is required, undertake works in the following order of preference: <ol style="list-style-type: none"> Conduct works when no water is present Conduct works in times of no flow Conduct work in times of flow but in a way that does not negatively impact the flow of water For open trench activities, stockpile soil away from streambed and apply erosion control rip rap to minimise risk of flow events of exposed soils Develop and implement a Rehabilitation Management Plan (Section 7.8) 	B	1	2

Environmental Value	Potential impact	Inherent Risk		Unmitigated Risk Rating	Mitigation, management or avoidance controls	Residual Risk		Mitigated Risk Rating
		Likelihood	Consequence			Likelihood	Consequence	
	Alteration to surface water quality and/or quantity	C	3	9	<ul style="list-style-type: none"> Disturbance footprint reduced to the greatest extent possible to avoid areas of environmental significance Develop and implement the following management plans relating to chemical storage, waste and CSG water: <ol style="list-style-type: none"> EMP (Section 7.1.5.1) ESC Plan (Section 7.1.5.3) Spill response plan (Section 7.1.5.5) Environmental contingency plan (Section 7.1.5.6) CSG water management plan (Appendix B) Waste management plan (Section 7.7.4.1) Storage of chemicals and refuelling of plant and machinery to be a minimum of 200 m away from nearest waterway/watercourse Spills response kits available on site Site induction program relating to spill response management for all project employees Store project materials and hazardous chemicals in accordance with: <ol style="list-style-type: none"> AS 3780:2008 – <i>The storage and handling of corrosive substances</i> AS 1940:2004 – <i>The storage and handling of flammable and combustible liquids</i> AS 3833:2007 – <i>Storage and handling of mixed classes of dangerous goods in packaged and intermediate bulk containers</i> Onsite washdown areas for project vehicles/machinery will be located and clearly demarcated to prevent contaminated run-off from entering waterways Water quality will be monitored on a regular basis in accordance with the EA conditions 	B	2	4

Environmental Value	Potential impact	Inherent Risk		Unmitigated Risk Rating	Mitigation, management or avoidance controls	Residual Risk		Mitigated Risk Rating
		Likelihood	Consequence			Likelihood	Consequence	
	Creating a barrier to fish passage	B	2	4	<ul style="list-style-type: none"> Disturbance footprint reduced to the greatest extent possible to avoid waterways Design and construct waterway crossings consistent with the <i>Accepted Development Requirements for Operational Work that is Constructing or Raising Waterway Barrier Works</i> (DAF 2018) 	B	1	2
Air Quality	Dust emissions	B	2	4	<ul style="list-style-type: none"> Develop and implement a complaints management process for air nuisance (Section 7.3.5.1) Undertake activities in accordance with signed Conduct and Compensation Agreement's between the Proponent and key stakeholders Monitor air/dust emissions in accordance with EA conditions Dust suppression using water trucks/wetting Monitor weather conditions to inform scheduling of proposed activities to avoid high wind conditions Site induction program relating to dust minimisation for all project employees Reinstate disturbed areas as soon as possible to limit exposed soils being blown away Onsite speed limits will be established 	B	1	2
	Combustion emissions	B	2	4	<ul style="list-style-type: none"> Vehicles to be operated in a fuel-efficient manner and not be left idling for long periods Low NOx combustion engines will be utilised during operations, where practicable Review new technologies to identify opportunities to reduce emissions and use energy efficiently 	B	1	2
	Fugitive emissions	B	2	4	<ul style="list-style-type: none"> Well heads to be designed to ensure integrity at the surface in accordance with DNRME Code of Practice (DNRME 2019) 	B	1	2

Environmental Value	Potential impact	Inherent Risk		Unmitigated Risk Rating	Mitigation, management or avoidance controls	Residual Risk		Mitigated Risk Rating
		Likelihood	Consequence			Likelihood	Consequence	
	Wind erosion of exposed areas	B	2	4	<ul style="list-style-type: none"> Monitor weather conditions to inform scheduling of proposed activities to avoid high wind conditions 	B	1	2
Noise	Increased noise associated with site establishment/clearing	B	2	4	<ul style="list-style-type: none"> Develop and implement a complaints management process for noise nuisance (Section 7.4.6.1) Use of low light spill lighting components and directional lighting 	B	1	2
	Increased noise associated with construction of GCF, including operating plant and vehicle movements	B	2	4	<ul style="list-style-type: none"> Machinery will be maintained as per manufacturer design specifications Onsite speed limits will be established Site induction program relating to noise and lighting for all project employees 	B	1	2
	Increased noise associated with construction and workover of gas well sites, including operating plant and vehicle movements	B	2	4	<ul style="list-style-type: none"> Develop and implement a protocol for Constraints Planning and Field Development to avoid placement of wells and disturbance activities in close proximity to sensitive receptors (Section 7.2.6.1) Undertake activities in accordance with signed Conduct and Compensation Agreement's between the Proponent and key stakeholders 	B	1	2
	Increased noise associated with operations of the wells and GCF, including operating plant and vehicle movements	D	2	8	<ul style="list-style-type: none"> Develop and implement a complaints management process for noise nuisance (Section 7.4.6.1) Undertake further noise modelling during detailed design phase to understand which wells require noise mitigation Machinery will be maintained as per manufacturer design specifications Well head packs sound powers set to 95dB(A) Exhaust noise levels from the compressor engines was set to 113.4dB(A) which represents the installation of a standard hospital grade muffler Noise from the Ariel JCG6 compressors was set to 119dB(A) which represents the typical reduction from panel attention structures or enclosures 	B	1	2

Environmental Value	Potential impact	Inherent Risk		Unmitigated Risk Rating	Mitigation, management or avoidance controls	Residual Risk		Mitigated Risk Rating
		Likelihood	Consequence			Likelihood	Consequence	
Surface Water	Reduced bank stability, erosion and degradation of local water quality from waterway crossings	C	2	6	<ul style="list-style-type: none"> Disturbance footprint reduced to the greatest extent possible to avoid waterways/watercourses Design and construct waterway crossings consistent with the <i>Riverine Protection Permit Exemption Requirements</i> (DRDMW 2023a) Reduce construction disturbance to 6 m in areas associated with waterways/watercourse crossings Develop and implement a rehabilitation management plan (Section 7.8) Use HDD construction method as preference for waterway/watercourse crossings to limit open trench excavations For open trench activities, stockpile soil away from streambed and apply erosion control rip rap to minimise risk of flow events of exposed soils Water quality will be monitored on a regular basis in accordance with the EA conditions 	B	1	2
	Altered stream flow and flood regime from the placement of infrastructure, plant and equipment within and surrounding waterways	C	2	6	<ul style="list-style-type: none"> Disturbance footprint reduced to the greatest extent possible to avoid waterways/watercourses Utilise existing access tracks where possible No wells positioned within waterways/watercourses Co-locate infrastructure across waterways/watercourse to reduce disturbance Where open cut trenching in waterway/watercourse is required, undertake works in the following order of preference: <ol style="list-style-type: none"> Conduct works when no water is present Conduct works in times of no flow Conduct work in times of flow but in a way that does not negatively impact the flow of water 	B	1	2

Environmental Value	Potential impact	Inherent Risk		Unmitigated Risk Rating	Mitigation, management or avoidance controls	Residual Risk		Mitigated Risk Rating
		Likelihood	Consequence			Likelihood	Consequence	
	Erosion, salting, vegetation dieback and degraded water quality from the runoff or surface ponding from cleared areas, the re-use of CSG water for project activities or irrigation	C	2	6	<ul style="list-style-type: none"> The re-use of CSG water for Project activities will be carried out in accordance with: <ol style="list-style-type: none"> End of Waste Code Associated Water (including coal seam gas water) (ENEW07547018) End of Waste Code Irrigation of Associated Water (including coal seam gas water) ((ENEW07546918) Streamlined Model Conditions for Petroleum Activities (ESR/2016/1989) Undertake activities in accordance with the CSG Water Management Plan (Appendix B) An operational water balance model has been developed for the project (Appendix B). The water balance model will be updated throughout the life of the project to ensure that sufficient on-site CSG water and brine storage capacity is available Brine will be stored in tanks prior to being transferred to an appropriately licenced facility for disposal Site induction program relating to spill response and emergency incidents for all project employees 	B	2	4
	Degraded water quality within surrounding waterways from spills of fuel, oil or chemicals	B	3	6	<ul style="list-style-type: none"> Develop and implement the following management plans relating to chemical storage, waste and CSG water: <ol style="list-style-type: none"> EMP (Section 7.1.5.1) ESC Plan (Section 7.1.5.3) Spill response plan (Section 7.1.5.5) Environmental contingency plan (Section 7.1.5.6) CSG water management plan (Appendix B) Waste management plan (Section 7.7.4.1) Storage of chemicals and refuelling of plant and machinery to be a minimum of 200 m away from nearest waterway/watercourse Spills response kits available on site 	B	1	2

Environmental Value	Potential impact	Inherent Risk		Unmitigated Risk Rating	Mitigation, management or avoidance controls	Residual Risk		Mitigated Risk Rating
		Likelihood	Consequence			Likelihood	Consequence	
					<ul style="list-style-type: none"> Site induction program relating to spill response management for all project employees Store project materials and chemicals in accordance with: <ol style="list-style-type: none"> AS 3780:2008 – <i>The storage and handling of corrosive substances</i> AS 1940:2004 – <i>The storage and handling of flammable and combustible liquids</i> AS 3833:2007 – <i>Storage and handling of mixed classes of dangerous goods in packaged and intermediate bulk containers</i> Onsite washdown areas for project vehicles/machinery will be located and clearly demarcated to prevent contaminated run-off from entering waterways 			
	Waterway barriers that prevent or impede movements of aquatic fauna from poorly designed and constructed waterway crossings	C	3	9	<ul style="list-style-type: none"> Disturbance footprint reduced to the greatest extent possible to avoid waterways/watercourses Design and construct waterway crossings consistent with the <i>Accepted Development Requirements for Operational Work that is Constructing or Raising Waterway Barrier Works</i> (DAF 2018) 	B	1	2
	Impact on water quality and sedimentation of downstream environments including the Comet River and associated habitat for EVNT species such as the white-throated snapping turtle	B	3	6	<ul style="list-style-type: none"> Water quality will be monitored on a regular basis in accordance with the EA conditions Develop and implement an ESC Plan (Section 7.1.5.3) 	B	1	2
Groundwater	Degradation of groundwater quality and quantity from exercising underground water rights	C	2	6	<ul style="list-style-type: none"> CSG production wells will be designed, constructed, operated and decommissioned in accordance with the DNRME Code of Practice (DNRME 2019) 	B	1	2

Environmental Value	Potential impact	Inherent Risk		Unmitigated Risk Rating	Mitigation, management or avoidance controls	Residual Risk		Mitigated Risk Rating
		Likelihood	Consequence			Likelihood	Consequence	
					<ul style="list-style-type: none"> Comply with obligations under the Water Monitoring Strategy and Springs Impact Mitigation Strategy, 'make good' obligations, and any other obligations identified in an approved UWIR Comply with Water Act requirements for bore baseline assessments 			
	Alteration of groundwater flow regimes and quality between hydrostratigraphic units	C	2	6	<ul style="list-style-type: none"> CSG production wells will be designed, constructed, operated and decommissioned in accordance with the DNRME Code of Practice (DNRME 2019) 	B	1	2
	Below ground chemical spills and leaks	C	2	6	<ul style="list-style-type: none"> CSG production wells will be designed, constructed, operated and decommissioned in accordance with the DNRME Code of Practice (DNRME 2019) Well siting will be determined through adoption of the Proponent's protocol for all cases where activities for the project involves significant disturbance to land A review of available geological information will be undertaken prior to drilling commencing to aid in informing method and materials to be used A suitably licenced, and experienced drilling contractors will be engaged to undertake the drilling program and will adopt currently accepted best industry practice throughout the engagement Ensure all products are used in accordance with the manufacturer's recommendations and relevant SDS 	B	1	2
	Salinisation or waterlogging in CSG water is used to irrigate in an inappropriate manner	C	2	6	<ul style="list-style-type: none"> Treated produced water will be beneficially used to support irrigation in accordance with the DES <i>End of Waste Code Associated water for irrigation (including coal seam gas water)</i> (ENEW07546918) 	B	1	2
Waste	General waste impacts	C	3	9	<ul style="list-style-type: none"> Manage waste in accordance with the waste management hierarchy under the WRR Act 	B	1	2

