Application for Environmental Authority

Supporting document submission by Clean Energy Fuels Australia Marketing Pty Ltd (CEFA)

Preparation Date: January 2026

Submission in conjunction with:

Site Specific Application for a new Environmental Authority for a Resource Activity Form ESR/2015/1757

Application to be a Suitable Registered Operator Form ESR/2015/1771

Centurion Liquefied Natural Gas Facility

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1.0 SUMMARY

1.1 DOCUMENT SUMMARY

Prepared By	Clean Energy Fuels Australia Marketing Pty Ltd (CEFA)
Prepared For	Department of the Environment, Tourism, Science & Innovation (DETSI)
Nature of contents	Confidential – Not for distribution
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1.2 COMPANY DETAILS

Project Proponent	Clean Energy Fuels Australia Marketing Pty Ltd (CEFA)
Company registered	16/12/2020
State registered in	Western Australia
Business structure	*Company*
Company Numbers	ABN 12 646 658 951 ACN 667 339 406
Registered Office	Clean Energy Fuels Australia Marketing Pty Ltd 239 Planet Street, Welshpool, WA 6106 T (08) 9212 6700
Directors	Gary Ireson Basilio Lenzo
Online	*www.cefa.com.au*
Registered Suitable Operator (Qld)	*Application Form ESR/2015/1771 enclosed*

2.0 INTRODUCTION

2.1 INTRODUCTION

This document supports the Environmental Authority (EA) Application for the construction, installation, operation and eventual decommissioning of the proposed CENTURION LNG FACILITY at the Centurion Coal Mine at Goonyella, Queensland. The completed EA application form (ESR/2015/1757) is presented under separate cover. The application and this supporting document should be read concurrently. This document contains additional detail that cannot be incorporated into the form and the necessary description and assessment of potential impacts and operational controls that will be implemented to prevent and mitigate impacts.

The Proponent is Clean Energy Fuels Australia Marketing Pty Ltd (CEFA). CEFA proposes to construct, own, and operate the micro-LNG plant, referred to as the CENTURION LNG FACILITY (**the facility**). The facility will be located within Mining Lease (ML 6949) held by Centurion Coal Mining Pty Ltd (Centurion Mining) at Goonyella, Queensland.

Incidental coal seam gas (ICSG) will be supplied to the facility from pre drainage activities associated with Centurion Mining's coal mining activities on ML 1790 (to the north of ML6949 and including the proposed expansion of the current underground mine). The ICSG from the Centurion Coal Mine will be piped from UIS (Underground In-Seam) and SIS (Surface In-Seam) gas wells, which are part of the operating mine, directly to the 'battery limits' of the facility.

The facility will be powered using grid power that uses a mix of renewable and thermal energy (with the future stage potential of on-site gas fired power generation). The facility will process up to **1.46 petajoules of ICSG annually**. The gas that will be supplied to the site would otherwise be flared (remotely by the coal mine operator) as a waste product of the mining process.

The gas will be pre-compressed, filtered, dehydrated, purified, and liquefied in the modular micro-LNG plant using cryogenic processes, to produce **70 tonnes per day** of Liquefied Natural Gas (LNG). Produced LNG will be stored on site in **3 x 365,000 litre / 50 tonne** above ground storage tanks. (2 tanks will be installed prior to commissioning, the third tank will be added when gas supply increases)

LNG will be trucked from the site in **double configuration (A Double) heavy vehicles** to remote customers. Based upon requirements and commercial agreements the LNG will be distributed for use as a substitute for diesel or re-gasified for supply into the east coast natural gas grid (for distribution and commercial sale to end users).

The modular micro-LNG plant infrastructure and equipment exist and are owned by CEFA. The micro-LNG plant and all associated equipment was previously installed and operated at Mount Magnet in Western Australia. The plant operated successfully but has subsequently been replaced by a larger LNG plant. Subject to receiving the necessary approvals, it is proposed that the micro-LNG plant will be uplifted, mobilised and transported to Queensland for installation at the facility site near Goonyella. Use of these existing assets will deliver significant environmental and economic benefits to Queensland by providing additional energy resources to remote Queensland customers whilst reducing waste and limiting greenhouse gas emissions due to flaring.

This document supporting the **Environmental Authority (EA)** application outlines the project's **Environmentally Relevant Activities (ERAs)**, proposed operational measures, and the strategies in place to manage and mitigate any environmental impacts associated with the facility (from construction and operation to decommissioning). A Petroleum Facility Licence (PFL) application for the project has been submitted in accordance with the *Petroleum and Gas (Production and Safety) Act 2004*. As the site facility will be located on a mining lease the Petroleum Inspectorate will be the administering authority for all Major Hazard Facility (MHF) considerations.

2.2 PURPOSE

The purpose of this document is to provide sufficient detail to support the application for a site-specific EA to facilitate the construction and operation of the proposed facility. The EA is required to ensure that all environmentally relevant activities (ERAs) associated with the facility are identified, assessed, and managed in compliance with the Queensland *Environmental Protection Act 1994*. Through this document, CEFA aims to demonstrates:

- Competence as a reputable operator,
- That potential environmental impacts related to site development, gas processing, and chemical storage activities have been identified, assessed, and controlled,
- That all risks of harm to environmental values are managed **so far as reasonably practicable**.

2.3 SCOPE

The scope of this EA application includes:

- The site of the facility, immediate surrounding area, sensitive receptors,
- All plant, equipment, processes, and materials used, handled, and stored,
- All stages of the facility lifecycle, including:
    - site preparation, installation and commissioning of the micro-LNG processing plant,
    - operation and maintenance of the facility, and
    - eventual decommissioning and rehabilitation of the site.
- Issues within scope include but are not limited to, risks, preventative and mitigative controls associated with:
    - ecology,
    - land and waters,
    - air and noise emissions,
    - equipment operated, chemicals stored, wastes generated, and
    - site rehabilitation.

This document has been prepared in accordance with the *Environmental Protection Act 1994 (EP Act)* and *Environmental Protection Regulation 2019 (EP Reg),* and accordingly includes assessment of the potential environmental impacts, proposed mitigation strategies, and any relevant management plans required to support the compliance of the proposed facility. Compliance with the requirements of Section 125 of the EPAct are outlined below in ***Table 1***.

The proposed development may expand and increase in subsequent phases. This application is for initial installation, commissioning and operation (Phase 1). In the interests of open and full disclosure, where future expansion or change is foreseeable, the potential future actions are identified and explained.

Table 1 – EA application requirements

EPAct Section	Requirement	Proponent Response
125(1)	An application for an environmental authority must—	
125(1)(a)	be made to the administering authority; and	Submission to DETSI
125(1)(b)	be made in the approved form;	Submission with form ESR/2015/1757
125(1)(c)	describe all environmentally relevant activities for the application;	***Section 2.4*** - Environmentally Relevant Activities
125(1)(d)	describe the land on which each activity will be carried out;	Refer to ***Section 5***.
125(1)(e)	be accompanied by the fee prescribed under a regulation;	Payment to DETSI.
125(1)(f)	If 2 or more entities (joint applicants) jointly make the application—nominate 1 joint applicant as the principal applicant;	Not applicable. Single applicant.
125(1)(g)(i)	State whether the application is – (i)a standard application; or (ii)a variation application; or (iii)a site-specific application; and	Site-specific application.
125(1)(h)	State whether the applicant is a registered suitable operator;	CEFA application to register as a suitable operator under separate cover on form ESR/2015/1771.
125(1)(i)	If a development permit under the Planning Act, or an SDA approval under the State Development Act, is required under either of those Acts for carrying out the environmentally relevant activities for the application—describe the permit or approval;	No development permits or approvals are required (confirmed with petroleum and gas regulator)
125(1)(j)	If the application is a standard or variation application—include a declaration that each relevant activity complies with the eligibility criteria;	Not applicable – Site specific application
125(1)(k)	If the application is a variation application—	Not applicable.
125(1)(l)(i)	Include an assessment of the likely impact of each relevant activity on the environmental values;	Refer to ***Section 7***.
125(1)(l)(ii)	Include a description of the proposed measures for minimising and managing waste generated by each relevant activity;	Refer to ***Sections 6 and 7***.
125(1)(l)(iii)	Include details of any site management plan that relates to the land that is the subject of the application;	Not applicable.
125(1)(m)	State whether the applicant wants any environmental authority granted for the application to take effect on a day nominated by the applicant;	Not applicable – works will commence following approval of EA application and issuance of PFL.
125(1)(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. CEFA is a sub lessee to Centurion Coal Mining who hold the ML and ultimate responsibilities for the ML.
125(1)(o)	Include any other document relating to the application prescribed under a regulation.	Petroleum Facility Licence & Major Hazard Facility operation under the Petroleum & Gas Inspectorate applied separately
126	Requirements for site-specific applications—CSG activities	Requirements not applicable to this development.
126A	Requirements for site-specific applications—particular resource projects and resource activities	Requirements not applicable to this development.

2.4 ENVIRONMENTALLY RELEVANT ACTIVITIES (ERAS)

The CENTURION LNG FACILITY will operate under the tenure of a PFL, as defined under the *Petroleum and Gas (Production and Safety) Act 2004*. This EA application identifies the ERAs associated with the proposed facility, as outlined in **Schedule 2** and **3** of the *Environmental Protection Regulation 2019*.

The ERAs detailed below in ***Table 2*** were determined using online DETSI forms and tools and were confirmed in consultation with DETSI (Energy & Extractive Resources, Environmental Services & Regulation) through pre-lodgement meetings undertaken on 14-Jan-2025 and 15-Jan-2026.

The primary site activity is LNG production and storage, categorised as a petroleum activity under ***Schedule 3*** of the *Environmental Protection Regulation 2019*. Associated activities include **ERA 8, Chemical Storage, for the storage of dangerous goods Class 2.1 flammable gas (LNG)**, with a maximum on-site storage capacity of 150 tonnes. This application addresses both production and storage components of the relevant ERAs. Aggregate environmental scores for each ERA have been calculated and added below.

Table 2 – Prescribed ERAs – Centurion LNG Facility

EP Reg Schedule	Prescribed ERA	Threshold	Aggregate Environmental Score (AES)	Relevance to Project
Sch 3	ERA 8: A petroleum activity	Includes 1 or more activities mentioned in Schedule 2.	126	The facility is a petroleum activity, involving the processing and storage of gas sourced from coal seams.
Sch 2	ERA 8: Chemical Storage	Storage of 50t or more of a chemicals of dangerous goods class 2.1 flammable gas (LNG), with maximum on-site storage capacity approximately 150 tonnes.	51	The facility includes storage infrastructure for up to 150 tonnes of liquified natural gas in its first phase.
Sch 2	ERA 9: Hydrocarbon gas refining	Refining coal seam gas.	64	The facility will process incidental coal seam gas (ICSG) from an operating mine.