Environmental Value	Potential impact	Inherent Risk		Unmitigated Risk Rating	Mitigation, management or avoidance controls	Residual Risk		Mitigated Risk Rating
		Likelihood	Consequence			Likelihood	Consequence	
					<ul style="list-style-type: none"> Manage CSG water to address the requirements of the CSG Water Policy (ESR/2016/2381) Undertake proposed activities in accordance with the CSG water management plan (Appendix B) Develop and implement a Waste Management Plan to manage waste generated by the project for general, recyclable and regulated waste (Section 7.7.4.1) 			
	Land contamination and groundwater and surface water pollution	C	2	6	<ul style="list-style-type: none"> Store project materials and chemicals in accordance with: <ol style="list-style-type: none"> AS 3780:2008 – <i>The storage and handling of corrosive substances</i> AS 1940:2004 – <i>The storage and handling of flammable and combustible liquids</i> AS 3833:2007 – <i>Storage and handling of mixed classes of dangerous goods in packaged and intermediate bulk containers</i> Drilling fluids are selected and managed to ensure all products are used in accordance with the manufacturer’s recommendations and relevant SDS Manage drill muds and cuttings in accordance with the DES <i>End of waste code Coal Seam Gas Drilling Mud</i> (ENEW07543018) Concentrated waste product (brine and salt) from water treatment processes will be disposed of at a licensed waste facility Treated produced water will be beneficially used to support irrigation and project activities in accordance with the DES <i>End of Waste Code Associated water (including coal seam gas water)</i> (ENEW07547018) and <i>End of Waste Code Associated water for irrigation (including coal seam gas water)</i> (ENEW07546918) 	B	2	4

Environmental Value	Potential impact	Inherent Risk		Unmitigated Risk Rating	Mitigation, management or avoidance controls	Residual Risk		Mitigated Risk Rating
		Likelihood	Consequence			Likelihood	Consequence	
	Reduced biodiversity and ecological processes including wildlife injury or death or vegetation dieback	C	3	9	<ul style="list-style-type: none"> Storage of chemicals and refuelling of plant and machinery to be a minimum of 200 m away from nearest waterway/watercourse Waste bins to be sealed with lids to reduce animal attraction and consumption of waste Regular waste transport schedule to reduce volumes of waste stored on site 	B	2	4
	Reduced air quality from waste odours	C	3	9	<ul style="list-style-type: none"> Waste will be transported off-site as soon as required and on a regular basis to avoid duration of waste odours 	B	1	2
	Reduced visual amenity	C	3	9	<ul style="list-style-type: none"> Waste will be stored in required bins and transported off-site as soon as required and on a regular basis to avoid visual amenity impacts 	B	1	2

9 PROPOSED EA CONDITIONS

9.1 Streamlined Model Conditions for Petroleum Activities

Streamlined model conditions for petroleum activities exist and may be imposed by the administering authority for this EA. A response to each of the streamlined model conditions as listed in the ‘*streamlined model conditions for petroleum activities*’ (ESR/2016/1989, version 2.02, date 05/05/2016) is provided in **Table 53** to demonstrate the project is able to operate in a way that ensures compliance with these conditions.

Table 52. Streamlined model conditions for petroleum activities

Reference	Streamline Model Condition	Project Outcome
General		
Authorised Activities		
Conditions (General 1) to (General 6)	<< The environmental authority will contain conditions that explicitly authorise particular activities to be carried out on the relevant resource authorities. This will include a scoping table and thresholds for scale and intensity.>>	No change proposed to condition
Monitoring Standards		
General 7. PESCD ³ 1.	All monitoring must be undertaken by a <u>suitably qualified person</u> ⁴ .	No change proposed to condition
General 8.	If requested by the <u>administering authority</u> in relation to investigating a complaint, monitoring must be commenced within 10 business days.	No change proposed to condition
General 9.	All laboratory analyses and tests must be undertaken by a laboratory that has <u>National Association of Testing Authorities Australia (NATA) accreditation</u> for such analyses and tests.	No change proposed to condition
General 10.	Notwithstanding condition (General 9), where there are no NATA accredited laboratories for a specific analyte or substance, then	No change proposed to condition

Reference	Streamline Model Condition	Project Outcome
	duplicate samples must be sent to at least two separate laboratories for independent testing or evaluation.	
General 11.	<p>Monitoring and sampling must be carried out in accordance with the requirements of the following documents (as relevant to the sampling being undertaken), as amended from time to time:</p> <ul style="list-style-type: none"> a. for <u>waters</u> and aquatic environments, the Queensland Government’s Monitoring and Sampling Manual 2009 – <i>Environmental Protection (Water) Policy 2009</i> b. for groundwater, <i>Groundwater Sampling and Analysis – A Field Guide (2009:27 GeoCat #6890.1)</i> c. for noise, the Environmental Protection Regulation 2008 d. for air, the <i>Queensland Air Quality Sampling Manual and/or Australian Standard 4323.1:1995 Stationary source emissions method 1: Selection of sampling positions, as appropriate for the relevant measurement</i> e. for soil, the <i>Guidelines for Surveying Soil and Land Resources, 2nd edition (McKenzie et al. 2008), and/or the Australian Soil and Land Survey Handbook, 3rd edition (National Committee on Soil and Terrain, 2009)</i> 	No change proposed to condition
Notification		
General 12.	<p>In addition to the requirements under Chapter 7, Part 1, Division 2 of the EP Act, the administering authority must be notified through the Pollution Hotline and in writing, as soon as possible, but within 48 hours of becoming aware of any of the following events:</p> <ul style="list-style-type: none"> a. any unauthorised <u>significant disturbance to land</u> b. potential or actual loss of structural or <u>hydraulic integrity</u> of a dam 	No change proposed to condition

Reference	Streamline Model Condition	Project Outcome
	<ul style="list-style-type: none"> c. when the level of the contents of any <u>regulated dam</u> reaches the mandatory reporting level d. when a regulated dam will not have available storage to meet the <u>design storage allowance</u> on 1 November of any year e. potential or actual loss of <u>well integrity</u> f. when the seepage trigger action response procedure required under condition (Water 14(g)) is or should be implemented g. unauthorised releases of any volume of <u>prescribed contaminants</u> to waters h. unauthorised releases of volumes of contaminants, in any mixture, to land greater than: <ul style="list-style-type: none"> (ii) 200 L of hydrocarbons; or (iii) 200 L of stimulation additives; or (iv) 500 L of <u>stimulation fluids</u>; or (v) 1 000 L of brine; or (vi) 5 000 L of untreated coal seam gas water; or (vii) 5 000 L of raw sewage; or (viii) 10 000 L of treated sewage effluent. i. the use of <u>restricted stimulation fluids</u> i. groundwater monitoring results from a <u>landholder's active groundwater bore</u> monitored under the <u>stimulation</u> impact monitoring program which is a 10% or greater increase from a previous baseline value for that bore and which renders the water unfit for its intended use 	

Reference	Streamline Model Condition	Project Outcome
	ii. monitoring results where two out of any five consecutive samples do not comply with the relevant limits in the environmental authority.	
Financial assurance		
General 13. PESCB 1.	Petroleum activities that cause significant disturbance to land must not be carried out until financial assurance has been given to the administering authority as security for compliance with the environmental authority and any costs or expenses, or likely costs or expenses, mentioned in section 298 of the EP Act..	No change proposed to condition
General 14.	Prior to any changes in petroleum activities which would result in an increase to the maximum significant disturbance since financial assurance was last given to the administering authority, the holder of the environmental authority must amend the financial assurance and give the administering authority the increased amount of financial assurance.	No change proposed to condition
General 15.	If the amount of financial assurance held by the administering authority has been discounted and either the nominated period of financial assurance has ended, or an event or change in circumstance has resulted in the holder of the environmental authority no longer being able to meet one or more of the mandatory pre-requisites or applicable discount criteria, the holder of the environmental authority must amend the financial assurance and give the administering authority the increased amount of financial assurance as soon as practicable.	No change proposed to condition
Contingency procedures for emergency environmental incidents		
General 16.	Petroleum activities involving significant disturbance to land cannot commence until the development of written contingency procedures	No change proposed to condition

Reference	Streamline Model Condition	Project Outcome
	<p>for emergency environmental incidents which include, but are not necessarily limited to:</p> <ul style="list-style-type: none"> a. a clear definition of what constitutes an environmental emergency incident or near miss for the petroleum activity. b. consideration of the risks caused by the petroleum activity including the impact of flooding and other natural events on the petroleum activity. c. response procedures to be implemented to prevent or minimise the risks of environmental harm occurring. d. the practices and procedures to be employed to restore the environment or mitigate any environmental harm caused. e. procedures to investigate causes and impacts including impact monitoring programs for releases to waters and/or land. f. training of staff to enable them to effectively respond. g. procedures to notify the administering authority, local government and any potentially impacted landholder. 	
Maintenance of plant and equipment		
General 17. PESCC 4.	All plant and equipment must be maintained and operated in their proper and effective condition.	No change proposed to condition
General 18.	<p>The following infrastructure must be signed with a unique reference name or number in such a way that it is clearly observable:</p> <ul style="list-style-type: none"> a. regulated dams and <u>low consequence</u> dams b. <u>exploration, appraisal</u> and <u>development wells</u> c. water treatment facilities d. brine encapsulation facilities 	No change proposed to condition

Reference	Streamline Model Condition	Project Outcome
	<ul style="list-style-type: none"> e. landfill cells f. sewage treatment facilities g. specifically authorised discharge points to air and waters h. any chemical storage facility associated with the environmentally relevant activity of chemical storage i. field compressor stations j. central compressor stations k. gas processing facilities; and l. pipeline compressor stations. 	
General 19.	Measures to prevent fauna being harmed from entrapment must be implemented during the construction and operation of well infrastructure, dams and pipeline trenches.	No change proposed to condition
Erosion and sediment control		
General 20.	<p>For activities involving significant disturbance to land, <u>control measures</u> that are commensurate to the site-specific risk of erosion, and risk of sediment release to waters must be implemented to:</p> <ul style="list-style-type: none"> a. allow stormwater to pass through the site in a controlled manner and at non-erosive flow velocities b. minimise soil erosion resulting from wind, rain, and flowing water c. minimise the duration that disturbed soils are exposed to the erosive forces of wind, rain, and flowing water d. minimise work-related soil erosion and sediment runoff; and e. minimise negative impacts to land or properties adjacent to the activities (including roads). 	No change proposed to condition

Reference	Streamline Model Condition	Project Outcome
Complaints		
General 21.	Petroleum activities must not cause <u>environmental nuisance</u> at a <u>sensitive place</u> , other than where an alternative arrangement is in place.	No change proposed to condition. The assessment in this EA application has demonstrated that environmental nuisance is not expected as a result of the project.
Documentation		
General 22.	A <u>certification</u> must be prepared by a suitably qualified person within 30 business days of completing every plan, procedure, program and report required to be developed under this environmental authority, which demonstrates that: <ul style="list-style-type: none"> a. relevant material, including current published guidelines (where available) have been considered in the written document b. the content of the written document is accurate and true; and c. the document meets the requirements of the relevant conditions of the environmental authority. 	No change proposed to condition
General 23.	All plans, procedures, programs, reports and methodologies required under this environmental authority must be written and implemented.	No change proposed to condition
General 24.	All <u>documents</u> required to be developed under this environmental authority must be kept for five years.	No change proposed to condition
General 25.	All documents required to be prepared, held or kept under this environmental authority must be provided to the administering authority upon written request within the requested timeframe.	No change proposed to condition

Reference	Streamline Model Condition	Project Outcome
General 26.	A record of all complaints must be kept including the date, complainant's details, source, reason for the complaint, description of investigations and actions undertaken in resolving the complaint.	No change proposed to condition
Streamlined Conditions – Waste Management		
General waste management		
Waste 1. PESCC 24.	Measures must be implemented so that waste is managed in accordance with the <u>waste and resource management hierarchy</u> and the <u>waste and resource management principles</u> .	No change proposed to condition
Waste 2.	Waste, including waste fluids, but excluding waste used in <u>closed-loop systems</u> , must be transported off-site for lawful re-use, remediation, recycling or disposal, unless the waste is specifically authorised by conditions <<Insert List>> to be disposed of or used on site.	No change proposed to condition
Waste 3.	<u>Waste fluids</u> , other than <u>flare precipitant</u> stored in <u>flare pits</u> , or <u>residual drilling material</u> or drilling fluids stored in <u>sumps</u> , must be contained in either: <ul style="list-style-type: none"> a. an above ground container; or b. a <u>structure</u> which contains the wetting front. 	No change proposed to condition
Waste 4.	<u>Green waste</u> may be used on-site for either rehabilitation or sediment and erosion control, or both.	No change proposed to condition
Waste 5.	Vegetation waste may be burned if it relates to a state forest, timber reserve or forest entitlement area administered by the <i>Forestry Act 1959</i> and a permit has been obtained under the <i>Fire and Rescue Service Act 1990</i> .	No change proposed to condition
Pipeline wastewater		

Reference	Streamline Model Condition	Project Outcome
Waste 6.	<p><u>Pipeline waste water</u>, may be released to land provided that it:</p> <ul style="list-style-type: none"> a. can be demonstrated it meets the acceptable standards for release to land; and b. is released in a way that does not result in visible scouring or erosion or pooling or run-off or vegetation die-off. 	No change proposed to condition
Authorised uses of produced water for petroleum activities		
Waste 7.	<p><u>Produced water</u> may be re-used in:</p> <ul style="list-style-type: none"> a. drilling and well hole activities; or b. <u>stimulation</u> activities. 	No change proposed to condition
Waste 8.	<p>Produced water may be used for dust suppression provided the following criteria are met:</p> <ul style="list-style-type: none"> a. the amount applied does not exceed the amount required to effectively suppress dust; and b. the application: <ul style="list-style-type: none"> i. does not cause on-site ponding or runoff ii. is directly applied to the area being dust suppressed iii. does not harm vegetation surrounding the area being dust suppressed; and iv. does not cause visible salting. 	No change proposed to condition
Waste 9.	<p>Produced water may be used for construction purposes provided the use:</p> <ul style="list-style-type: none"> a. does not result in negative impacts on the composition and structure of soil or subsoils 	No change proposed to condition

Reference	Streamline Model Condition	Project Outcome
	<ul style="list-style-type: none"> b. is not directly or indirectly released to waters c. does not result in runoff from the construction site; and d. does not harm vegetation surrounding the construction site. 	
Waste 10.	If there is any indication that any of the circumstances in condition (Waste 8)(b)(i) to (Waste 8)(b)(iv) or (Waste 9)(a) to (Waste 9)(d) is occurring the use must cease immediately and the affected area must be remediated without delay.	No change proposed to condition
Use of produced water for irrigation activities		
	<p><< Insert either option A, B or C: >></p> <p>Option A: Insert general beneficial use approval irrigation of associated water conditions including release limits</p> <p>Option B: Insert release limits proposed in the application and as determined by an independent suitably qualified person</p> <p>Option C: Insert conditions (Waste C1) and (Waste C2):</p>	It is proposed that Option C (Waste C1) and (Waste C2) be inserted into the conditions.
Waste C1.	<p>Irrigation of produced water is authorised providing it ensures:</p> <ul style="list-style-type: none"> a. ensures that soil structure, stability and productive capacity can be maintained or improved b. toxic effects to crops do not result; and c. yields and produce quality are maintained or improved. 	No change proposed to condition

Reference	Streamline Model Condition	Project Outcome		
Waste C2.	<p>Irrigation of produced water is authorised providing a written report is provided to the chief executive which:</p> <ol style="list-style-type: none"> certifies that the outcomes in condition (Waste C1) will be achieved states water quality criteria, which has been determined in accordance with the assessment procedures outlined in Waste Schedule, Table 1—Assessment procedures for water quality criteria includes a water monitoring program to monitor that the outcomes listed in condition (Waste C1) are being achieved. <p>Waste management schedule, Table 1—Assessment procedures for water quality criteria</p>	No change proposed to condition		
	<table border="1"> <thead> <tr> <th>Water quality criteria</th> <th>Assessment procedure</th> </tr> </thead> <tbody> <tr> <td> Electrical conductivity Sodium adsorption ratio pH </td> <td> Salinity Management Handbook, with reference to Chapter 11; and/or Australian and New Zealand Guidelines for Fresh and Marine Water Quality, with reference to Volume 1 Chapter 4 and Volume 3 Chapter 9. The assessment should consider: <ul style="list-style-type: none"> soil properties within the root zone to be irrigated (e.g. clay content, cation exchange capacity, exchangeable sodium percentage) water quality of the proposed resource (e.g. salinity, sodicity) climate conditions (e.g. salinity, sodicity) leaching fractions average root zone salinity (calculated) crop salt tolerance (e.g. impact threshold and yield decline) </td> </tr> </tbody> </table>		Water quality criteria	Assessment procedure
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Reference	Streamline Model Condition	Project Outcome
	<ul style="list-style-type: none"> • management practices and objectives (e.g. irrigation application rate, amelioration techniques) • broader landscape issues (e.g. land use, depth to groundwater) • any additional modelling and tests undertaken to support the varied water quality parameters <hr/> <p>Heavy metals</p> <p>Australian and New Zealand Guidelines for Fresh and Marine Water Quality, with reference to Volume 1 Chapters 3 and 4 and Volume 3 Chapter 9.</p> <p>The assessment should aim to derive site specific trigger values (e.g. cumulative contaminant loading limit) based on the methodology provided in the above mentioned procedure.</p>	
Sewage treatment		
Waste 11.	<p>Treated sewage effluent or <u>greywater</u> can be released to land provided it:</p> <ul style="list-style-type: none"> a. meets or exceeds <u>secondary treated class B standards</u> for a treatment system with a <u>daily peak design capacity</u> of between 150 EP and 1500 EP; or b. meets or exceeds <u>secondary treated class C standards</u> for a treatment system with a daily peak design capacity of less than 150 EP. 	No change proposed to condition
Waste 12.	<p>The release of treated sewage effluent or greywater authorised in condition (Waste 11) must:</p> <ul style="list-style-type: none"> a. be to a fenced and signed contaminant release area(s) 	No change proposed to condition

Reference	Streamline Model Condition	Project Outcome
	<ul style="list-style-type: none"> b. not result in pooling or run-off or aerosols or spray drift or vegetation die-off c. be to a contaminant release area(s) that is kept vegetated with groundcover, that is: <ul style="list-style-type: none"> i. not a declared pest species ii. kept in a viable state for transpiration and nutrient uptake; and iii. grazed or harvested and removed from the contaminant release area as needed, but not less than every three months. 	
Waste 13.	Notwithstanding condition (Waste 11), treated sewage effluent that meets or exceeds <u>secondary treated class A</u> standards may be used for dust suppression or construction activities, provided the use meets the criteria in condition (Waste 8) or (Waste 9), as relevant to the use.	No change proposed to condition
Waste 14.	Sewage pump stations must be fitted with a: <ul style="list-style-type: none"> a. stand-by pump; and b. high level alarm to warn of imminent pump station overflow, that operates without mains power or with a back-up power source that starts automatically in the event of a power failure. 	No change proposed to condition
Residual drilling material		
Waste 15.	If sumps are used to store residual drilling material or drilling fluids, they must only be used for the duration of drilling activities.	No change proposed to condition
Waste 16.	Residual drilling material can only be disposed of on-site:	No change proposed to condition

Reference	Streamline Model Condition	Project Outcome
	<ul style="list-style-type: none"> a. by mix-bury-cover method if the residual drilling material meets the approved quality criteria; or b. if it is certified by a suitably qualified third party as being of acceptable quality for disposal to land by the proposed method and that environmental harm will not result from the proposed disposal. 	
Waste 17.	<p>Records must be kept to demonstrate compliance with condition (Waste 15) and (Waste 16).</p> <p><< Use conditions (Waste 18) to (Waste 21) where the environmental authority application requests and provides an environmental assessment of onsite waste disposal. >></p>	No change proposed to condition
Onsite waste disposal – General waste		
Waste 18.	<p>General waste may be disposed of onsite at a dedicated landfill facility provided that the general waste:</p> <ul style="list-style-type: none"> a. is not a <u>liquid</u> b. does not contain, or is not comingled with regulated waste c. does not contain an organic fraction of more than 5% of the general waste stream d. was generated from activities permitted under this environmental authority; and e. does not exceed 10 000 tonnes in any year. 	<p>Not applicable. General waste won't be disposed of onsite. It will be disposed to a licenced waste facility.</p> <p>Green waste and timber may be re-used on site where practicable.</p>
Waste 19.	<p>The landfill used for the disposal of general waste must be:</p> <ul style="list-style-type: none"> a. on land owned by the holder of the relevant resource authority(ies) 	<p>Not applicable. General waste won't be disposed of onsite. It will be disposed to a licenced waste facility.</p> <p>Green waste and timber may be re-used on site where practicable.</p>

Reference	Streamline Model Condition	Project Outcome
	<ul style="list-style-type: none"> b. designed by a suitably qualified person and certified as being suitable for the containment of the waste c. designed and located so that the landfill is protected from any potential adverse consequences of regional or local flooding to the probable maximum flood level d. designed and operated to exclude stormwater runoff from entering the landfill e. capped upon closure with capping methodology certified by a suitably qualified person as being suitable for containing the waste 	
Waste 20.	Waste disposal activities must not result in any negative effect on public health particularly in relation to propagation of diseases and the breeding and harbourage of flies, mosquitoes, rats and other pest organisms.	No change proposed to condition
Waste 21.	Waste disposal must not result in litter escaping the boundary of the landfill facility.	No change proposed to condition
Streamlined Conditions—Protecting Acoustic Values		

Reference	Streamline Model Condition	Project Outcome																																																																																															
Noise 1.	<p>Notwithstanding condition (General 21), emission of noise from the petroleum activity(ies) at levels less than those specified in Protecting acoustic values, Table 1—Noise nuisance limits are not considered to be environmental nuisance.</p> <p>Protecting acoustic values, Table 1—Noise nuisance limits</p> <table border="1"> <thead> <tr> <th>Time period</th> <th>Metric</th> <th>Short term noise event</th> <th>Medium term noise event</th> <th>Long term noise event</th> </tr> </thead> <tbody> <tr> <td>7:00am—6:00pm</td> <td>L_{Aeq,adj,15 min}</td> <td>45 dBA</td> <td>43 dBA</td> <td>40 dBA</td> </tr> <tr> <td>7:00am—6:00pm</td> <td>L_{Aeq,adj,15 min}</td> <td>40 dBA</td> <td>38 dBA</td> <td>35 dBA</td> </tr> <tr> <td rowspan="2">10:00pm—6:00am</td> <td>L_{Aeq,adj,15 min}</td> <td>28 dBA</td> <td>28 dBA</td> <td>28 dBA</td> </tr> <tr> <td>Max L_{pA,15mins}</td> <td>55 dBA</td> <td>55 dBA</td> <td>55 dBA</td> </tr> <tr> <td>6:00am—7:00am</td> <td>L_{Aeq,adj,15 min}</td> <td>40 dBA</td> <td>38 dBA</td> <td>35 dBA</td> </tr> </tbody> </table> <p>1. The noise limits in Table 1 have been set based on the following deemed background noise levels (L_{ABG}): 7:00am—6:00 pm: 35 dBA 6:00pm—10:00 pm: 30 dBA 10:00pm—6:00 am: 25 dBA 6:00am—7:00 am: 30 dBA</p>	Time period	Metric	Short term noise event	Medium term noise event	Long term noise event	7:00am—6:00pm	L _{Aeq,adj,15 min}	45 dBA	43 dBA	40 dBA	7:00am—6:00pm	L _{Aeq,adj,15 min}	40 dBA	38 dBA	35 dBA	10:00pm—6:00am	L _{Aeq,adj,15 min}	28 dBA	28 dBA	28 dBA	Max L _{pA,15mins}	55 dBA	55 dBA	55 dBA	6:00am—7:00am	L _{Aeq,adj,15 min}	40 dBA	38 dBA	35 dBA	<p>The Proponent wishes to replace ‘Table 1 – Noise nuisance limits’ of this condition with the site-specific noise nuisance limits listed in the table below.</p> <p>Protecting acoustic values, Table 1—Site-specific noise nuisance limits</p> <table border="1"> <thead> <tr> <th>Sensitive Receptor</th> <th>Time Period</th> <th>Metric</th> <th>Short term noise event (dB(A))</th> <th>Medium term noise event (dB(A))</th> <th>Long term noise event (dB(A))</th> </tr> </thead> <tbody> <tr> <td rowspan="5">Struan Homestead</td> <td>Day</td> <td>L_{Aeq,adj,15 min}</td> <td>45</td> <td>43</td> <td>40</td> </tr> <tr> <td>Evening</td> <td>L_{Aeq,adj,15 min}</td> <td>51</td> <td>49</td> <td>46</td> </tr> <tr> <td rowspan="2">Night</td> <td>L_{Aeq,adj,15 min}</td> <td>38</td> <td>38</td> <td>38</td> </tr> <tr> <td>Max L_{pA,15mins}</td> <td>55</td> <td>55</td> <td>55</td> </tr> <tr> <td>Morning</td> <td>L_{Aeq,adj,15 min}</td> <td>46</td> <td>44</td> <td>41</td> </tr> <tr> <td rowspan="5">Struan Ringers</td> <td>Day</td> <td>L_{Aeq,adj,15 min}</td> <td>45</td> <td>43</td> <td>40</td> </tr> <tr> <td>Evening</td> <td>L_{Aeq,adj,15 min}</td> <td>46</td> <td>44</td> <td>41</td> </tr> <tr> <td rowspan="2">Night</td> <td>L_{Aeq,adj,15 min}</td> <td>36</td> <td>36</td> <td>36</td> </tr> <tr> <td>Max L_{pA,15mins}</td> <td>55</td> <td>55</td> <td>55</td> </tr> <tr> <td>Morning</td> <td>L_{Aeq,adj,15 min}</td> <td>42</td> <td>40</td> <td>37</td> </tr> <tr> <td></td> <td>Day</td> <td>L_{Aeq,adj,15 min}</td> <td>45</td> <td>43</td> <td>40</td> </tr> </tbody> </table>					Sensitive Receptor	Time Period	Metric	Short term noise event (dB(A))	Medium term noise event (dB(A))	Long term noise event (dB(A))	Struan Homestead	Day	L _{Aeq,adj,15 min}	45	43	40	Evening	L _{Aeq,adj,15 min}	51	49	46	Night	L _{Aeq,adj,15 min}	38	38	38	Max L _{pA,15mins}	55	55	55	Morning	L _{Aeq,adj,15 min}	46	44	41	Struan Ringers	Day	L _{Aeq,adj,15 min}	45	43	40	Evening	L _{Aeq,adj,15 min}	46	44	41	Night	L _{Aeq,adj,15 min}	36	36	36	Max L _{pA,15mins}	55	55	55	Morning	L _{Aeq,adj,15 min}	42	40	37		Day	L _{Aeq,adj,15 min}	45	43	40
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Sensitive Receptor	Time Period	Metric	Short term noise event (dB(A))	Medium term noise event (dB(A))	Long term noise event (dB(A))																																																																																												
Struan Homestead	Day	L _{Aeq,adj,15 min}	45	43	40																																																																																												
	Evening	L _{Aeq,adj,15 min}	51	49	46																																																																																												
	Night	L _{Aeq,adj,15 min}	38	38	38																																																																																												
		Max L _{pA,15mins}	55	55	55																																																																																												
	Morning	L _{Aeq,adj,15 min}	46	44	41																																																																																												
Struan Ringers	Day	L _{Aeq,adj,15 min}	45	43	40																																																																																												
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	Night	L _{Aeq,adj,15 min}	36	36	36																																																																																												
		Max L _{pA,15mins}	55	55	55																																																																																												
	Morning	L _{Aeq,adj,15 min}	42	40	37																																																																																												
	Day	L _{Aeq,adj,15 min}	45	43	40																																																																																												