The proposed facility is a small-scale, modular plant, which will solely process incidental coal seam gas that is a waste from adjacent mining process that would otherwise be flared. The facility footprint, emissions, and waste are relatively small. The net environmental impact is accordingly minor. With respect to greenhouse gas emissions, the facility provides an overall net benefit, by capturing and processing waste gas (that would have otherwise been flared), and distributing it as a fuel source potentially displacing more carbon intensive fuels such as diesel. Whilst the facility will process incidental coal seam gas (ICSG), this is not a typical CSG field activity. The facility will not extract coal seam gas (it will be delivered to the site by pipeline). The facility will not extract, store, or treat groundwater to produce or process gas. The operation will convert existing waste gas from an operating coal mine into LNG for beneficial use.

3.0 THE PROPONENT – CLEAN ENERGY FUELS AUSTRALIA MARKETING (CEFA)

3.1 PROJECT PROPONENT INTRODUCTION

Clean Energy Fuels Australia (CEFA) was founded in 2008 in Perth by a team of experienced West Australian energy professionals in response to a growing demand for professional off network energy advisory services. The proponent, Clean Energy Fuels Australia Marketing Pty Ltd is a subsidiary of Clean Energy Fuels Australia Pty Ltd (CEFA).

CEFA commenced LNG distribution operations on the East Coast of Australia in 2012 (through subsidiary Clean Energy Distribution Pty Ltd (CED)). CED secured LNG customers in Victoria, South Australia and New South Wales and became the only independent LNG distributer in Australia.

CEFA continued to provide advisory services from Perth and operate the CED business on the east coast until 2019 when advisory services were diverted into a partnership with global infrastructure fund manager – I Squared Capital (**I Squared**). This facilitated the beginning of the Mid-West LNG Hub project and the long-term partnership between I Squared and CEFA to develop trucked LNG solutions across Australia as part of a diversified energy platform focused on low emissions and renewable energy operations.

I Squared become the majority shareholder in CEFA In late 2020, in conjunction with the positive investment decision into the Mid-West LNG Hub and the formation of CED's 'sister' corporation Mid-West LNG Pty Ltd, which has since become the operator of the Mid-West LNG Hub. CEFA remains as the LNG brand leader, project development and operational management entity.

The Mid-West LNG Hub now consists of a state of the art, modular 250 tonne per day (**tpd**) mixed-refrigerant liquefaction plant which supplies LNG to mining customers in the Mid-West and South-West regions of WA. The Mid-West LNG hub is capable of being expanded to a multi-train facility with an increased production capacity of 500tpd. In 2024 CEFA acquired 50% interest in the 400km long Mid-west Gas Pipeline in Western Australia. In 2024 CEFA completed the largest LNG virtual pipeline storage installation in the world, at Western Australia Pilbara Minerals. I Squared continue to provide 100% of the required funding for the development of the CEFA energy platform, including the expansion of the Mid-West LNG Hub.

I Squared is the major shareholder in CEFA. I Squared is an independent global infrastructure manager focussing on investments in energy, utilities, transport, telecom and social infrastructure. With commitments from some of the world's largest pension and sovereign wealth funds, I Squared manages over US$34 billion of assets across various infrastructure asset classes. The firm is headquartered in Miami and has offices in New York, New Delhi, London, Hong Kong and Singapore.

I Squared has 52 portfolio companies in over 54 countries and has extensive operating experience in energy, telecoms infrastructure, datacentres and toll roads. A significant portion of the fund's investments are in the energy sector including 15,900MW of thermal (gas, LNG and diesel) and 4,400MW of renewable (solar, wind, hydro, waste and bio energy) power generation assets, 3,300km+ of gas gathering lines and pipelines, LNG production facilities with a capacity of 1.5 billion MMBTU and 4,400+ cubic kilometres of bulk liquid storage.

3.2 KEY PERSONNEL

The Key Personnel involved in the delivery and operation of the facility are outlined in ***Table 3***.

Table 3 – Key personnel

Name	Position	Role
Basil Lenzo	Managing Director	Project Director
Gary Ireson	Director	Project Sponsor / Company Contact
David Trembecki	General Manager Corporate	Project Sponsor
Andrew Mayo	Project Consultant	Project and Commercial
Chris Baumann	Project Consultant	Commercial
Wolfgang Jovanovic	Project Manager	Project Manager
Darren Gavin → Guy Bowden (handover Feb-26)	Project Manager	Owner Project Manager
David Wheatley	Project Engineer	Project Engineer
Kevin Menage	Installation Manager	Construction Manager
Raheel Khan	General Manager Production	Operational Management of the facility

The facility project delivery team will be led by Basil Lenzo as Project Director, with Gary Ireson and David Trembecki providing project sponsorship peer review. Details of the project directors and sponsors are outlined below.

3.2.1 Basil Lenzo – Managing Director

Basil is a qualified mechanical engineer and practicing lawyer, specialising in both the technical and commercial aspects of project development, project delivery and day to day operations including CEFA's LNG east coast distribution business.

The unique combination of Basil's technical and commercial experience is particularly useful at more advanced stages of project development, such as detailed technical and commercial discussions with suppliers, review of operational cost assumptions, approvals, specifications requirements and final tender responses.

Basil qualified as a mechanical engineer and was a successful engineer having worked across a variety of sectors including gold, mineral sands, base metals, coal and iron ore in mechanical, process and project delivery roles before qualifying as a lawyer and starting his own legal practice. Basil has been responsible for design and construction of a large number of projects, in both technical and legal roles, most notably the Tronox Cooljarloo Wet, Dry and Synthetic Rutile Plants and Yara's Burrup Fertiliser Plant.

3.2.2 Gary Ireson – Director

Gary is a driven management professional with a background in engineering and downstream gas applications. Gary specialises in identifying opportunities for collaboration between organisations to drive value from projects. Through his experience and day to day engagement in the mining & energy space, Gary provides a constant source of new opportunities, as well as an additional resource for CEFA.

Gary is a mechanical engineer and has more than 25 years of relevant industry experience including establishing Wesfarmers LNG plant in Kwinana under his role as Director Gas and Power. Gary is Executive General Manager at Rivet Group (ex Cootes) which provides bulk ore haulage and energy haulage services in WA.

3.2.3 David Trembecki – GM Corporate

David is a motivated and engaged energy expert, specialising in key technology, opportunity identification & assessment and supplier relationships. David is responsible for the design, construction and operation of CEFA's proprietary virtual gas pipeline financial models. He also has the unique advantage of having successfully transitioned those models from concept to contract execution, and into on to operating LNG sites.

David's broad skill base, generalist experience, technical interest and passion for energy projects supports CEFA's uniquely flexible and innovative approach. David is also involved in the day to day operations including CEFA's LNG east coast distribution business and has developed solid technical skills in this area of the business.

David holds a degree in Business Studies and a background in business management, strategy, sales & marketing. David has spent close to a decade working in the clean energy space, since relocating from the UK to Australia in 2009.

3.2.4 Raheel Khan – GM Production

Raheel Khan is a Chemical Engineer with over 20 years of industry experience. As an experienced operations manager, Raheel has a wealth of expertise across a diverse range of industries, including ammonia manufacturing, hydrogen production (both blue and green varieties), refining, and the oil and gas sector. Raheel holds an BA, BA, Chem Eng, and is a CPEng, and RPEQ.

3.3 REGISTERED SUITABLE OPERATOR

CEFA have applied to be registered as a suitable operator under separate cover. CEFA's experience and track record in LNG production and distribution support their application. CEFA's backing from major shareholder, I Squared Capital, ensures that they maintain the financial and professional resources to establish a safe and compliant facility, to protect the environmental values of the facility site, and maintain ongoing compliance with the requirements of an Environmental Authority.

The facility will be operated and maintained by competent CEFA employees with the support of Original Equipment Manufacturers, specialist consultants, and specialist contractors. The facility will predominantly unattended and monitored remotely under normal conditions with 24/7 monitoring being undertaken via control rooms in Western Australia, the United States and the United Kingdom (with supervision changing across the course of each day to maintain 24/7 coverage). The site operator will be based in Moranbah, will attend site during business hours, and will respond after hours to incidents and emergencies. A pool of competent maintenance personnel will include workers who are located within the region to ensure timely response to any breakdown, trip, or incident.

4.0 THE PROJECT – CENTURION LNG OVERVIEW

4.1 PROJECT BACKGROUND

The proposed CENTURION LNG FACILITY (**the facility**) is a part of a broader project aimed at capturing ICSG from an operating coal mine and converting it into LNG. The facility is designed to reduce the environmental impact of waste gas that would otherwise be flared by capturing the waste gas and providing a pathway to distribute the resource to the market. This section outlines the general objectives, activities, and key components of the proposed facility. The facility is an independent operation that will be located on land leased from Peabody (operators of Centurion Coal Mine). Facility operation is reliant upon supply of gas:

- FROM Centurion Coal Mine under a formal gas supply agreement,
- TO commercial customers of the LNG product produced in the facility.

The integrity of the project is assured because the micro-LNG plant has been previously successfully operated, by the proponent in Western Australia. Previous operation was conducted in accordance with rigorous environmental compliance requirements.

4.2 PURPOSE OF THE CENTURION LNG FACILITY

The primary purpose of the proposed facility is to convert ICSG from the Centurion Coal Mine into LNG for sale to commercial customers. The proposed facility will process waste gas that is currently being flared to produce a commercially viable liquefied natural gas (LNG) product. The LNG produced will be transported offsite by road for re-gasification and injection into the national grid for domestic (industrial, commercial, residential) use or direct use in domestic remote industrial operations. The proposed micro-LNG facility will:

- operate as a **modular, small-scale LNG production plant** with a focus on environmental sustainability and resource efficiency
- process up to **1.46 petajoules** of ICSG per annum,
- produce up to **70 tonnes per day** of LNG through a cryogenic process,
- distribute LNG to remote Queensland industrial energy users (with the potential to displace the equivalent use of **30 million litres of diesel** p.a., or for injection into the **east coast gas grid**.

4.3 PUBLIC INTEREST

The proposed facility is in the public interest due to the significant environmental, economic, and social benefits it offers to the region. The facility's ability to capture ICSG and convert it to LNG, allows gas that would otherwise be flared as a waste product to be captured, converted to LNG, and transported off site as a mobile fuel.

Natural gas remains critical to the Australian Energy mix which includes renewables as well as coal fired power, and gas fired power. Gas is broadly recognised as an essential transition fuel towards a cleaner energy future and nationally and internationally pursued net zero goals. For example, natural gas is a cleaner burning fuel, that produces lower CO_2, NO_X, and SO_X emissions than diesel. The primary benefit of the facility is the direct reduction in CO_2 equivalent emissions produced through flaring of

waste ICSG. Secondary benefits include addition of gas into the domestic market which has in recent years been stressed with increasing energy costs, exacerbated by international export of large volumes of LNG. Further, the produced LNG will (assuming commercial arrangements are established) be used to displace diesel as a fuel source for remote energy users in Queensland.

Once operational, the facility will play a key role in reducing waste gas emissions and contributing to the region's energy needs, in addition to creating job opportunities and fostering local economic growth. The proposed facility will contribute significant benefits to the local community, the region and the state of Queensland. These benefits are presented in the following sections.

4.3.1 Environmental Benefits

The proposed facility will reduce greenhouse gas emissions through the capture and conversion of waste ICSG that would normally be flared (or abnormally be cold vented). The facility will contribute to lowering the overall carbon footprint of the Centurion Coal Mine and its surrounding operations by processing up to **1.46 petajoules** of ICSG annually. Centurion Coal Mining will claim this as an abatement project. Additionally, the production of LNG from waste gas will:

- **Reduce carbon dioxide (CO_2) equivalent emissions**: ICSG comprises predominantly methane (CH_4) gas. When methane is combusted in air, CO_2, water (H_2O), light and energy are produced. When methane is vented rather than combusted it has 21 times more impact as a greenhouse gas than CO_2. The captured ICSG will be converted to LNG rather than being burned by flaring as a waste product. Ultimately the produced LNG will be combusted, but it will displace or offset emissions from other, potentially more carbon intensive, fuel sources. Emissions reduction will be achieved through the avoidance of flaring the ICSG as a waste. Without this project, emissions would occur both through flaring and through consumption of gas.

- **Avoidance of waste / lower regional emissions**: By converting ICSG into LNG, the project reduces the need for flaring, which directly results in lower greenhouse gas and other pollutant emissions in the region.

- **Provide alternative lower greenhouse gas intensive fuel within the region**: The project will provide a viable alternative fuel (to diesel) for transport or remote stationary power generation. Whilst this will be entirely contingent upon commercial opportunities being exploited, remote customers utilising natural gas as a fuel source in transport or power generation would further reduce regional emissions. Should the LNG be used to displace diesel, the resultant beneficial impact will be lower overall emissions, as diesel is more CO_2 intensive than LNG.

4.3.2 Economic & Employment Benefits

The proposed facility will contribute to the local economy through the creation of employment opportunities through all phases of the project. Local contractors and suppliers will be required for services such as transportation, equipment maintenance, and civil works across the full lifecycle of the operation. Economic benefits are outlined below in ***Table 4***.

Table 4 – Direct & indirect economic benefits

Aspect	Benefits to Queensland
Employment	The facility will generate direct employment (full time equivalents (FTE) beyond contracted suppliers and service providers) in all phases of the facility operation, as below: • Planning: 4 FTE (with input from 4-6 CEFA team members as needed), • Construction: 15-20 FTE, • Operation: 2 FTE, • Decommissioning: 5 FTE.
	Additional specialist consultants, contracted resources, and contracted services will be required for facility maintenance, civil engineering, transportation, supply, support, and waste management. Additional employment opportunities will be generated separately and downstream for LNG receiving and re-gasification facilities.
Investment	The facility represents a significant investment in the local, regional, and state economies and includes a significant improvement to local processing infrastructure. The total project capital expenditure is estimated in excess of $30M:
	Local businesses (transport, civil contractors, maintenance services, material and product suppliers, waste management contractors etc.) will benefit from expenditure during all phases of the project.
Resource Utilisation	The facility will improve the utilisation of a valuable energy resource that is currently being wasted. The product that would otherwise be flared: ○ ≤4.0 Terajoules per day / ≤14.6 Petajoules – 10yr life of project life, OR ○ ≤70,000t CO_2-e p.a. / ≤700,000t CO_2-e 10 year life of project, will be available as a commercial energy source in a market that is stressed. Injection of additional fuel into the domestic gas market should help to place downward pressure on energy prices.
Government Revenue	The proposed facility will generate new tax revenue and royalties from the processing and sale of natural gas. Total government revenue is estimated to exceed $35M over the life of the project.

4.3.3 Energy Supply & Security

The proposed facility will contribute to energy security within the region by producing LNG that can be transported directly to commercial customers within the region. The collection and use of a waste as an energy source will add resource into a domestic energy market that is becoming increasingly stressed. The local production of LNG may contribute to reduction of reliance on internationally sourced diesel. The diversification of the region's energy supply will help ensure stable and reliable energy resource availability for local remote industries.

Initially, LNG produced at the facility will be transported to Rolleston where it will be re-gasified for injection into the national grid. The national grid has been subject to increasing energy costs over recent year. This has been exacerbated by international export of large volumes of LNG from Queensland. The retention of some LNG for the domestic market improves the energy security of the domestic market. When commercial opportunities are secured for displacement of other fuels for transport or static energy production, the LNG produced by the facility will offer a cleaner, more cost-effective alternative to diesel, including for heavy horsepower applications. This will benefit regional

mining and industrial operations. The shift from diesel to LNG in regional mining and industrial operations will result in cost savings and reductions in greenhouse gas emissions. Energy supply and security benefits are outlined below in ***Table 5***.

Table 5 – Direct & indirect energy and environmental benefits

Aspect	Benefits to Queensland
Energy Security	The facility will add previously unavailable energy resources into the national gas grid and increase access to a locally produced transportable energy supply, reducing dependence on international imports.
Alternative Fuels	The facility will provide an alternative to diesel for industrial operations. If taken up commercially this will reduce industry fuel costs and emissions.
Greenhouse Gas Reduction	The facility will significantly reduce regional greenhouse gas emissions by capturing waste methane that would otherwise be flared (and converted to CO_2).
Lower Fuel Costs	LNG fuel in most cases can be delivered at a discount to diesel on an energy content basis, providing direct cost savings for industrial users.

4.3.4 Summary of Public Interest Benefits

The proposed facility is expected to provide significant benefits to central Queensland in terms of employment, investment, energy security, and environmental outcomes. Public interest benefits are summarised below in ***Table 6***.

Table 6 – Summary of direct, associated, and indirect benefits

Benefit Type	Description
Direct Benefits	Job creation during construction, operation, and decommissioning.
	Reduction of flared gas emissions and overall greenhouse gas emissions in the region.
Associated Benefits	Improved local energy security and reduced reliance on imported gas supplies.
	Additional resources to domestic energy supply, that is currently stressed.
	Support for local industries through supply of cost-effective LNG supply.
Indirect Benefits	Increased local business activity, engagement of the local supply chain (contractors, and suppliers of materials and services).
	Long-term contributions to the sustainability of central Queensland's energy and environmental resources.
	Potential downward pressure on domestic energy prices.

4.4 PROJECT STAKEHOLDERS

The facility will involve multiple stakeholders, each of whom will have interests in the project's development, operation, and potential impacts. The facility is located near Goonyella, Queensland, within the Mining Lease (ML 6949) held by Centurion Coal Mining Pty Ltd (Centurion Mining). The facility has significant local, state, and industry stakeholders, including government authorities, local communities, Indigenous groups, and environmental agencies. The key stakeholders in the proposed facility are outlined below in ***Table 7***. CEFA will develop a stakeholder engagement plan for their project stakeholders. Critically for the project, CEFA is engaged in a sub-lease arrangement with Centurion Mining. Except where there is a statutory or commercial requirement for CEFA to engage

stakeholders directly, Centurion Mining will lead consultation with all stakeholders that are common to CEFA and Centurion Mining (i.e., local landholders, residents, Indigenous groups, etc.).

Table 7 – Key stakeholders - Centurion LNG Facility

Stakeholder	Description
CEFA Owners / Shareholders	The owners and shareholders of CEFA, including I Squared maintain a commercial interest in the success of the project and are a key stakeholder.
Department of Natural Resources, Mines & Energy (DNRME)	The Queensland government agency responsible for issuing the Petroleum Facility Licence (PFL) for the project.
Department of the Environment, Tourism, Science & Innovation (DETSI)	Administers the Environmental Authority (EA) for the project, overseeing environmental regulations and compliance.
Isaac Regional Council	The local government authority with jurisdiction over planning, local infrastructure, and services related to the project.
Centurion Coal Mining Pty Ltd	Holder of the Mining Lease (ML 6949) and Petroleum Lease (PL 504). Centurion Mining is the supplier of gas for the LNG facility.
Local Landholders and Residents	Landholders and residents within proximity of the facility, who may be affected by noise, emissions, or transportation. As the mining leaseholder Centurion Mining will lead consultation with the landholders and residents.
Indigenous Groups	Native title holders and local Aboriginal communities, including traditional custodians of the land. The Widi People have a relevant interest in the Land on which the proposed facility is to be located. Centurion Mining have established a Cultural Heritage Management Plan (CHMP) in consultation with the Widi people. As the mining leaseholder Centurion Mining will lead consultation.
Environmental & Other Interest Groups	Organisations focused on monitoring and advocating for the environmental management of projects like the facility. As the mining leaseholder Centurion Mining will lead consultation with environmental and other interest groups.
LNG Customers / Commercial Gas Providers	Commercial suppliers of natural gas. Industrial users of LNG in the region (mining, manufacturing, and transportation sectors).

4.4.1 Public Support & Stakeholder Engagement

Stakeholders will be engaged in accordance with the requirements of the EPAct. The project is expected to gain public support for reasons outlined below. The project:

- Is inherently sustainable, with avoidance of waste as a key feature,
- Is located in an existing mining industrial location,
- Has limited local environmental impacts, with limited impact on sensitive receptors,
- Has the potential to improve environmental outcomes while generating economic benefits,
- Has the potential to contribute to downward pressure on energy prices,
- Has the potential to improve domestic resource security,

- Aligns with regional initiatives to promote sustainable resource utilisation and reduce emissions from mining and industrial activities.

CEFA are committed to engaging with local stakeholders, including government agencies, Indigenous communities, and local residents, to ensure that the facility delivers broad-based benefits to the community and will do so as appropriate for their involvement as a PFL holder and sub-lessee to Centurion Mining. CEFA is committed to operation in compliance with all relevant environmental and safety regulations.

4.5 PERMIT DESCRIPTION

The facility will be operated under a *Petroleum Facility Licence* issued under the *Petroleum and Gas (Production and Safety) Act 2004*. CEFA will be the PFL holder. The proposed facility site is located fully within the boundaries of Mining Lease (ML 6949), which is held by Centurion Coal Mining Pty Ltd (Centurion Mining).

The proposed facility site is within the existing mining operations of the Centurion Coal Mine. The site was previously disturbed and is underlain by the current underground mine. The facility site comprises an area that is 190m x 190m. The site was cleared, graded, levelled and surfaced by Centurion Mining. and under their existing *Environmental Authority EPML00815613* prior to handing land over to CEFA.

All necessary permissions for gas extraction are under the mining and petroleum leases held by Centurion Mining. The gas for the facility will be sourced from Centurion Mining's operations on ML1790.

4.6 FACILITY ACTIVITIES

The proposed CENTURION LNG FACILITY will be capable of processing approximately 35 million cubic metres of incidental coal seam gas (ICSG) annually. This equates to 1.46 petajoules of energy. The key facility activities are summarised below in ***Table 8***. The facility (micro-LNG plant) is shown below in ***Figure 1***. Facility details are presented in ***Section 5***.