Reference	Streamline Model Condition	Project Outcome												
		Meroo Downs	Evening	LAeq,adj, 15 min	52	50	47							
	Night			LAeq,adj, 15 min	45	45	45							
				Max LpA, 15 mins	55	55	55							
		Morning		LAeq,adj, 15 min	51	49	46							
		Togara	Day	LAeq,adj, 15 min	45	43	40							
			Evening	LAeq,adj, 15 min	46	44	41							
	Night			LAeq,adj, 15 min	36	36	36							
				Max LpA, 15 mins	55	55	55							
		Morning		LAeq,adj, 15 min	42	40	37							
Noise 2.	<p>If the noise subject to a <u>valid complaint</u> is <u>tonal</u> or <u>impulsive</u>, the adjustments detailed in Protecting acoustic values, Table 2— Adjustments to be added to noise levels at <u>sensitive receptors</u> are to be added to the measured noise level(s) to derive LAeq,adj, 15 min.</p> <p>Protecting acoustic values, Table 2—Adjustments to be added to noise levels at sensitive receptors</p> <table border="1"> <thead> <tr> <th>Noise Characteristic</th> <th>Adjustment to noise</th> </tr> </thead> <tbody> <tr> <td>Tonal characteristics</td> <td>+ 2 dBA</td> </tr> <tr> <td>Tonal characteristics is clearly audible</td> <td>+ 5 dBA</td> </tr> <tr> <td>Impulsive characteristics is detectable</td> <td>+ 2 to + 5 dBA</td> </tr> </tbody> </table>	Noise Characteristic	Adjustment to noise	Tonal characteristics	+ 2 dBA	Tonal characteristics is clearly audible	+ 5 dBA	Impulsive characteristics is detectable	+ 2 to + 5 dBA	No change proposed to condition				
Noise Characteristic	Adjustment to noise													
Tonal characteristics	+ 2 dBA													
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Noise 3.	Notwithstanding condition (Noise 1), emission of any low frequency noise must not exceed either (Noise 3(a)) and (Noise 3(b)), or (Noise 3(c)) and (Noise 3(d)) in the event of a valid complaint about low frequency noise being made to the administering authority:	Low frequency noise is not expected to be emitted as a result of the project												

Reference	Streamline Model Condition	Project Outcome
	<ul style="list-style-type: none"> a. 60 dB(C) measured outside the sensitive receptor; and b. the difference between the external A-weighted and C-weighted noise levels is no greater than 20 dB; or c. 50 dB(Z) measured inside the sensitive receptor; and d. the difference between the internal A-weighted and Z-weighted (Max LpZ, 15 min) noise levels is no greater than 15 dB. 	
Noise 4. PESCC 21.	A Blast Management Plan must be developed for each blasting activity in accordance with Australian Standard 2187.	Not applicable. Blasting will not occur
Noise 5. PESCC 22.	Blasting operations must be designed to not exceed an airblast overpressure level of 120 dB (linear peak) at any time, when measured at or extrapolated to any sensitive place.	Not applicable. Blasting will not occur
Noise 6. PESCC	Blasting operations must be designed to not exceed a ground-borne vibration peak particle velocity of 10mm/s at any time, when measured at or extrapolated to any sensitive place.	Not applicable. Blasting will not occur
Streamlined Conditions – Protecting Air Values		
Venting and flaring		
Air 1.	<p>Unless venting is authorised under the <i>Petroleum and Gas (Production and Safety) Act 2004</i> or the <i>Petroleum Act 1923</i>, waste gas must be flared in a manner that complies with all of (Air 1(a)) and (Air 1(b)) and (Air 1(c)), or with (Air 1(d)):</p> <ul style="list-style-type: none"> a. an automatic ignition system is used, and b. a flame is visible at all times while the waste gas is being flared, and 	A safety flare will be located at the GCF but will only be used for emergency purposes.

Reference	Streamline Model Condition	Project Outcome																								
	<p>c. there are no visible smoke emissions other than for a total period of no more than 5 minutes in any 2 hours, or</p> <p>d. it uses an <u>enclosed flare</u>.</p>																									
<p>Fuel burning and combustion facilities – authorised point sources</p>																										
Air 2A.	A fuel burning or combustion facility must not be operated unless it is listed in Protecting air values, Table 1 Authorised point sources.	Not applicable. Fuel burning and combustion activities proposed for the project do not meet the thresholds and definition of ‘fuel burning or combustion facility’, whereby it is not capable of burning more than 500 kg of fuel in an hour in isolation, combined or interconnected.																								
Air 2B.	<p>If a <u>fuel burning or combustion</u> facility is listed in Protecting air values, Table 1—Authorised point sources, the fuel burning or combustion facility must be operated so that the releases to air do not exceed the limits specified in Protecting air values, Table 1—Authorised point sources at the specified release point reference.</p> <p>Protecting air values, Table 1—Authorised point sources</p> <table border="1"> <thead> <tr> <th rowspan="2">Resources Authority</th> <th rowspan="2">Facility</th> <th rowspan="2">Release Point Reference</th> <th rowspan="2">Equipment Description</th> <th rowspan="2">Minimum Release Height (m)</th> <th rowspan="2">Minimum Efflux Velocity (m / sec)</th> <th colspan="2">Nox as Nitrogen Dioxide</th> <th colspan="2">Carbon Monoxide</th> </tr> <tr> <th>Maximum concentration (mg / Nm3)</th> <th>Maximum Mass emission rate (g / sec)</th> <th>Maximum concentration (mg / Nm3)</th> <th>Maximum Mass emission rate (g / sec)</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Resources Authority	Facility	Release Point Reference	Equipment Description	Minimum Release Height (m)	Minimum Efflux Velocity (m / sec)	Nox as Nitrogen Dioxide		Carbon Monoxide		Maximum concentration (mg / Nm3)	Maximum Mass emission rate (g / sec)	Maximum concentration (mg / Nm3)	Maximum Mass emission rate (g / sec)											Not applicable. As per explanation provided in Condition (Air 2A)
Resources Authority	Facility							Release Point Reference	Equipment Description	Minimum Release Height (m)	Minimum Efflux Velocity (m / sec)	Nox as Nitrogen Dioxide		Carbon Monoxide												
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Reference	Streamline Model Condition	Project Outcome
Point source air monitoring		
Air 3.	<p>Point source air monitoring for each fuel burning or combustion facility listed in Protecting air values, Table 1—Authorised point sources must:</p> <ul style="list-style-type: none"> a. be undertaken once: <ul style="list-style-type: none"> i. in the first three months after each facility is first commissioned, and then ii. every year thereafter b. be carried out when the facility the subject of the sampling is operating under maximum operating conditions for the annual period; and c. demonstrate compliance with the limits listed in Protecting air values, Table 1—Authorised point sources at each release point reference. 	Not applicable. As per explanation provided in Condition (Air 2A)

Reference	Streamline Model Condition	Project Outcome																				
Air 4.	<p>The operation of fuel burning or combustion facilities must not result in ground level concentrations of contaminants exceeding the maximum limits specified in Protecting air values, Table 2—Maximum ground level concentration of contaminants to air.</p> <p>Protecting air values, Table 2—Maximum ground level concentration of contaminants to air</p> <table border="1"> <thead> <tr> <th>Contaminant</th> <th>EPP AUt Quality Objective/ Maximum ground level concentration at 0 degrees Celsius</th> <th>Units</th> <th>Averaging time</th> </tr> </thead> <tbody> <tr> <td>e.g. Nitrogen Dioxide</td> <td>e.g. 250</td> <td>µg/m³</td> <td>1 hour</td> </tr> <tr> <td>e.g. Nitrogen Dioxide</td> <td>e.g. 62</td> <td>µg/m³</td> <td>1 year</td> </tr> <tr> <td>e.g. Sulphur Dioxide</td> <td>e.g. 570</td> <td>µg/m³</td> <td>1 hour</td> </tr> <tr> <td>e.g. Carbon Monoxide</td> <td>e.g. 11</td> <td>mg/m³</td> <td>8 hours</td> </tr> </tbody> </table>	Contaminant	EPP AUt Quality Objective/ Maximum ground level concentration at 0 degrees Celsius	Units	Averaging time	e.g. Nitrogen Dioxide	e.g. 250	µg/m ³	1 hour	e.g. Nitrogen Dioxide	e.g. 62	µg/m ³	1 year	e.g. Sulphur Dioxide	e.g. 570	µg/m ³	1 hour	e.g. Carbon Monoxide	e.g. 11	mg/m ³	8 hours	Not applicable. As per explanation provided in Condition (Air 2A)
Contaminant	EPP AUt Quality Objective/ Maximum ground level concentration at 0 degrees Celsius	Units	Averaging time																			
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e.g. Carbon Monoxide	e.g. 11	mg/m ³	8 hours																			
Air receiving environment monitoring program																						
Air 5.	An air receiving environment monitoring program (AREMP) must be developed to demonstrate compliance with the limits in Protecting Air Values, Table 2—Maximum ground level concentration of contaminants to air.	No change proposed to condition																				
Air 6.	The AREMP must include, but not necessarily be limited to: <ul style="list-style-type: none"> a. the delineation of the relevant air shed(s) 	No change proposed to condition																				

Reference	Streamline Model Condition	Project Outcome
	<ul style="list-style-type: none"> b. the identification of background reference sites and impact monitoring sites within the relevant air shed(s), including sensitive places c. a monitoring program to be carried out annually that: <ul style="list-style-type: none"> i. includes background reference and impact monitoring sites ii. includes an assessment of meteorological conditions (wind speed and direction) iii. is sufficient to determine compliance with the limits listed in Protecting Air Values, Table 2— Maximum ground level concentration of contaminants to air iv. identifies the effects of the authorised contaminants released to air in the relevant air shed(s) v. is representative of when the fuel burning or combustion facilities are operating under maximum operating conditions for the annual period d. an assessment of the condition of each fuel burning or combustion facility; and e. a description of other significant point sources in the air shed and surrounding land use including sensitive places. 	
Air 7.	An AREMP report must be written annually which includes the information required by condition (Air 6) and an assessment of the extent to which monitoring data for ground level concentrations complies with the air contaminant limits listed in Protecting air values, Table 2—Maximum ground level concentration of contaminants to air.	No change proposed to condition
Air 8.	Where monitoring data indicates that ground level concentrations listed in Protecting air values, Table 2— Maximum ground level concentration of contaminants to air have not been met, the AREMP	No change proposed to condition