Table 8 – Centurion LNG Facility key activities

Activity	Description
Gas receipt	ICSG will be received from the Centurion Coal Mine underground in-seam (UIS) and surface in-seam (SIS) wells located in ML1790. Custody transfer of the gas will be at the facility battery limit (nominally at the facility boundary). Gas will be received into the facility at low pressure (~0.05 bar).
Gas pre compression	Incoming gas will be pre-compressed to approximately 6.0 bar for processing.
Gas conditioning	Gas will be conditioned through removal of impurities, including heavy hydrocarbons, oxygen, carbon dioxide, particulates, and water vapour.
Cryogenics	LNG will be produced through cryogenic cooling to temperatures below -161°C.
LNG storage	LNG storage on-site will be in 3 x 365kl above ground cryogenic vessels. Storage capacity is sufficient for 2 days of LNG production with a maximum capacity ~150T. Initially two storage vessels will be installed. The third vessel will be installed later when required and IS included in this application.
LNG transfer	LNG will be dispensed from storage to road tankers for offsite transportation.
Electricity supply	Electrical supply will be provided from the grid for all routine operations under normal conditions. The facility is designed to operate on grid power (sourced using a mix of renewable and thermal power) as the primary source of supply. *Note: At start up 100% of the electricity supply will be sourced from the grid. Power from the grid is included within this EA application. The potential exists to move to on-site internal combustion gas engines using ICSG when expansion of the site is required due to increased gas supply (to be addressed at that time through EA amendment at a later date as NOTED below).*
Maintenance & response	CEFA will conduct routine scheduled and preventive maintenance, reactive maintenance and response to trips, excursions, shutdowns and incidents.
Decommissioning & rehabilitation	The facility site was leased to CEFA as a cleared, levelled, surfaced designated area of land. The facility is modular and will likely be decommissioned and re-located to operate elsewhere when no-longer required. The site will be rehabilitated to its pre-construction state or an agreed-upon condition at the completion of operations.

Future:	Potential Expansion / Improvement (not included in assessment)
Emergency / standby / stand-alone power generation	Two ISO 40ft containerised reciprocating internal combustion gas generator sets, each rated at ~ 2 MW electrical output, will be installed to provide up to 4 MW of capacity. The units will operate on the existing gas feed supplied to the LNG plant.
Duplication of processing capacity and storage	The modular nature of the facility supports expansion through addition of extra modules, and additional storage vessels.



Figure 1 – Centurion LNG Facility – micro LNG plant equipment (in operation at Mt Magnet, WA)

5.0 THE SITE & SURROUNDING ENVIRONMENT

5.1 SITE LOCATION & ACCESS

The proposed CENTURION LNG FACILITY (the facility) site is located in the northern quadrant of mining lease ML 6949, and is approxmately 135 west south west of Mackay, 41km north of the town of Moranbah, and 3km north of Centurion Coal Mine.

The facility and proposed petroleum facility licence area comprises an area 190m x 190m. The site boundary coordinates are presented below in ***Table 9***. The site location is shown in ***Figures 2*** and ***3***. The site is located on Lot 412 on Plan SP352711.

Table 9 – Site coordinates (latitude & longitude)

Datum / Survey Point	Coordinates (latitude & longitude)
Southwest Corner (BP-1)	21° 37' 37.56175" South, 147° 58' 18.31585" East
Northwest Corner (BP-2)	21° 37' 32.34911" South, 147° 58' 21.86460" East
Northeast Corner (BP-3)	21° 37' 35.66725" South, 147° 58' 27.43951" East
Southeast Corner (BP-4)	21° 37' 40.87993" South, 147° 58' 23.89080" East

The facility site is accessible via existing roads and infrastructure associated with the Centurion Coal Mine operations. The site will be accessed using the Centurion Access Road as shown on ***Figure 4***. Centurion Coal Mining Pty Ltd (Centurion Mining) will provide access to utilities such as power, water, and communications, which are required for the operation of the LNG facility. The lease agreement includes provisions for CEFA's use of these services and infrastructure as part of the overall project.

5.2 SITE TENURE

5.2.1 Freehold / Leasehold Tenure

The facility is located wholly within the boundaries of mining lease ML 6949 which is held by Centurion Coal Mining Pty Ltd (Centurion Mining). Gas will be sourced from the adjacent mining lease ML1790 (a mineral hydrocarbon mining lease) held by Centurion Mining. The real property description of the land parcel 'under' the mining lease is Lot 412 on Plan SP352711. The land is owned by Centurion Mining (A.C.N. 010 879 526). The land title is presented in ***APPENDIX A***. Overlapping tenures including land parcels and MLs are shown on ***Figure 5***.

Centurion Mining is the registered owner of freehold land on Lot 412 on Plan SP352711. Centurion Mining is the registered holder of ML 6949 and ML 1790 under the *Mineral Resources Act 1989 (Qld)*. The mining lease(s) allocate exclusive rights to Centurion Coal Mining for the purposes of undertaking coal mining activities and utilisation of ICSG within the designated lease areas. CEFA has executed a Gas Supply Agreement with Centurion Mining (Peabody). The agreement:

- Details of the land covered by the agreement (190m x 190m), specifically designated for LNG processing and associated infrastructure,
- Provides CEFA with the necessary legal interest in the land, and subject to the requirements of a Petroleum Facilities Licence, to construct, operate, and maintain the facility,

- Confirms infrastructure and services that will support the operation of the facility including civil infrastructure (road, stormwater, water supply, off-site sewage treatment etc.), and

- Confirms the supply of gas from ML1790 to the facility, and the conditions under which the gas will be transferred and received by CEFA.

Land tenure is summarised below in ***Table 10***.

Table 10 – Land tenure overview

Aspect	Details
Mining Leases (ML 6949 and ML1790)	ML6949 (Centurion Mine) Held by Centurion Coal Mining Pty Ltd ML1790 (Wards Well) Held by Centurion Coal Mining Pty Ltd
Petroleum Lease (PL 504)	Held by Centurion Coal Mining Pty Ltd
Petroleum Facility Licence	To be held by CEFA. Application submitted in preparation for this EA.
Land Ownership	Centurion Coal Mining Pty Ltd (and / or associated entities) are the registered owner of the land, and registered leaseholder of ML 6949 and PL 504
Lease Agreement	CEFA hold an interest in the land under a lease agreement with Centurion for LNG facility operation
Area of Interest	190m x 190m (approximate) within the boundaries of ML 6949
Legislation	*Mineral Resources Act 1989 (Qld),* *Petroleum and Gas (Production and Safety) Act 2004 (Qld),* *Environmental Protection Act (1994)*

5.2.2 Native Title

The Widi People of Nebo Estate #2 are recognised as the Registered Native Title Body Corporate relevant to the Centurion North Development and ML6949. An extract from the Centurion Mining Heritage Management Plan showing the relevant Indigenous Parties is presented below in ***Figure 5A***. Under the gas supply agreement with Centurion, CEFA are in practicality operating under a sub-lease agreement. Centurion Mining will accordingly take the lead on all engagement with registered Indigenous parties.



Source: *Google Earth, accessed 5-Jan-2026*

South Queensland Environmental Expertise & Services Pty Ltd (SQEES) www.sq-ees.com | ABN: 54 614 031 837	N	Client: CEFA Drawn: LD Date: 5-Jan-2026 Scale: As Shown	Title: Client CEFA Site Centurion LNG, Goonyella Content Site Location Map (Regional)	CLEAN ENERGY FUELS AUSTRALIA	Figure: 2 Revision: 1.0



Source: *Google Earth, accessed 5-Jan-2026*

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Client:	CEFA
Drawn:	LD
Date:	5-Jan-2026
Scale:	As Shown

Title:

Client	CEFA
Site	Centurion LNG, Goonyella
Content	Site Location Map (Local)

CLEAN ENERGY FUELS AUSTRALIA

Figure: 3

Revision: 1.0

NORTH



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REVISIONS

REV	DESCRIPTION	DRN	CHK'D	ENG	PROJ	DATE
E	RE-ISSUED FOR INTERNAL REVIEW	DW	BL			07.04.25
D	RE-ISSUED FOR INTERNAL REVIEW	DW	BL			24.03.25
C	RE-ISSUED FOR INTERNAL REVIEW	DW	NP			20.03.25
B	ISSUED FOR REVIEW	DW	NP			13.03.25
A	INTERNAL REVIEW	DW	-			09.03.25