Reference	Streamline Model Condition	Project Outcome
	<p>report required by condition (Air 7) must also include an assessment of:</p> <ul style="list-style-type: none"> a. the extent to which the values of the air environment in the relevant air shed(s) are being protected b. an assessment of whether contaminant releases to the air environment are consistent with the air management hierarchy in the Environmental Protection (Air) Policy 2008, and c. any corrective actions that have been implemented or proposed to be implemented to become consistent with the air management hierarchy and achieve compliance with Protecting air values, Table 2— Maximum ground level concentration of contaminants to air. 	
Air 9.	<p>A <u>statement of compliance</u> prepared by a suitably qualified person must accompany each AREMP report required by condition (Air 7) and if applicable, condition (Air 8) stating:</p> <ul style="list-style-type: none"> a. whether the AREMP as most recently implemented complies with the requirements of conditions (General 7 / PESCD1), condition (General 11(d)), (Air 5) and (Air 6) b. that, to the best of the suitably qualified person’s knowledge, the assessment required by condition (Air 7) and if applicable, condition (Air 8) is true, correct and complete, and c. that, to the best of the suitably qualified person’s knowledge, all information provided as part of the statement of compliance, including attachments, is true, correct and complete. 	No change proposed to condition
Air 10.	<p>Where condition (Air 8) applies, the documents required by conditions (Air 7), (Air 8) and (Air 9) must be given to the administering authority within 5 business days after the AREMP report is written.</p>	No change proposed to condition

Reference	Streamline Model Condition	Project Outcome
Streamlined Conditions – Protecting Land Values		
General		
Land 1.	Contaminants must not be directly or indirectly released to land except for those releases authorised by conditions <<insert relevant waste to land conditions>>.	No change proposed to condition
Top soil management		
Land 2.	Top soil must be managed in a manner that preserves its biological and chemical properties.	No change proposed to condition
Land management		
Land 3.	Land that has been significantly disturbed by the petroleum activities must be managed to ensure that mass movement, gully erosion, rill erosion, sheet erosion and tunnel erosion do not occur on that land.	No change proposed to condition
Acid sulphate soils		
Land 4.	Acid sulfate soils must be treated and managed in accordance with the latest edition of the <i>Queensland Acid Sulfate Soil Technical Manual</i> .	No change proposed to condition It is noted that there are no acid sulfate soils mapped over the project area.
Chemical storage		
Land 5.	Chemicals and fuels stored, must be effectively contained and where relevant, meet Australian Standards, where such a standard is applicable.	No change proposed to condition
Pipeline operation and maintenance		

Reference	Streamline Model Condition	Project Outcome
Land 6.	Pipeline operation and maintenance must be in accordance, to the greatest practicable extent, with the relevant section of the APIA Code of Environmental Practice: Onshore Pipelines (2009).	No change proposed to condition
Pipeline reinstatement and revegetation		
Land 7. PPSCE 17.	Pipeline trenches must be backfilled, and topsoils reinstated within three months after pipe laying.	No change proposed to condition
Land 8.	Reinstatement and revegetation of the pipeline right of way must commence within 6 months after cessation of petroleum activities for the purpose of pipeline construction.	No change proposed to condition
Land 9.	Backfilled, reinstated and revegetated pipeline trenches and right of ways must be: <ul style="list-style-type: none"> a. a <u>stable</u> landform b. re-profiled to a level consistent with surrounding soils c. re-profiled to original contours and establishment drainage lines; and d. vegetated with groundcover which is not a <u>declared pest species</u>, and which is established and growing 	No change proposed to condition
Streamlined Conditions – Protecting Biodiversity Values		
Confirming biodiversity values		
Biodiversity 1.	Prior to undertaking activities that result in significant disturbance to land in areas of native vegetation, confirmation of on-the-ground <u>biodiversity values</u> of the native vegetation communities at that location must be undertaken by a suitably qualified person.	No change proposed to condition

Reference	Streamline Model Condition	Project Outcome
Biodiversity 2.	A suitably qualified person must develop and certify a methodology so that condition (Biodiversity 1) can be complied with and which is appropriate to confirm on-the-ground biodiversity values.	No change proposed to condition
Biodiversity 3.	For conditions (Biodiversity 4) to (Biodiversity 9), where mapped biodiversity values differ from those confirmed under conditions (Biodiversity 1) and (Biodiversity 2), petroleum activities may proceed in accordance with the conditions of the environmental authority based on the confirmed on-the-ground biodiversity value.	No change proposed to condition
Planning for land disturbance		
Biodiversity 4.	<p>The location of the petroleum activity(ies) must be selected in accordance with the following site planning principles:</p> <ul style="list-style-type: none"> a. maximise the use of <u>areas of pre-existing disturbance</u> b. in order of preference, avoid, minimise or mitigate any impacts, including cumulative impacts, on areas of native vegetation or other areas of ecological value c. minimise disturbance to land that may result in <u>land degradation</u> d. in order of preference, avoid then minimise isolation, fragmentation, edge effects or dissection of tracts of native vegetation; and e. in order of preference, avoid then minimise <u>clearing</u> of native mature trees. 	No change proposed to condition
Planning for land disturbance – linear infrastructure		
Biodiversity 5.	<p>Linear infrastructure construction corridors must:</p> <ul style="list-style-type: none"> a. maximise co-location 	No change proposed to condition

Reference	Streamline Model Condition	Project Outcome
	<p>b. be minimised in width to the greatest practicable extent; and</p> <p>c. for linear infrastructure that is an <u>essential petroleum activity</u> authorised in an <u>environmentally sensitive area</u> or its <u>protection zone</u>, be no greater than 40m in total width.</p>	
Authorised disturbance to Environmentally Sensitive Areas		
	<p><< Use conditions (Biodiversity 6) and (Biodiversity 7) where the environmental authority application does not request access to Category A, B or C environmentally sensitive areas or their protection zones, or is silent on impacts to these values. >></p> <p><< Or, if access to Category A, B or C environmentally sensitive areas or their protection zones is requested in the application and approved, delete conditions (Biodiversity 6) and (Biodiversity 7) and insert (Biodiversity 8) as relevant to the scope of the approval request. >></p>	<p>It is noted the project does not propose to impact any ESAs, therefore, the Proponent requests to use (Biodiversity 6) and (Biodiversity 7) and not include (Biodiversity 8)</p>
Biodiversity 6.	<p>Petroleum activities are not permitted in <u>Category A</u>, B or C environmentally sensitive areas.</p>	<p>No change proposed to condition</p>
Biodiversity 7.	<p>Essential petroleum activities may be undertaken in areas of pre-existing disturbance in the primary protection zones of <u>Category B environmentally sensitive areas</u> that are ‘endangered’ regional ecosystems and <u>Category C environmentally sensitive areas</u> other than ‘nature refuges’ or ‘koala habitat’ areas, providing those activities do not have a measurable negative impact on the adjacent environmentally sensitive area.</p>	<p>No change proposed to condition</p>
Biodiversity 8.	<p>Where petroleum activities are to be carried out in environmentally sensitive areas or their protection zones, the petroleum activities must be carried out in accordance with Protection of Biodiversity Values, Table 1—Authorised petroleum activities in environmentally sensitive areas and their protection zones.</p>	<p>Request to remove (Biodiversity 8) as (Biodiversity 6) and (Biodiversity 7) apply.</p>

Reference	Streamline Model Condition				Project Outcome
	Protecting biodiversity values, Table 1—Authorised petroleum activities in environmentally sensitive areas and their protection zones				
	Environmentally sensitive area	Within the environmentally sensitive area	Primary protection zone of the environmentally sensitive area	Secondary protection zone of the environmentally sensitive area	
	Category A environmentally sensitive areas	No petroleum activities permitted.	Only low impact petroleum activities permitted.	Only essential petroleum activities permitted.	
	Category B environmentally sensitive areas that are other than 'endangered' regional ecosystems	Only low impact petroleum activities permitted.	Only low impact petroleum activities permitted.	Only essential petroleum activities permitted.	
	Category B environmentally sensitive areas that are 'endangered' regional ecosystems	Only low impact petroleum activities permitted.	Only essential petroleum activities permitted.	Only essential petroleum activities permitted	
	Category C environmentally sensitive areas that are 'nature refuges' or 'koala habitat'	Only low impact petroleum activities permitted.	Only low impact petroleum activities permitted.	nil	

Reference	Streamline Model Condition				Project Outcome
	Category C environmentally sensitive areas that are 'essential habitat', 'essential regrowth habitat', or 'of concern' regional ecosystems	Only low impact petroleum activities permitted.	Only essential petroleum activities permitted.	nil	
	Category C environmentally sensitive areas that are 'regional parks' (previously known as 'resources reserves')	Only essential petroleum activities permitted.	Only essential petroleum activities permitted.	nil	
	Category C environmentally sensitive areas that are 'state forests' or 'timber reserves'	Only essential petroleum activities permitted.	Petroleum activities permitted.	nil	
	Areas of vegetation that are 'critically limited'	Only low impact petroleum activities permitted.	Only essential petroleum activities permitted.	nil	

Reference	Streamline Model Condition	Project Outcome
Biodiversity 9.	<p>A report must be prepared for each <u>annual return period</u> for all petroleum activities that involved clearing of any environmentally sensitive area or protection zone which includes:</p> <ul style="list-style-type: none"> a. records able to demonstrate compliance with conditions (Biodiversity 4), (Biodiversity 5) and (Biodiversity 8) b. a description of the works c. a description of the area and its pre-disturbance values (which may include maps or photographs, but must include GPS coordinates for the works); and d. based on the extent of environmentally sensitive areas and primary protection zones on the relevant resource authority(ies), the proportion of native vegetation cleared per environmentally sensitive area and primary protection zone, including regional ecosystem type, over the annual return period. 	Not applicable. No clearing of ESAs or protection zones is proposed by the project
Impacts to prescribed environmental matters		
	<p><i><< Note: Conditions (Biodiversity 10 to 20) were not formulated during the streamlining project. These conditions were developed separately by DES in consultation with QRC, APPEA and AMEC to reflect the requirements of the Environmental Offsets Act 2014 following its introduction in July 2014. These conditions have replaced conditions (Biodiversity 8B), and (Biodiversity 10 to 13) from Version 1 of this guideline. >></i></p> <p><i><< Include condition (Biodiversity 10) in all environmental authorities. However, if significant residual impacts to a prescribed environmental matter were not proposed or authorised, there is no need to include Protecting biodiversity values, Table 2—Significant residual impacts to prescribed environmental matters or a reference to Table 2 in condition (Biodiversity 10). Or, if significant residual impacts to a</i></p>	

Reference	Streamline Model Condition	Project Outcome															
	<p><i>prescribed environmental matter were proposed and authorised, include the full condition (Biodiversity 10) and Table 2, populated as per the instructions given in Appendix 1. >></i></p>																
<p>Biodiversity 10.</p>	<p><u>Significant residual impacts to prescribed environmental matters << other than if the impacts were authorised by an existing authority issued before the commencement of the Environmental Offsets Act 2014 >></u>, are not authorised under this environmental authority or the <i>Environmental Offsets Act 2014 << unless the impact(s) is specified in Protecting biodiversity values, Table 2—Significant residual impacts to prescribed environmental matters >>.</i></p> <p>Protecting biodiversity values, Table 2—Significant residual impacts to prescribed environmental matters</p> <table border="1"> <thead> <tr> <th>Prescribed environmental matter</th> <th>Location of impact</th> <th><u>Maximum extent of impact <<OR Maximum extent of impact – stage 1>></u></th> </tr> </thead> <tbody> <tr> <td colspan="3">REGULATED VEGETATION</td> </tr> <tr> <td>Endangered regional ecosystem – insert RE ID</td> <td><i>e.g., maps/figures, coordinates, lot(s) on plan(s), resource authorities or project areas.</i></td> <td><i>X ha</i></td> </tr> <tr> <td>Of concern regional ecosystem (not within an urban area) – insert RE ID</td> <td><i>as per above</i></td> <td><i>X ha</i></td> </tr> <tr> <td>Regional ecosystems (not within an urban area) that intersect a wetland on the</td> <td><i>as per above</i></td> <td><i>X ha</i></td> </tr> </tbody> </table>	Prescribed environmental matter	Location of impact	<u>Maximum extent of impact <<OR Maximum extent of impact – stage 1>></u>	REGULATED VEGETATION			Endangered regional ecosystem – insert RE ID	<i>e.g., maps/figures, coordinates, lot(s) on plan(s), resource authorities or project areas.</i>	<i>X ha</i>	Of concern regional ecosystem (not within an urban area) – insert RE ID	<i>as per above</i>	<i>X ha</i>	Regional ecosystems (not within an urban area) that intersect a wetland on the	<i>as per above</i>	<i>X ha</i>	<p>Not applicable. The project will not result in a significant residual impact to prescribed environmental matters</p>
Prescribed environmental matter	Location of impact	<u>Maximum extent of impact <<OR Maximum extent of impact – stage 1>></u>															
REGULATED VEGETATION																	
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Of concern regional ecosystem (not within an urban area) – insert RE ID	<i>as per above</i>	<i>X ha</i>															
Regional ecosystems (not within an urban area) that intersect a wetland on the	<i>as per above</i>	<i>X ha</i>															