REFERENCES

-

FIG - 4

DRAWING N°

SITE LOCATION AND ACCESS MAP

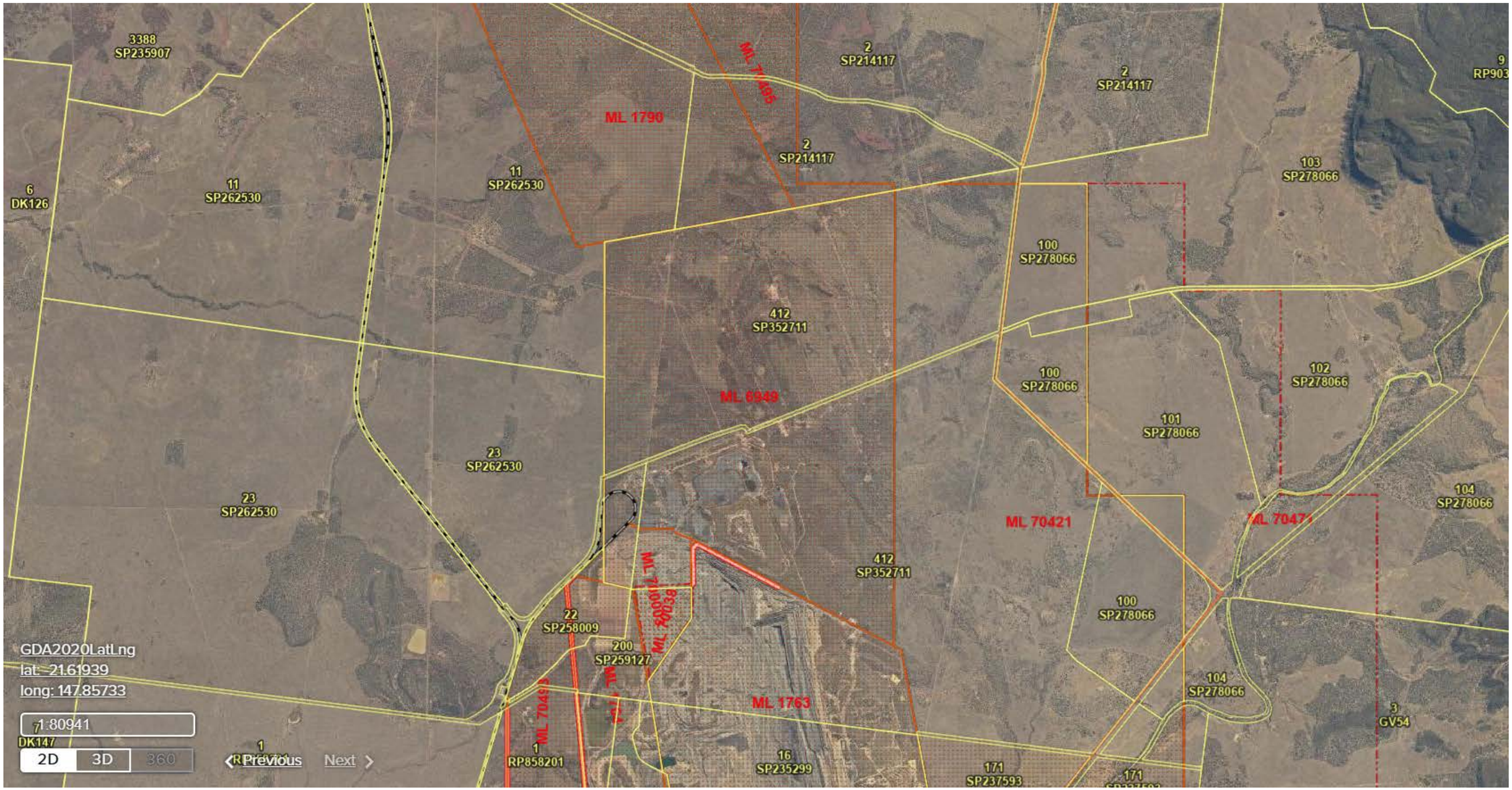
TITLE

DESIGNED	CLEAN ENERGY
DATE	17.10.2022
DRAWN	DW
SCALE	1:20,000
	A3

CLEAN ENERGY FUELS AUSTRALIA

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PROJECT	QLD - CENTURION
CLIENT	CLEAN ENERGY FUELS MARKETING
TITLE	QLD - CENTURION SITE LOCATION SITE LOCATION - V1
DRAWING N°	C12-DR-GA-002
REV	B



Source: *Queensland Globe, accessed 8-Dec-2025*

South Queensland Environmental Expertise & Services Pty Ltd (SQEES) www.sq-ees.com | ABN: 54 614 031 837	N	Client: CEFA Drawn: LD Date: 5-Jan-2026 Scale: As Shown	Title: Client CEFA Site Centurion LNG, Goonyella Content Land Tenures (Lot 412SP352711, ML6949 & ML1790)	CLEAN ENERGY FUELS AUSTRALIA	Figure: 5 Revision: 1.0

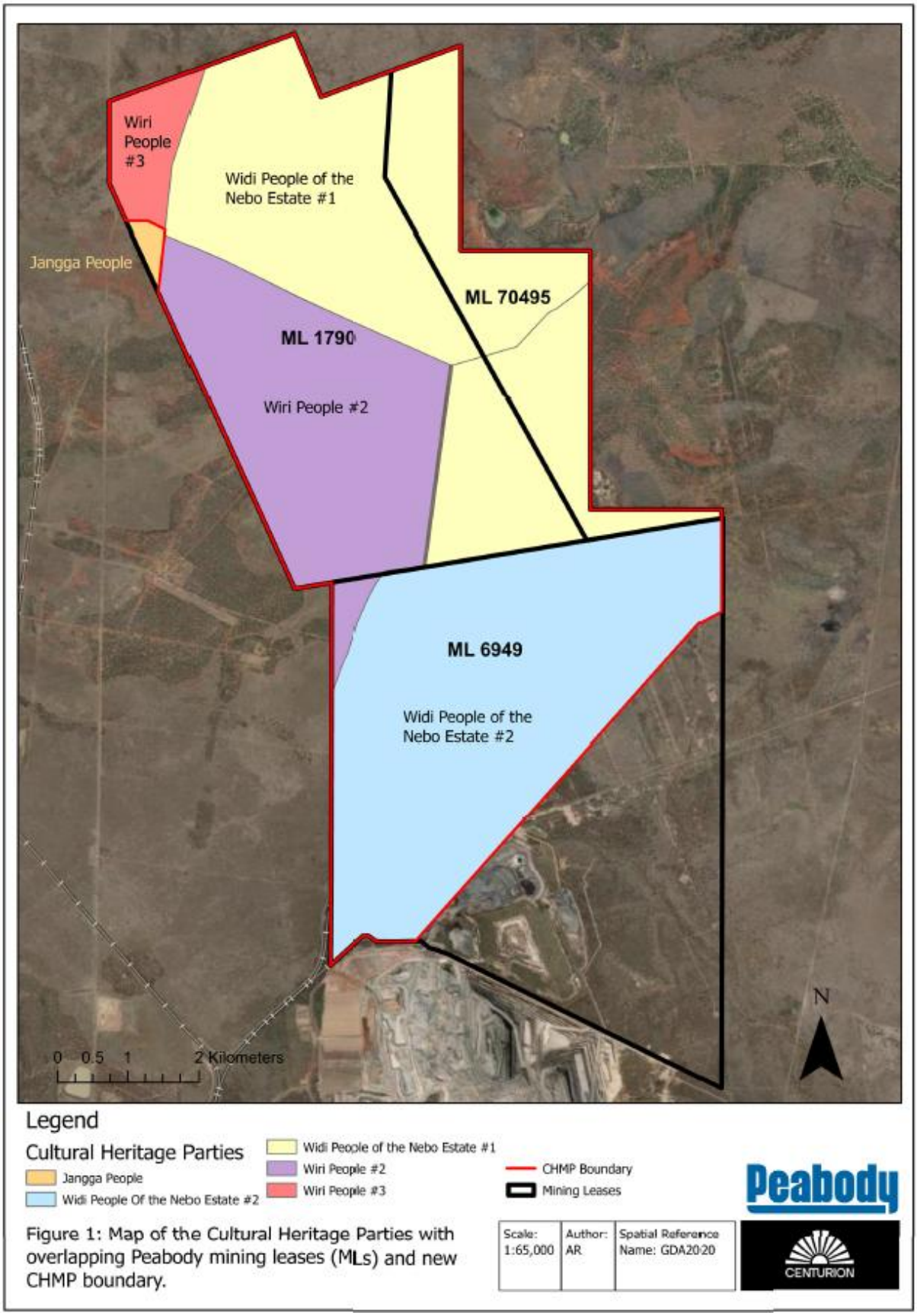


Figure 1: Map of the Cultural Heritage Parties with overlapping Peabody mining leases (MLs) and new CHMP boundary.

Figure 5A – Land tenure with Cultural Heritage Parties

5.3 SITE & SURROUNDING LAND USE

The facility will be constructed on previously disturbed land within Mining Lease (ML) 6949. The site has been used for mining related operations, and gas gathering equipment and general equipment laydown and storage. The facility will be located close to existing mine infrastructure. The land is suited for industrial use. Development of the facility on the proposed site constitutes a continuation of industrial activity at this location. The lease agreement between Centurion Mining and CEFA ensures that the facility can be integrated into existing mining operations with minimal disruption.

The surrounding area is used for mining, industrial, agriculture, and rural residential purposes. The key land uses underlying and adjacent to the site are outlined in ***Table 11*** and summarised below:

- **Mining Operations**: The Centurion Coal Mine, operated by Centurion Mining, is the predominant land use on ML 6949. Mining activities include longwall coal mining and the production of incidental coal seam gas (ICSG). (ICSG from the adjacent ML1790 will be processed by the proposed facility.)

- **Mining Operations:** The proposed facility site and ML 6949 are surrounded by active and approved mining leases. Goonyella Riverside Mine is located to the south and includes waste rock emplacement up to 50m above natural ground level. Wards Well mining leases are located to the north. Surface infrastructure associated with Goonyella Riverside Mine is located adjacent to the proposed PFL boundary to the west. Eaglefield Open Cut Mine is located to the north-east and is approved for external waste rock emplacement up to 65 metres above natural ground level.

- **Grazing and Agriculture**: Adjacent to the mining lease are rural properties used primarily for cattle grazing. Properties include rural residential dwellings. These are located several kilometres away from the proposed facility. They are considered sensitive receptors and included within assessment of impacts of the proposed facility.

Table 11 – Land use in the area of the Centurion LNG Facility (summary)

Land Use	Description
Mining Operations	Longwall coal mining within ML 6949. Mining and ICSG extraction in ML1790.
Petroleum Operations	While Centurion Mining has the right to extract CSG under PL 504, currently no commercial CSG extraction or processing is undertaken on site.
Grazing and Agriculture	Cattle grazing on rural properties surrounding the mining lease. Rural properties constitute sensitive receptors as discussed later in this section.
Industrial Use	Proposed construction and operation of the Centurion LNG Facility

5.4 SITE BACKGROUND & CONDITION

5.4.1 Site History

Following European settlement, the land within the ML 6949 area was used for grazing and agriculture. The mine is situated in the Bowen Basin area. Commercial exploitation of Bowen Basin coal began at Blair Athol in the 1890s. Large scale coal exploration and mining began in the Bowen Basin in the 1960s. Mining operations at the former North Goonyella Mine (on ML 6949) commenced in 1994. Since the granting of mining and petroleum leases, the site and surrounding area have been

progressively developed for coal extraction, including the construction of infrastructure such as roads, pipelines, coal handling and offices for mining personnel.

The facility site was previously disturbed and cleared by Centurion Mining for the development of ML 6949. The site area is located over the North Goonyella underground coal mine and contains infrastructure and vent shafts and has been used for, access, and laydown. The site was already heavily modified, and has subsequently been fully cleared and stripped by Centurion Mining under their **Environmental Authority EPML00815613.** Centurion Mining have engaged civil consultants Capital Consulting to complete civil works on and around the site. The existing disturbances to the land from mining activities make the area well-suited for the proposed facility, as it will not require additional significant changes to land use patterns in the region.

5.4.2 Site Condition in Dec-2025

Under the gas supply agreement the site was transferred to CEFA as a cleared, stripped, levelled, parcel of land, with stormwater management and sediment and erosion controls in place, or about to be implemented around the site by Centurion Mining's contractor. CEFA have taken on a site that consists of exposed surfaces with little to no grass cover, vegetation, or environmental sensitivity. The 190m x 190m site area includes no significant vegetation, no endangered regional (remnant or regrowth) ecosystems, and no habitat for local fauna. The ecological value is limited due to the fragmentation caused by previous land disturbance. The disturbed and cleared nature of the land makes it suitable for industrial development with little to no potential impact on undisturbed natural habitats. Photographs of the site taken in December 2025, are shown below in ***Figure 6***.

5.4.3 Site Listing on Environmental Registers (EMR & CLR)

Environmental management register (EMR), contaminated land register (CLR) search results are presented in ***APPENDIX B***.

The site (part of Lot 412 on Plan SP352711) IS NOT included on the Contaminated Land Register (CLR).