Reference	Streamline Model Condition			Project Outcome
	vegetation management wetlands map – <i>insert RE ID</i>			
	Regional ecosystems (not within an urban area) within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map – <i>insert RE ID and Broad Vegetation Group</i>	<i>as per above</i>	<i>X ha</i>	
	Essential habitat (not in an urban area) for endangered wildlife – <i>insert species name</i>	<i>as per above</i>	<i>X ha</i>	
	Essential habitat (not in an urban area) for vulnerable wildlife – <i>insert species name</i>	<i>as per above</i>	<i>X ha</i>	
	Connectivity areas			
	Connectivity area that is a regional ecosystem (not in urban area) – <i>insert RE ID</i>	<i>as per above</i>	<i>X ha</i>	

Reference	Streamline Model Condition		Project Outcome	
	Wetlands and watercourses			
	A wetland in a wetland protection area shown on the Map of referable wetlands (HES wetlands in GBR) – <i>insert reference</i>	<i>as per above</i>		<i>X ha</i>
	A wetland of high ecological significance shown on the Map of referable wetlands – <i>insert reference</i>	<i>as per above</i>		<i>X ha</i>
	Designated precincts in strategic environmental areas			
	Designated precinct in a strategic environmental areas – <i>insert reference</i>	<i>as per above</i>		
Protected wildlife habitat				
An area shown as a high risk area on the flora survey trigger map that contains plants that are endangered or vulnerable wildlife – <i>insert area and species names</i>	<i>as per above</i>		<i>X ha</i>	

Reference	Streamline Model Condition			Project Outcome
	An area not shown as a high risk area on the flora survey trigger map that contains plants that are endangered or vulnerable wildlife – <i>insert area and species names</i>	<i>as per above</i>	<i>X ha</i>	
	A non-juvenile koala habitat tree located in an area shown as a bushland habitat, high value rehabilitation habitat or medium value rehabilitation habitat in the 'Map of Assessable Development Area Koala Habitat Values' – <i>insert reference</i>	<i>as per above</i>	<i>X ha</i>	
	Habitat for an animal that is endangered wildlife – <i>insert area and species name</i>	<i>as per above</i>	<i>X ha</i>	
	Habitat for an animal that is vulnerable	<i>as per above</i>	<i>X ha</i>	

Reference	Streamline Model Condition		Project Outcome
	wildlife – <i>insert area and species name</i>		
	Habitat for an animal that is special least concern wildlife – <i>insert area and species name</i>	<i>as per above</i>	<i>X ha</i>
	Protected areas		
	National park – <i>insert reference</i>	<i>as per above</i>	<i>X ha</i>
	Regional park – <i>insert reference</i>	<i>as per above</i>	<i>X ha</i>
	Nature refuge – <i>insert reference</i>	<i>as per above</i>	<i>X ha</i>
	Highly protected zones of State marine parks		
	Conservation park zone – <i>insert reference</i>	<i>as per above</i>	<i>X ha</i>
	Marine national park zone – <i>insert reference</i>	<i>as per above</i>	<i>X ha</i>
	Preservation zone – <i>insert reference</i>	<i>as per above</i>	<i>X ha</i>
	Other zones – <i>insert reference</i>	<i>as per above</i>	<i>X ha</i>
	Fish habitat areas		
	A declared fish habitat area – <i>insert reference</i>	<i>as per above</i>	<i>X ha</i>
	Waterway providing fish passage		
	Fish passage (not in an urban area) – <i>insert reference</i>	<i>as per above</i>	<i>X ha</i>
	Marine plants		

Reference	Streamline Model Condition			Project Outcome
	Marine plant (not in an urban area) – insert reference	as per above	X ha	
	Legally secured offset area			
	Legally secured offset area – insert reference	as per above	X ha	
Biodiversity 11.	<p><< Include condition (Biodiversity 11) in all environmental authorities. If Table 2 is not needed to be included in the environmental authority, then delete all grey text from the condition. >></p> <p>Records demonstrating that each impact to a prescribed environmental matter << not listed in Protecting biodiversity values, Table 2—Significant residual impacts to prescribed environmental matters >> did not, or is not likely to, result in a significant residual impact to that matter must be:</p> <ul style="list-style-type: none"> a. completed by an <u>appropriately qualified person</u>; and b. kept for the life of the environmental authority. 			No change proposed to condition
Biodiversity 12.	<p><< Include condition (Biodiversity 12) in all environmental authorities that authorise a significant residual impact to a prescribed environmental matter. Include the relevant condition reference, depending on whether staging will be undertaken. >></p> <p>An <u>environmental offset</u> made in accordance with the <i>Environmental Offsets Act 2014</i> and Queensland Environmental Offsets Policy, as amended from time to time, must be undertaken for the maximum extent of impact to each prescribed environmental matter authorised in Protecting biodiversity values, Table 2—Significant residual impacts to prescribed environmental matters, unless a lesser extent of the impact has been approved in accordance with condition (Biodiversity 14) [for staged offsets] OR condition (Biodiversity 18) [for non-staged offsets].</p> <p>Staged impacts</p>			Not applicable. The project will not result in a significant residual impact to prescribed environmental matters

Reference	Streamline Model Condition	Project Outcome
	<< Insert conditions (Biodiversity 13 to 17) if the environmental authority application, or a notice of election provided prior to the environmental authority application being decided, proposed to carry out the activities that will, or are likely to, result in a significant residual impact to a prescribed environmental matter in stages, as well as the undertaking of environmental offsets in stages. >>	
Biodiversity 13.	The significant residual impacts to a prescribed environmental matter authorised in condition (Biodiversity 10) for which an environmental offset is required by condition (Biodiversity 12) may be carried out in stages. An environmental offset can be delivered for each stage of the impacts to prescribed environmental matters.	Not applicable. The project will not result in a significant residual impact to prescribed environmental matters
Biodiversity 14.	Prior to the commencement of each stage, a report completed by an appropriately qualified person, that includes an analysis of the following must be provided to the administering authority: <ul style="list-style-type: none"> a. for the forthcoming stage—the estimated significant residual impacts to each prescribed environmental matter; and b. for the previous stage, if applicable—the actual significant residual impacts to each prescribed environmental matter, to date. 	Not applicable. The project will not result in a significant residual impact to prescribed environmental matters
Biodiversity 15.	The report required by condition (Biodiversity 14) must be approved by the administering authority before a notice of election for the forthcoming stage, if applicable, is given to the administering authority.	Not applicable. The project will not result in a significant residual impact to prescribed environmental matters
Biodiversity 16.	A notice of election for the staged environmental offset referred to in condition (Biodiversity 15), if applicable, must be provided to the administering authority no less than three months before the proposed commencement of that stage, unless a lesser timeframe has been agreed to by the administering authority.	Not applicable. The project will not result in a significant residual impact to prescribed environmental matters

Reference	Streamline Model Condition	Project Outcome
Biodiversity 17.	<p>Within six months from the completion of the final stage of the project, a report completed by an appropriately qualified person, that includes the following matters must be provided to the administering authority:</p> <ul style="list-style-type: none"> a. an analysis of the actual impacts on prescribed environmental matters resulting from the final stage; and b. if applicable, a notice of election to address any outstanding offset debits for the authorised impacts. 	
Non-staged impacts		
	<p><i><< Insert conditions (Biodiversity 18 to 20) if the environmental authority application, or a notice of election provided prior to the environmental authority application being decided, did not propose to carry out the activities that will, or are likely to, result in significant residual impacts to a prescribed environmental matter, or the undertaking of environmental offsets in stages. Offset debits are not allowed for non-staged impacts and any exceedances of the maximum extent of impact authorised in Table 2 are likely to be investigated further as a compliance matter. >></i></p> <p><i><< If the administering authority is satisfied that conditions (Biodiversity 18) and (Biodiversity 19) are not required, i.e., because sufficient information has been provided in the environmental authority application, then these conditions are not necessary for inclusion in the environmental authority. >></i></p>	Not applicable. The project will not result in a significant residual impact to prescribed environmental matters
Biodiversity 18.	Prior to the commencement of any impacts to a prescribed environmental matter for which an environmental offset is required by condition (Biodiversity 12), a report completed by an appropriately qualified person that contains an analysis of the estimated maximum extent of impact to each prescribed environmental matter must be provided to the administering authority.	Not applicable. The project will not result in a significant residual impact to prescribed environmental matters

Reference	Streamline Model Condition	Project Outcome
Biodiversity 19.	The report required by condition (Biodiversity 18) must be approved by the administering authority before the notice of election, if applicable, is given to the administering authority.	Not applicable. The project will not result in a significant residual impact to prescribed environmental matters
Biodiversity 20.	The notice of election for the environmental offset required by condition (Biodiversity 12), if applicable, must be provided to the administering authority no less than three months before the proposed commencement of the significant residual impacts for which the environmental offset is required.	Not applicable. The project will not result in a significant residual impact to prescribed environmental matters
Streamlined Conditions – Protecting Water Values		
Authorised impacts to waters		
Water 1.	<< Insert site-specific conditions authorising impacts to waters, if approved. >>	Not applicable. No authorised impacts are proposed
Authorised impacts to wetlands		
Water 2.	The extraction of groundwater as part of the petroleum activity(ies) from underground aquifers must not directly or indirectly cause environmental harm to a <u>wetland</u> .	No change proposed to condition. It is noted the groundwater assessment undertaken for the project will not have a significant impact on water resources.
Authorised activities in waters		
Water 3.	Petroleum activities must not occur in or within 200m of a: <ul style="list-style-type: none"> a. <u>wetland of high ecological significance</u> b. <u>Great Artesian Basin Spring</u> c. <u>subterranean cave GDE.</u> 	No change proposed to condition

Reference	Streamline Model Condition	Project Outcome
Water 4.	Only construction or maintenance of <u>linear infrastructure</u> is permitted in or within <u>any wetland of other environmental value</u> or in a <u>watercourse</u> .	No change proposed to condition
Water 5A.	The construction or maintenance of linear infrastructure in a wetland of other environmental value must not result in the: <ul style="list-style-type: none"> a. clearing of riparian vegetation outside of the minimum area practicable to carry out the works; or b. ingress of saline water into freshwater aquifers; or c. draining or filling of the wetland beyond the minimum area practicable to carry out the works. 	No change proposed to condition
Water 5B.	After the construction or maintenance works for linear infrastructure in a wetland of other environmental value are completed, the linear infrastructure must not: <ul style="list-style-type: none"> a. drain or fill the wetland b. prohibit the flow of surface water in or out of the wetland c. lower or raise the water table and hydrostatic pressure outside the bounds of natural variability that existed before the activities commenced d. result in ongoing negative impacts to water quality e. result in bank instability; or f. result in fauna ceasing to use adjacent areas for habitat, feeding, roosting or nesting. 	No change proposed to condition
Water 6.	The construction or maintenance of linear infrastructure activities in a watercourse must be conducted in the following preferential order: <ul style="list-style-type: none"> a. firstly, in times where there is no water present b. secondly, in times of no flow c. thirdly, in times of flow, providing a bankfull situation is not expected and that flow is maintained. 	No change proposed to condition