The site was subdivided from Lot 1 on Plan GV334 which IS included on the environmental management register. The parent lot (Lot 1) was included on the EMR for the following notifiable activities or hazardous contaminant:

- *MINE WASTES -*
  (a) storing hazardous mine or exploration wastes, including, for example, tailings dams, overburden or waste rock dumps containing hazardous contaminants; or
  (b) exploring for, or mining or processing, minerals in a way that exposes faces, or releases groundwater, containing hazardous contaminants.

- *PETROLEUM PRODUCT OR OIL STORAGE - storing petroleum products or oil -*
  (a) in underground tanks with more than 200L capacity; or
  (b) in above ground tanks with -
  (i) for petroleum products or oil in class 3 packaging groups 1 and 2 of the dangerous goods code - more than 2,500L capacity; or
  (ii) for petroleum products or oil in class 3 in packaging groups 3 of the dangerous goods code - more than 5, 000L capacity; or
  (iii) for petroleum products that are combustible liquids in class C1 or C2 in Australian Standard AS1940, 'The storage and handling of flammable and combustible liquids' published by Standards Australia - more than 25, 000L capacity.

- *LIVESTOCK DIP OR SPRAY RACE - operating a livestock dip or spray race facility.*



Source: *Peabody Dec-2025*

South Queensland Environmental Expertise & Services Pty Ltd (SQEES) www.sq-ees.com | ABN: 54 614 031 837

Client:	CEFA
Drawn:	CD
Date:	29-Dec-2025
Scale:	NA

Title: Client CEFA
Site Centurion LNG,
Content Site photograph Dec-2025

CLEAN ENERGY FUELS AUSTRALIA

Figure: 6

Revision: 1

5.5 LAND & WATER

5.5.1 Topography

Topography of the site area is characterised as gently undulating plains with elevations ranging from approximately 300-340 metres above sea level. The terrain is predominantly flat, with occasional low ridges and minor slopes, contributing to relatively stable conditions for construction. The high point near the site is Red Hill Bluff at 343m. The area is drained by the ephemeral Gum Tree Creek to the west and Goonyella Creek, which flows to the Issac River, to the east of the site.

The region has historically been modified for mining and grazing activities, resulting in some altered drainage patterns. Centurion Coal Mine is a major landscape feature approximately 3km to the south of the site. Regional topography is shown in ***Figure 7***. The proposed facility site has an elevation of 315m to 321m, with overall slope down to the south. The site was surveyed in Oct-2025. Site topography is shown in ***Figure 8***. Topographic features are summarised below in ***Table 12***.

Table 12 – Topographic features

Topographic Feature	Description
General Terrain:	Gently undulating plains and low ridges
Site Elevation:	315 to 321 metres above sea level,
Slope:	Gentle slopes, typically less than 3% (6m fall over 190m, down to south)
Significant Features:	No steep ridgelines or valleys in proximity. Red Hill Bluff, ~343m elevation, is located ~1.1km east of the site.
Registered watercourse:	Goonyella Creek (~2km to the east). Gum Tree Creek (>2km to the west)

5.5.2 Regional Geology & Soils

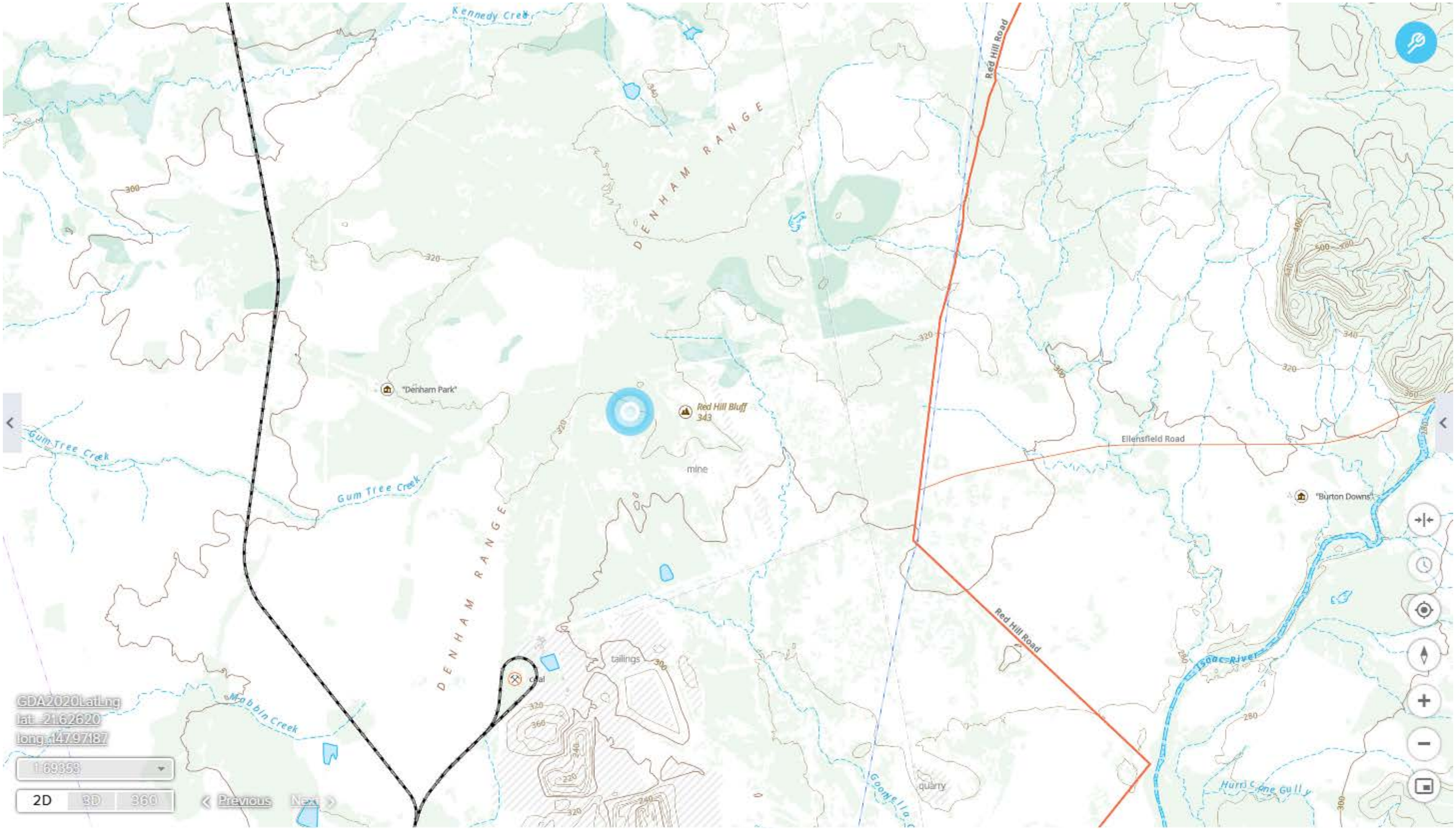
The site is located over the coal measures of the Bowen basin. The underground workings of the existing mine, extracting resources from Permian Coal measures, extend beneath the site. Regional soils are summarised in ***Table 13*** below, and discussed as follows:

- Black Cracking Clays (Vertosols): characterised by high clay content and a tendency to crack during dry conditions. These soils are well-suited to grazing and provide good fertility for vegetation. High water retention can lead to soil compaction. Subject to erosion where exposed.

- Sandy Loams: found on higher terrain and have better drainage than the black cracking clays. Sandy loams have lower fertility and higher permeability and are less prone to waterlogging and erosion.

Table 13 – Regional soil characteristics

Soil Type	Description
Black Cracking Clays (Vertosols)	High water retention, prone to cracking, moderate fertility
Sandy Loams	Low fertility, good drainage, potential for erosion if left bare
Erosion Risk	Moderate to high depending on disturbance
Compaction Potential	High, particularly for clay soils under heavy machinery



Source: *Qld Globe, accessed 12-Nov-2025*

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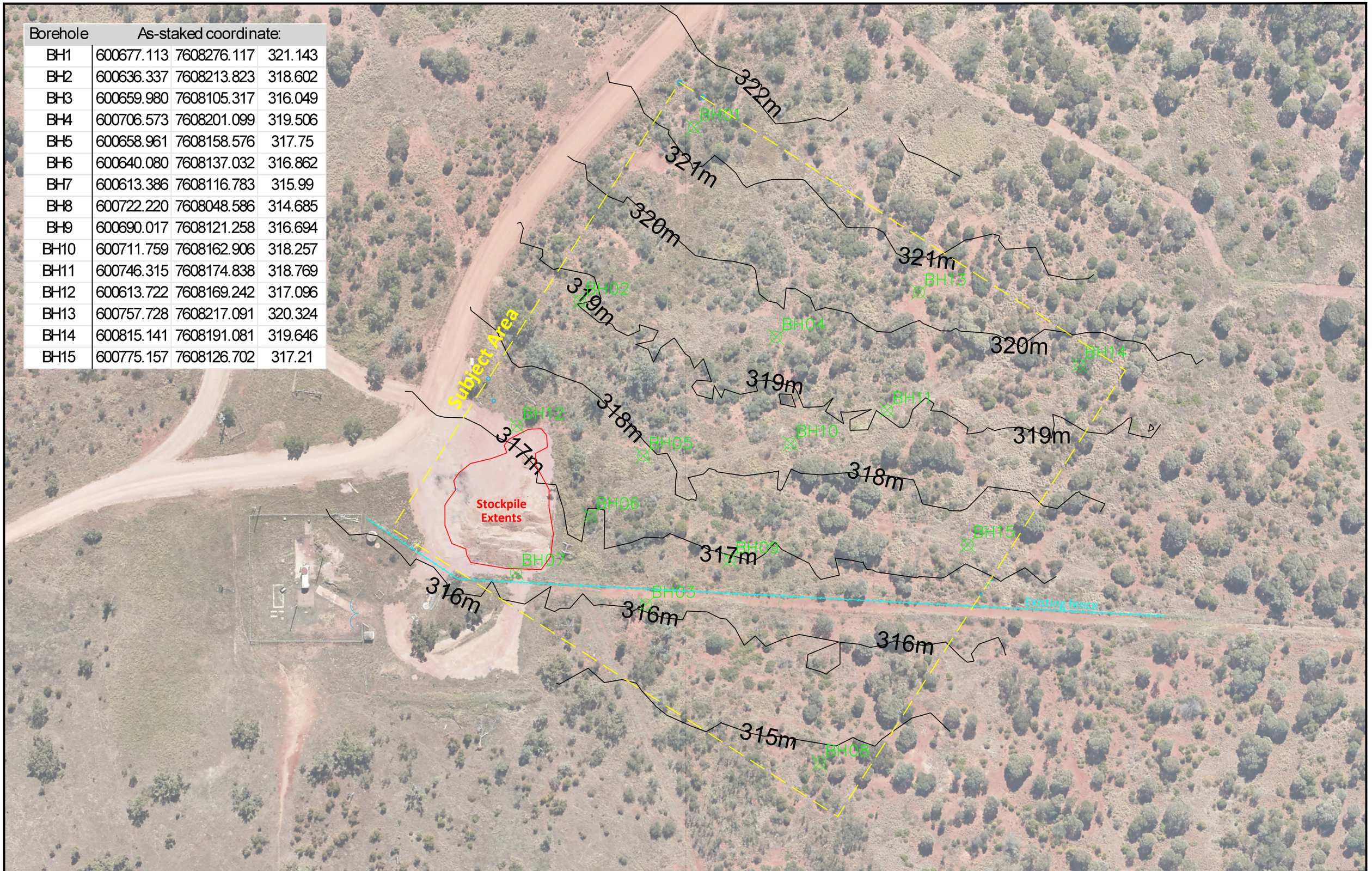
Client:	CEFA
Drawn:	LD
Date:	27-Nov-2025
Scale:	As Shown