Reference	Streamline Model Condition	Project Outcome			
Water 7.	<p>The construction or maintenance of linear infrastructure authorised under condition (Water 4) must comply with the water quality limits as specified in Protecting water values, Table 1—Release limits for construction or maintenance of linear infrastructure.</p> <p>Protecting water values, Table 1—Release limits for construction or maintenance of linear infrastructure</p>	No change proposed to condition			
	<table border="1"> <thead> <tr> <th>Water quality parameters</th> <th>Units</th> <th>Water quality limits</th> </tr> </thead> </table>		Water quality parameters	Units	Water quality limits
	Water quality parameters		Units	Water quality limits	
<table border="1"> <tbody> <tr> <td rowspan="3">Turbidity</td> <td rowspan="3">Nephelometric Turbidity Units (NTU)</td> <td> <p>For a wetland of other environmental value, if background water turbidity is above 45 NTU, no greater than 25% above background water turbidity measured within a 50m radius of the construction or maintenance activity.</p> <p>For a watercourse, if background water turbidity is above 45 NTU, no greater than 25% above background water turbidity measured within 50m downstream of the construction or maintenance activity.</p> </td> </tr> <tr> <td> <p>For a wetland of other environmental value, if background water turbidity is equal to, or below 45 NTU, a turbidity limit of no greater than 55 NTU applies, measured within a 50m radius of the construction or maintenance activity.</p> </td> </tr> <tr> <td> <p>For a watercourse, if background water turbidity is equal to, or below 45 NTU, a turbidity limit of no greater than 55 NTU applies, measured within 50m</p> </td> </tr> </tbody> </table>	Turbidity	Nephelometric Turbidity Units (NTU)	<p>For a wetland of other environmental value, if background water turbidity is above 45 NTU, no greater than 25% above background water turbidity measured within a 50m radius of the construction or maintenance activity.</p> <p>For a watercourse, if background water turbidity is above 45 NTU, no greater than 25% above background water turbidity measured within 50m downstream of the construction or maintenance activity.</p>	<p>For a wetland of other environmental value, if background water turbidity is equal to, or below 45 NTU, a turbidity limit of no greater than 55 NTU applies, measured within a 50m radius of the construction or maintenance activity.</p>	<p>For a watercourse, if background water turbidity is equal to, or below 45 NTU, a turbidity limit of no greater than 55 NTU applies, measured within 50m</p>
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Reference	Streamline Model Condition		Project Outcome
		downstream of the construction or maintenance activity.	
	Hydrocarbons	- For a wetland of other environmental value, or watercourse, no visible sheen or slick	
Water 8.	Monitoring must be undertaken at a frequency that is appropriate to demonstrate compliance with condition (Water 7).		No change proposed to condition
Register of activities in wetlands and watercourses			
Water 9.	<p>A register must be kept of all linear infrastructure construction and maintenance activities in a wetland of other environmental value and watercourses, which must include:</p> <ol style="list-style-type: none"> location of the activity (e.g. GPS coordinates (GDA94) and watercourse name) estimated flow rate of surface water at the time of the activity duration of works, and results of impact monitoring carried out under condition (Water 8). 		No change proposed to condition
Activities in river improvement areas			
Water 10.	Measures must be taken to minimise negative impacts to, or reversal of, any river improvement works carried out in River Improvement Areas by Queensland's River Improvement Trusts.		Not currently relevant but condition left in for protection of any future river improvement area
Activities in floodplains			
Water 11.	<p>Petroleum activity(ies) on <u>floodplains</u> must be carried out in a way that does not:</p> <ol style="list-style-type: none"> concentrate flood flows in a way that will or may cause or threaten a negative environmental impact; or 		No change proposed to condition

Reference	Streamline Model Condition	Project Outcome
	<ul style="list-style-type: none"> b. divert flood flows from natural drainage paths and alter flow distribution; or c. increase the local duration of floods; or d. increase the risk of detaining flood flows. 	
Seepage monitoring program		
Water 12.	<p>A seepage monitoring program must be developed by a suitably qualified person which is commensurate with the site-specific risks of contaminant seepage from containment facilities, and which requires and plans for detection of any seepage of contaminants to groundwater as a result of storing contaminants by << <i>Insert the specified date no longer than 3 months from date of grant of this environmental authority</i> >>.</p>	Not applicable. No significant chemical fuel and /or waste storage is proposed.
Water 13.	<p>The seepage monitoring program required by condition (Water 12) must include but not necessarily be limited to:</p> <ul style="list-style-type: none"> a. identification of the containment facilities for which seepage will be monitored b. identification of trigger parameters that are associated with the potential or actual contaminants held in the containment facilities c. identification of trigger concentration levels that are suitable for early detection of contaminant releases at the containment facilities d. installation of background seepage monitoring bores where groundwater quality will not have been affected by the petroleum activities authorised under this environmental authority to use as reference sites for determining impacts e. installation of seepage monitoring bores that: <ul style="list-style-type: none"> (i) are within formations potentially affected by the containment facilities authorised under this environmental authority (i.e. within the potential area of impact) 	Not applicable. No significant chemical fuel and /or waste storage is proposed.

Reference	Streamline Model Condition	Project Outcome
	<ul style="list-style-type: none"> (ii) provide for the early detection of negative impacts prior to reaching <u>groundwater dependent ecosystems</u>, landholder’s active groundwater bores, or water supply bores (iii) provide for the early detection of negative impacts prior to reaching migration pathways to other formations (i.e. faults, areas of unconformities known to connect two or more formations) f. monitoring of groundwater at each background and seepage monitoring bore at least quarterly for the trigger parameters identified in condition (Water 13(b)) g. seepage trigger action response procedures for when trigger parameters and trigger levels identified in conditions (Water 13(b)) and (Water 13(c)) trigger the early detection of seepage, or upon becoming aware of any monitoring results that indicate potential groundwater contamination h. a rationale detailing the program conceptualisation including assumptions, determinations, monitoring equipment, sampling methods and data analysis; and i. provides for annual updates to the program for new containment facilities constructed in each annual return period. 	
Seepage monitoring bore drill logs		
Water 14.	<p>A bore drill log must be completed for each seepage monitoring bore in condition (Water 13) which must include:</p> <ul style="list-style-type: none"> a. bore identification reference and geographical coordinate location b. specific construction information including but not limited to depth of bore, depth and length of casing, depth and length of screening and bore sealing details 	Not applicable. No significant chemical fuel and /or waste storage is proposed.

Reference	Streamline Model Condition	Project Outcome
	<ul style="list-style-type: none"> c. standing groundwater level and water quality parameters including physical parameter and results of laboratory analysis for the possible trigger parameters d. lithological data, preferably a stratigraphic interpretation to identify the important features including the identification of any aquifers; and e. target formation of the bore. 	
Streamlined Conditions – Rehabilitation		
Rehabilitation planning		
Rehabilitation 1.	<p>A Rehabilitation Plan must be developed by a suitably qualified person and must include the:</p> <ul style="list-style-type: none"> a. <u>rehabilitation goals</u>; and b. procedures to be undertaken for rehabilitation that will: <ul style="list-style-type: none"> i. achieve the requirements of conditions (Rehabilitation 2) to (Rehabilitation 8), inclusive; and ii. provide for appropriate monitoring and maintenance. 	No change proposed to condition
Transitional rehabilitation		
Rehabilitation 2.	<p><u>Significantly disturbed areas</u> that are no longer required for the ongoing petroleum activities, must be rehabilitated within 12 months (unless an exceptional circumstance in the area to be rehabilitated (e.g. a flood event) prevents this timeframe being met) and be maintained to meet the following acceptance criteria:</p> <ul style="list-style-type: none"> a. contaminated land resulting from petroleum activities is remediated and rehabilitated b. the areas are: <ul style="list-style-type: none"> i. non-polluting ii. a stable landform iii. re-profiled to contours consistent with the surrounding landform c. surface drainage lines are re-established 	No change proposed to condition

Reference	Streamline Model Condition	Project Outcome
	<ul style="list-style-type: none"> d. top soil is reinstated; and e. either: <ul style="list-style-type: none"> i. groundcover, that is not a declared pest species, is growing; or ii. an alternative soil stabilisation methodology that achieves effective stabilisation is implemented and maintained. 	
Final rehabilitation acceptance criteria		
Rehabilitation 3.	<p>All significantly disturbed areas caused by petroleum activities which are not <u>being or intended to be utilised by the landholder or overlapping tenure holder</u>, must be rehabilitated to meet the following final acceptance criteria measured either against the highest ecological value <u>adjacent land use</u> or the <u>pre-disturbed land use</u>:</p> <ul style="list-style-type: none"> a. greater than or equal to 70% of native ground cover <u>species richness</u> b. greater than or equal to the total per cent of ground cover c. less than or equal to the per cent species richness of declared plant pest species; and d. where the adjacent land use contains, or the pre-clearing land use contained, one or more <u>regional ecosystem(s)</u>, then at least one regional ecosystem(s) from the same broad vegetation group, and with the equivalent biodiversity status or a biodiversity status with a higher conservation value as any of the regional ecosystem(s) in either the adjacent land or pre-disturbed land, must be present. 	No change proposed to condition
Final rehabilitation acceptance criteria in environmentally sensitive areas		
Rehabilitation 4.	Where significant disturbance to land has occurred in an environmentally sensitive area, the following final rehabilitation criteria as measured against the pre-disturbance biodiversity values assessment (required by conditions (Biodiversity 1) and (Biodiversity 2)) must be met:	Not applicable. No impact to ESAs are proposed

Reference	Streamline Model Condition	Project Outcome
	<ul style="list-style-type: none"> a. greater than or equal to 70% of native ground cover species richness b. greater than or equal to the total per cent ground cover c. less than or equal to the per cent species richness of declared plant pest species d. greater than or equal to 50% of organic litter cover e. greater than or equal to 50% of <u>total density of coarse woody material</u>; and f. all <u>predominant species</u> in the <u>ecologically dominant layer</u>, that define the pre-disturbance regional ecosystem(s) are present. 	
Continuing conditions		
Rehabilitation 5.	Conditions (Rehabilitation 2), (Rehabilitation 3) and (Rehabilitation 4) continue to apply after this environmental authority has ended or ceased to have effect.	Noted.
Rehabilitation reporting for relinquishment of part of an authority to prospect area under the <i>Petroleum and Gas (Production and Safety) Act 2004</i>		
Rehabilitation 6.	Prior to relinquishing all or part of an authority to prospect area, a rehabilitation report must be prepared which specifically relates to the area to be relinquished and demonstrates condition (Rehabilitation 2), (Rehabilitation 3) and (Rehabilitation 4) has been met.	No change proposed to condition
Rehabilitation 7.	The report required under condition (Rehabilitation 6) must be submitted to the administering authority at least 40 business days prior to the relinquishment notice being lodged with the administering authority for the <i>Petroleum and Gas (Production and Safety) Act 2004</i> .	No change proposed to condition
Remaining dams		
Rehabilitation 8.	Where there is a dam (including a low consequence dam) that is being or intended to be utilised by the landholder or overlapping tenure holder, the dam must be decommissioned to no longer accept inflow from the petroleum activity(ies) and the contained water must be of a quality suitable for the intended on-going uses(s) by the landholder or overlapping tenure holder.	No change proposed to condition

Reference	Streamline Model Condition	Project Outcome
Conditions – Well construction, maintenance and stimulation activities		
<p><< Note: Stimulation conditions were not part of the streamlining project, however DES still conditions in relation to stimulation activities. Therefore the most recent version of the stimulation conditions have been inserted for completeness. >></p>		
Drilling activities		
Well activities 1.	Oil based or <u>synthetic based drilling muds</u> must not be used in the carrying out of the petroleum activity(ies).	No change proposed to condition
Well activities 2.	Drilling activities must not result in the connection of the target gas producing formation and another aquifer.	No change proposed to condition
Well activities 3.	Practices and procedures must be in place to detect, as soon as practicable, any fractures that have or may result in the connection of a target formation and another aquifer as a result of drilling activities.	No change proposed to condition
Stimulation activities	<< Where the EA application does not request authorisation of stimulation activities, insert condition (Well activities 4), otherwise insert conditions (Well activities 5) to (Well activities 18). >>	
Well activities 4.	Stimulation activities are not permitted. << OR >>	No change proposed to condition It is noted that stimulation activities are not proposed by the project
Well activities 5.	Polycyclic aromatic hydrocarbons or products that contain polycyclic aromatic hydrocarbons must not be used in stimulation fluids in concentrations above the <u>reporting limit</u> .	Not applicable as (Well activities 4) condition applies
Well activities 6.	Stimulation activities must not negatively affect water quality, other than that within the <u>stimulation impact zone</u> of the target gas producing formation.	Not applicable as (Well activities 4) condition applies
Well activities 7.	Stimulation activities must not cause the connection of the target gas producing formation and another aquifer.	Not applicable as (Well activities 4) condition applies

Reference	Streamline Model Condition	Project Outcome
Well activities 8.	The internal and external mechanical integrity of the well system prior to and during stimulation must be ensured such that there is: <ol style="list-style-type: none"> a. no significant leakage in the casing, tubing, or packer; and b. there is no significant fluid movement into another aquifer through vertical channels adjacent to the well bore hole. 	Not applicable as (Well activities 4) condition applies
Well activities 9.	Practices and procedures must be in place to detect, as soon as practicable, any fractures that cause the connection of a target gas producing formation and another aquifer.	Not applicable as (Well activities 4) condition applies
Stimulation risk assessment		
Well activities 10.	Prior to undertaking stimulation activities, a risk assessment must be developed to ensure that stimulation activities are managed to prevent environmental harm.	Not applicable as (Well activities 4) condition applies
Well activities 11.	The stimulation risk assessment must be carried out for every well to be stimulated prior to stimulation being carried out at that well and address issues at a relevant geospatial scale such that changes to features and attributes are adequately described and must include, but not necessarily be limited to: <ol style="list-style-type: none"> a. a process description of the stimulation activity to be applied, including equipment and a comparison to best international practice b. provide details of where, when and how often stimulation is to be undertaken on the tenures covered by this environmental authority c. a geological model of the field to be stimulated including geological names, descriptions and depths of the target gas producing formation(s) d. naturally occurring geological faults e. seismic history of the region (e.g. earth tremors, earthquakes) f. proximity of overlying and underlying aquifers g. description of the depths that aquifers with environmental values occur, both above and below the target gas producing formation 	Not applicable as (Well activities 4) condition applies

Reference	Streamline Model Condition	Project Outcome
	<ul style="list-style-type: none"> <li>h. identification and proximity of <u>landholder’ active groundwater bores</u> in the area where stimulation activities are to be carried out <li>i. the environmental values of groundwater in the area <li>j. an assessment of the appropriate limits of reporting for all water quality indicators relevant to stimulation monitoring in order to accurately assess the risks to environmental values of groundwater <li>k. description of overlying and underlying formations in respect of porosity, permeability, hydraulic conductivity, faulting and fracture propensity <li>l. consideration of barriers or known direct connections between the target gas producing formation and the overlying and underlying aquifers <li>m. a description of the well mechanical integrity testing program <li>n. process control and assessment techniques to be applied for determining extent of stimulation activities (e.g. microseismic measurements, modelling etc.) <li>o. practices and procedures to ensure that the stimulation activities are designed to be contained within the target gas producing formation <li>p. <u>groundwater transmissivity</u>, flow rate, hydraulic conductivity and direction(s) of flow <li>q. a description of the chemical compounds used in stimulation activities (including estimated total mass, estimated composition, chemical abstract service numbers and properties), their mixtures and the resultant compounds that are formed after stimulation <li>r. a mass balance estimating the concentrations and absolute masses of chemical compounds that will be reacted, returned to the surface or left in the target gas producing formation subsequent to stimulation 	

Reference	Streamline Model Condition	Project Outcome
	<ul style="list-style-type: none"> s. an environmental hazard assessment of the chemicals used including their mixtures and the resultant chemicals that are formed after stimulation including: <ul style="list-style-type: none"> i. toxicological and ecotoxicological information of chemical compounds used ii. information on the persistence and bioaccumulation potential of the chemical compounds used; and iii. identification of the chemicals of potential concern in stimulation fluids derived from the risk assessment t. an environmental hazard assessment of use, formation of, and detection of polycyclic aromatic hydrocarbons in stimulation activities u. identification and an environmental hazard assessment of using radioactive tracer beads in stimulation activities v. an environmental hazard assessment of leaving chemical compounds in stimulation fluids in the target gas producing formation for extended periods subsequent to stimulation w. human health exposure pathways to operators and the regional population x. risk characterisation of environmental impacts based on the environmental hazard assessment y. potential impacts to landholder bores as a result of stimulation activities z. an assessment of cumulative underground impacts, spatially and temporally of the stimulation activities to be carried out on the tenures covered by this environmental authority; and aa. potential environmental or health impacts which may result from stimulation activities including but not limited to water quality, air quality (including suppression of dust and other airborne contaminants), noise and vibration. 	
<p>Water quality baseline monitoring</p>		

Reference	Streamline Model Condition	Project Outcome
Well activities 12.	<p>Prior to undertaking any stimulation activity, a baseline bore assessment must be undertaken of the water quality of:</p> <ul style="list-style-type: none"> a. all landholder’s active groundwater bores (subject to access being permitted by the landholder) that are spatially located within a two (2) kilometre horizontal radius from the location of the stimulation initiation point within the target gas producing formation; and b. all landholders’ active groundwater bores (subject to access being permitted by the landholder) in any aquifer that is within 200m above or below the target gas producing formation and is spatially located with a two (2) kilometre radius from the location of the stimulation initiation point; and c. any other bore that could potentially be adversely impacted by the stimulation activities in accordance with the findings of the risk assessment required by conditions (Well activities 10) and (RMW026). 	Not applicable as (Well activities 4) condition applies
RMW028.	<p>Prior to undertaking stimulation activities at a well, there must be sufficient water quality data to accurately represent the water quality in the well to be stimulated. The data must include as a minimum the results of analyses for the parameters in condition (RMW029).</p>	Not applicable as (Well activities 4) condition applies
RMW029	<p>Baseline bore and well assessments must include relevant analytes and physico-chemical parameters to be monitored in order to establish baseline water quality and must include, but not necessarily be limited to:</p> <ul style="list-style-type: none"> a. pH b. electrical conductivity [$\mu\text{S}/\text{m}$] c. turbidity [NTU] d. total dissolved solids [mg/L] e. temperature [$^{\circ}\text{C}$] f. dissolved oxygen [mg/L] g. dissolved gases (methane, chlorine, carbon dioxide, hydrogen sulfide) [mg/L] 	Not applicable as (Well activities 4) condition applies

Reference	Streamline Model Condition	Project Outcome
	<ul style="list-style-type: none"> h. alkalinity (bicarbonate, carbonate, hydroxide and total as CaCO₃) [mg/L] i. sodium adsorption ratio (SAR) j. anions (bicarbonate, carbonate, hydroxide, chloride, sulphate) [mg/L] k. cations (aluminium, calcium, magnesium, potassium, sodium) [mg/L] l. dissolved and total metals and metalloids (including but not necessarily being limited to: aluminium, arsenic, barium, borate (boron), cadmium, total chromium, copper, iron, fluoride, lead, manganese, mercury, nickel, selenium, silver, strontium, tin and zinc) [µg/L] m. total petroleum hydrocarbons [µg/L] n. BTEX (as benzene, toluene, ethylbenzene, ortho-xylene, para- and meta-xylene, and total xylene) [µg/L] o. polycyclic aromatic hydrocarbons (including but not necessarily being limited to: naphthalene, phenanthrene, benzo[a]pyrene) [µg/L] p. sodium hypochlorite [mg/L] q. sodium hydroxide [mg/L] r. formaldehyde [mg/L] s. ethanol [mg/L]; and t. gross alpha + gross beta or radionuclides by gamma spectroscopy [Bq/L]. 	
Stimulation impact monitoring program		
RMW030.	<p>A stimulation impact monitoring program must be developed prior to the carrying out of stimulation activities which must be able to detect adverse impacts to water quality from stimulation activities and must consider the findings of the risk assessment required by conditions (RMW025) and (RMW026) that relate to stimulation activities and must include, as a minimum, monitoring of:</p>	Not applicable as (Well activities 4) condition applies

Reference	Streamline Model Condition	Project Outcome
	<ul style="list-style-type: none"> a. the stimulation fluids to be used in stimulation activities at sufficient frequency and which sufficiently represents the quantity and quality of the fluids used b. flow back waters from stimulation activities at sufficient frequency and which sufficiently represents the quality of that flow back water c. flow back waters from stimulation activities at sufficient frequency and accuracy to demonstrate that 150% of the volume used in stimulation activities has been extracted from the stimulated well; and d. all bores in accordance with condition (RMW027). 	
RMW031.	<p>The stimulation impact monitoring program must provide for monitoring of:</p> <ul style="list-style-type: none"> a. analytes and physico-chemical parameters relevant to baseline bore and well assessments to enable data referencing and comparison including, but not necessarily being limited to the analytes and physico-chemical parameters in condition (RMW029); and b. any other analyte or physico-chemical parameters that will enable detection of adverse water quality impacts and the inter-connection with a non-target aquifer as a result of stimulation activities including chemical compounds that are actually or potentially formed by chemical reactions with each other or coal seam materials during stimulation activities. 	Not applicable as (Well activities 4) condition applies
RMW032.	<p>The stimulation impact monitoring program must provide for monitoring of the bores in condition (RMW030(d)) at the following minimum frequency:</p> <ul style="list-style-type: none"> a. monthly for the first six (6) months subsequent to stimulation activities being undertaken; then b. annually for the first five (5) years subsequent to stimulation being undertaken or until analytes and physico-chemical parameters listed in conditions (RMW029(a)) to (RMW029(t)) inclusive, are not detected in concentrations above baseline 	Not applicable as (Well activities 4) condition applies

Reference	Streamline Model Condition	Project Outcome
	bore monitoring data on two (2) consecutive monitoring occasions.	
RMW033.	The results of the stimulation impact monitoring program must be made available to any potentially affected landholder upon request by that landholder.	Not applicable as (Well activities 4) condition applies

Conditions – Dams

<< Note: Dams conditions were not part of the streamlining project, however DES still applies conditions in relation to dams. The most recent version of dam conditions can be found in the guideline 'Structures which are dams or levees constructed as part of environmentally relevant activities (ESR/2016/1934e)'. >>

Table notes:

² Advice statements for the environmental authority:

- a. It is an offence under section 426 of the Act for a person to carry out an environmentally relevant activity unless the person holds, or is acting under, an environmental authority for the activity.
- b. The environmental authority does not authorise a relevant act to occur in carrying out an authorised relevant activity unless a condition of this environmental authority expressly authorises the relevant act to occur.
- c. The environmental authority does not authorise environmental harm unless a condition contained within the authority explicitly authorises that harm. Where there is no condition, the absence of a condition shall not be construed as authorising harm.

³ Conditions that include 'SC' are an existing approved and published standard condition.

⁴ Words underlined are currently defined in the dictionary, schedule of an environmental authority or the Environmental Protection Act 1994 and/or its subordinate legislation.

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12 ACRONYMS AND GLOSSARY

AES	Aggregate Environmental Score
AHD	Australian Height Datum
ALA	Atlas of Australia
AQO	Air Quality Objectives
Aquatics Report	Aquatic Values Assessment Report
Basin No. 130	Comet River Sub-basin
CCA	Code and Conduct Agreement
CHRC	Central Highlands Regional Council
CMA	Cumulative management area
CO	Carbon Monoxide
CSG	Coal seam gas
CSG Water Policy	<i>Coal Seam Gas Water Management Policy 2012</i>
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAF	Department of Agriculture and Fisheries
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEHP	Department of Environment and Heritage Protection
DES	Department of Environment and Science
DNRME	Department of Natural Resources, Mines and Energy
DoR	Department of Resources
DPM	DPM EnviroSciences
DRDMW	Department of Regional Development, Manufacturing and Water
EA	Environmental authority
EAR	Environmental Assessment Report
EIS	Environmental Impact Statement
EMP	Environmental management plan
EO Act	<i>Environmental Offsets Act 2014</i>

EOP	Environmental Offsets Policy 2012
EP Act	<i>Environmental Protection Act 1994</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
Epic	Epic Environmental Pty Ltd
EP Regulation	<i>Environmental Protection Regulation 2018</i>
EPP Air	<i>Environmental Protection (Air) Policy 2019</i>
EPP Noise	<i>Environmental Protection (Noise) Policy 2019</i>
EPP Water	<i>Environmental Protection (Water and Wetland Biodiversity) Policy 2019</i>
ERA	Environmentally relevant activity
ESA	Environmentally sensitive area
ESC Plan	Erosion and sediment control plan
EV	Environmental Value
Fisheries Act	<i>Fisheries Act 1994</i>
GCF	Gas compression facility
GDE	Groundwater Dependent Ecosystems
ha	Hectares
HDD	horizontal directional drilling
HES	High Ecological Significance
Hr	Hour
Kg	Kilograms
Km	Kilometres
Lat	Latitude
LGA	Local Government Area
Long	Longitude
m	metre
mbgl	metres below ground level
mm	millimetre

ML	megalitres
MNES	Matters of National Environmental Significance
MSES	Matter of state environmental significance
NC Act	<i>Nature Conservation Act 1992</i>
NC Animals Regulation	<i>Nature Conservation (Animals) Regulation 2020</i>
NC Plants Regulation	<i>Nature Conservation (Plants) Regulation 2020</i>
Noise loggers	Noise monitoring equipment
NPI	National Pollutant Inventory
Nox	Nitrogen Oxide
OGIA	Office of Groundwater Impact Assessment
P&G Act	<i>Petroleum and Gas (Production and Safety) Act 2004</i>
PL	Petroleum Lease
PMST	Protected Matters Search Tool
PPL	Petroleum Pipeline Licence
QEOP Guideline	<i>Queensland Environmental Offsets Policy Significant Residual Impact Guideline</i>
QFES	Queensland Fire and Emergency Services
RE	Regional Ecosystem
RIDA	Regional Interests Development Approval
RPI Act	<i>Regional Planning Interests Act 2014</i>
Report	Supporting information report (this report)
s	second
TEC	Threatened Ecological Communities
The Project	Construct and operate a coal seam gas project, known as Mahalo North Project
The Proponent	Comet Ridge Mahalo North Pty Ltd
UWIR	Underground water impact reports
VM Act	<i>Vegetation Management Act 1999</i>

Water Act	<i>Water Act 2000</i>
WildNet	Queensland Government Wildlife Online
WoNS	Weeds of National Significance
WPA	Wetland Protection Area
WRR Act	Waste Reduction and Recycling Act 2011
WQO	Water Quality Objective