Title: Client CEFA
Site Centurion LNG, Goonyella
Content Regional topography

CLEAN ENERGY FUELS AUSTRALIA

Figure: 7
Revision: 1.0

Borehole	As-staked coordinate:		
BH1	600677.113	7608276.117	321.143
BH2	600636.337	7608213.823	318.602
BH3	600659.980	7608105.317	316.049
BH4	600706.573	7608201.099	319.506
BH5	600658.961	7608158.576	317.75
BH6	600640.080	7608137.032	316.862
BH7	600613.386	7608116.783	315.99
BH8	600722.220	7608048.586	314.685
BH9	600690.017	7608121.258	316.694
BH10	600711.759	7608162.906	318.257
BH11	600746.315	7608174.838	318.769
BH12	600613.722	7608169.242	317.096
BH13	600757.728	7608217.091	320.324
BH14	600815.141	7608191.081	319.646
BH15	600775.157	7608126.702	317.21



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AUTHORISATION			
POSITION	NAME	SIGNATURE	SITE TOPOGRAPHY AND BOREHOLE LOCATIONS

z:\drawings\civils - surface and camp\lng - cefa\cefa_lng_plant_site_survey_251022.dwg

Peabody

CENTURION COAL MINE

CEFA LNG PLANT SITE SURVEY **FIG - 8**

SHEET : A3	SCALE : NTS	DRAWN BY : NB	DATE : Oct Nov - 2025	REVISION: A

5.5.3 Soil Assessment – Site Physical & Chemical Properties

Assessment of the site was completed by geotechnical consultant Blackrock Mining Solutions in Nov-2025. Fifteen boreholes were installed across the site. Physical / geotechnical properties were assessed using SPT (standard penetration test) equipment, soils were described and findings were recorded on geological logs. Surveyed borehole locations are shown on ***Figure 8*** (above). Nominal borehole locations, relative to proposed site facilities are shown on ***Figure 9***. Coordinates and soil logs for each borehole are presented in ***APPENDIX C***.

Soil physical properties, as logged, by the geotechnical engineer were similar in each borehole and are summarised as follows:

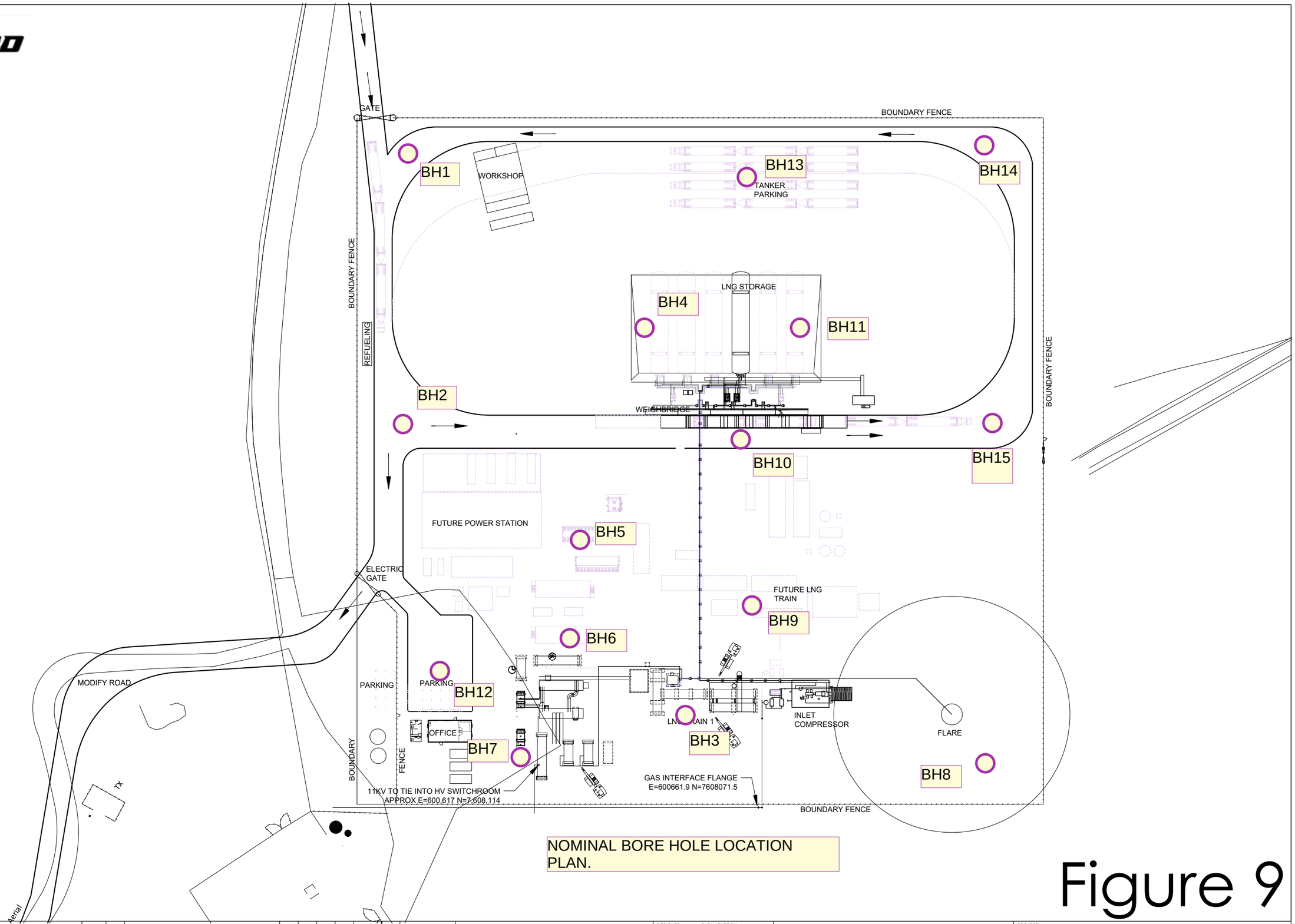
- **TOPSOIL** (to ~0.1 mBGS),
- **CLAY** (to ~3.0 mBGS) with trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; well graded, angular, brown, < PL, hard to very stiff,
- **HARD STRATA** described as **CLAYSTONE** was encountered in a small number of boreholes at depths between ~1.78 and 2.8m mBGS). Refusal on hard strata was encountered between 1.78m and 2.88 mBGS in boreholes BH01, BH02, BH05, BH06, BH07, and BH12.

Soil samples were collected by geotechnical consultant Blackrock Mining Solution for chemical analysis in accordance with specifications provided by the Suitably Qualified Person (as defined in the *Environmental Protection Act (1994)*). Eleven soil samples were submitted to the National Association of Testing Authorities (NATA) accredited Australian Laboratory Services (ALS) to provide baseline characterisation for a broad suite of soil contaminants of potential concern including:

- Total metals (As, Cd, Cr, Cu, Hg, Pb, Ni, Zn),
- Total petroleum / recoverable hydrocarbons (TPH / TRH) (C_6-C_{10}, C_{10}-C_{16}, C_{16}-C_{34}, C_{34}-C_{40}),
- BTEXN Compounds (benzene, toluene, ethyl benzene, xylenes, naphthalene),
- Polychlorinated biphenyls (PBC),
- Organochlorine pesticides / organophosphate pesticides (OC/OPs), and
- Polynuclear aromatic hydrocarbons (PAHs).

Analytical results were compared to *National Environmental Protection (Assessment of Site Contamination) Measure (NEPM)* guidelines for Commercial Industrial Sites. Concentrations of all contaminants of potential concern were below NEPM Health and Environmental Investigation Levels (HILs & EILs) for commercial and industrial sites in all soil samples collected at the site. Concentrations of most contaminants including PCBs, OCs & OPs, PAHs, TPH, TRH and BTEXN compounds were also below laboratory levels of reporting (LOR). The only exceptions to the above were low level metals in all samples, and very low level toluene in sample BH08 at 1.3 to 1.5mBGS. Tabulated soil analytical results are presented in ***APPENDIX D***. Laboratory documents are presented in ***APPENDIX E***.

ROTABOND CONSULTING



NOMINAL BORE HOLE LOCATION PLAN.

Figure 9

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REVISIONS

REV	DESCRIPTION	DRN	CHK'D	ENG	PROJ	DATE
F	RE-ISSUED FOR INTERNAL REVIEW	DW	GI			06.08.25
E	RE-ISSUED FOR INTERNAL REVIEW	DW	BL			07.04.25
D	RE-ISSUED FOR INTERNAL REVIEW	DW	BL			24.03.25
C	RE-ISSUED FOR INTERNAL REVIEW	DW	NP			20.03.25
B	ISSUED FOR REVIEW	DW	NP			13.03.25
A	INTERNAL REVIEW	DW	-			09.03.25

REFERENCES

FIG - 9 — DRAWING N°

NOMINALBOREHOLE LOCATIONS (RELATIVE TO SITE) — TITLE

DESIGNED	CLEAN ENERGY
DATE	17.10.2022
DRAWN	DW
SCALE	1:1000
	A3

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239 PLANET STREET
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Phone: +61(0) 8 9212 6700. www.cefa.com.au

PROJECT	QLD - CENTURION
CLIENT	CLEAN ENERGY FUELS MARKETING
TITLE	QLD - CENTURION GENERAL ARRANGEMENT SITE LAYOUT - V3
DRAWING N°	C12-DR-GA-001
REV	F

5.5.4 Surface Water Features

The site is located within the Goonyella Creek sub-catchment of the Isaac River catchment in the Bowen Basin, in Central Queensland. Key surface water features include:

- **Isaac River:** is a major river in the region and is located ~10 km to the south-east of the site. It is a significant watercourse that supports both agricultural and ecological values. The Isaac River catchment area includes Goonyella Creek, and surface water from the site may ultimately flow into the river during peak rainfall events.

- **Goonyella Creek:** is a tributary of the Isaac River and is located to the north east and east (~2km) of the site. The creek is ephemeral and intermittently flows north to south. Peak flows occur after heavy rainfall events. Minimal flow occurs during the dry season. The creek plays a role in local water drainage and runoff, particularly in storm events.

- **Gum Tree Creek:** is an ephemeral watercourse located >2km to the west of the site. The creek flows in a north south direction, and like Goonyella Creek has highly variable flows. The creek generally experiences flow only during significant rainfall events, with little to no base flow during the dry season. Gum Tree Creek lies outside the primary drainage pathway of the facility.

- **Unnamed, unregistered feature:** a potential or former ephemeral watercourse is located to the north and east of the site (closer to the site than Goonyella Creek). This unregistered feature is evident as a meandering line of greener / more dense vegetation. This unregistered feature is noted for context only, as it may influence surface runoff near and away from the site. The feature incorporates regional remnant or regrowth ecological communities as discussed in ***Section 5.7***.

Registered waterways near the site are shown on ***Figure 10***.

5.5.5 Regional Surface Water Quality

Baseline surface water quality data from Goonyella Creek and nearby watercourses indicates[1]:

- **Turbidity:** levels are generally higher during rainfall events due to the mobilisation of sediments from the surrounding land. This is common in ephemeral creeks where fluctuating water levels result in sediment disturbances.

- **pH and Conductivity:** surface water is typically neutral to slightly alkaline, with moderate salinity, which may vary seasonally depending on rainfall and evaporation rates.

- **Seasonal Variation:** water quality parameters such as nutrient levels, dissolved oxygen, and suspended solids vary considerably between the wet and dry seasons. Peak rainfall events are associated with higher nutrient loads and sediment transport into watercourses.

5.5.6 Regional Groundwater Features & Quality

Groundwater systems in the region are primarily associated with the Permian coal measures and Quaternary alluvial aquifers. Coal seam aquifers are characterised by low permeability and yield relatively small amounts of groundwater, that is typically of poor quality[2]. Groundwater in the area is mostly saline and unsuitable for agricultural or potable use. Key groundwater features include:

[1] Environmental Impact Statement, Section 10 Aquatic Ecology, Red Hill Mining Lease, BHP Mitsubishi Alliance
[2] Groundwater Quality, Bioregional Assessments, Australian Government



Source: *Qld Globe, accessed 12-Nov-2025*

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Title:

Client	CEFA
Site	Centurion LNG, Goonyella
Content	Registered waterways located near site

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Figure: 10

Revision: 1.0

- **Permian Coal Measures:** These deep aquifers are confined, with limited recharge potential. They yield small volumes of groundwater, that is characterised by high salinity, and dissolved solids, sulphates, and chloride levels are elevated. The groundwater has limited agricultural or industrial utility without significant treatment.

- **Quaternary Alluvial Aquifers:** These shallow aquifers are typically associated with the floodplains of the Isaac River and its tributaries. Groundwater in these aquifers is generally more accessible but remains of low quality due to elevated salinity and variability in water levels.

- **Water Levels:** Shallower groundwater levels in the region fluctuate seasonally, with higher levels observed during the wet season when rainfall contributes to localised recharge. Deeper coal seam aquifers have limited interaction with surface water systems and exhibit little seasonal variation in water levels.

Registered water bores nearest to the site include RN211642 and RN211805. Registered groundwater monitoring bores installed by Centurion Coal Mine include RN162630 and RN162632, located ~2.5km east, and ~2.6km east south east of the site respectively. Registered bores are shown on ***Figure 11***.

5.5.7 Water Assessment – Site Surface Water & Groundwater

No surface water features are present on site. No standing surface water was observed on site. Geotechnical boreholes were extended to refusal or 3.0mBGS. A number of boreholes were extended to refusal on hard strata. No groundwater was encountered in any borehole to a maximum depth of 3.0 mBGS. Surface water was not observed in the vicinity of the site. Shallow groundwater and surface water do not appear to constitute sensitive receptors at the site. Drilling completed by Centurion Mining near to the site (~100m to the northwest of the site associated with a nearby vent shaft) indicated a depth to groundwater of 110m.

5.5.8 Flood Risk

The site is not located within a known floodplain and is situated outside the 1-in-100-year flood extent, according to flood modelling for the region. Goonyella Creek and the Isaac River are prone to flooding during extreme rainfall events. The site is elevated and not directly subject to riverine flooding. Key flood risk characteristics include:

- **Ephemeral Creek Flooding:** Goonyella Creek can experience rapid rises in water levels following heavy rainfall. The ephemeral nature of the creek means that floodwaters typically recede quickly. The creek is unlikely to pose a significant flood risk to the project site.

- **Surface Water Runoff:** The topography of the area, which consists of gently sloping plains, means that surface water runoff may occur during intense storm events, potentially contributing to overland flow, localised ponding and minor flooding in low-lying areas.

The Isaac Regional Council Flood Hazard Map Overlay is shown in ***Figure 12***.

Note: Site civil design incorporates an earthen berm to the north and east of the site to limit ingress of overland flow to the site (minimising potential erosion and sedimentation.



Source: *Qld Globe, accessed 12-Nov-2025*

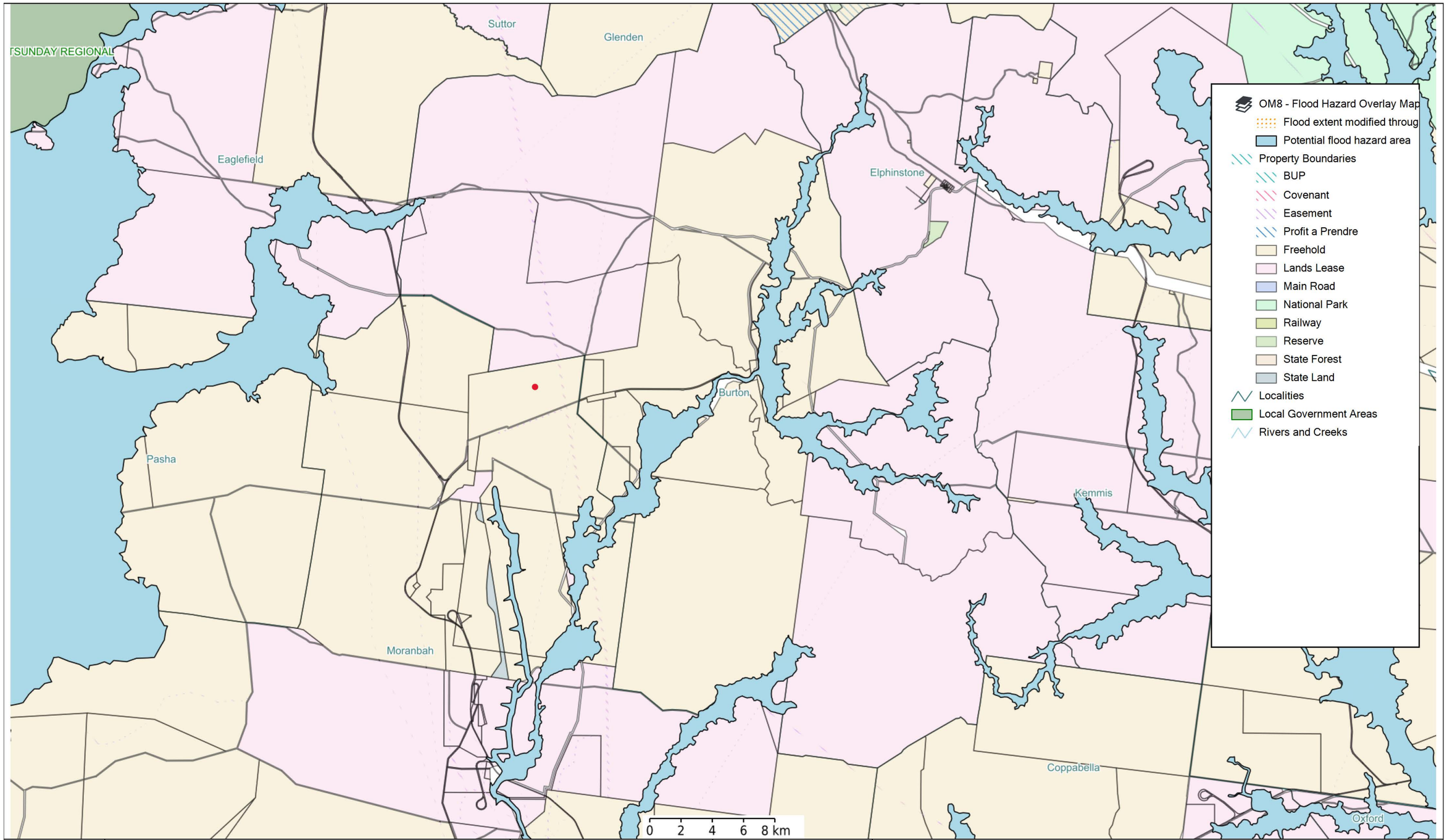
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Title: Client CEFA
Site Centurion LNG, Goonyella
Content Registered Water Boreholes Located Near Site

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Figure: 11
Revision: 1.0



ISAAC REGION

Isaac Regional Council does not warrant the accuracy of information in this publication and any person using or relying upon such information does so on the basis that IRC shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

05/01/2026

1:245811

N

Source: *Isaac Regional Council - Accessed 5-Jan-2026*

Note: *Approximate location of site shown*

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Title: Client CEFA
Site Centurion LNG, Goonyella
Content Isaac Regional Council Flood Hazard Overlay

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Figure: 12

Revision: 1.0

5.6 CLIMATE

The facility is located in the North Goonyella region, within the Bowen Basin of Queensland. The area experiences a semi-arid, hot climate (BSh under the Köppen-Geiger climate classification). This section provides an overview of the climatic conditions relevant to the proposed site, including temperature, rainfall, evaporation, and potential climate risks that could affect the facility's operations.

5.6.1 Temperature

The Bowen Basin region, including the site, experiences hot summers and warm to cool winters. Based on data from the Moranbah Airport (station 034035) and Moranbah Water Treatment Plant (station 034028), the mean daily temperatures range from 8.8°C to 24.3°C in winter (July) and from 20.6°C to 34.9°C in summer (December).

5.6.2 Rainfall

The region receives highly variable rainfall, with the majority occurring during the summer months, particularly between November and March. The annual mean rainfall is approximately 553 mm, although this can fluctuate significantly year to year. Most of the rainfall is attributed to summer storms and tropical low-pressure systems. This variability can pose challenges for managing surface water and site erosion. Long-term average values taken from Moranbah airport weather station (site 034035) (BoM 2012 to 2026 *https://www.bom.gov.au/climate/averages/tables/cw_034035.shtml*) are shown below in ***Table 14***.

Table 14 – Monthly climate statistics for Centurion LNG (Moranbah BoM data)

Month	Mean Rainfall (mm)	Mean Temperature (°C)
January	113.1	21.5 - 34.3
February	92.9	21.4 - 33.7
March	81.2	20.4 -32.8
April	32.0	16.9 - 30.2
May	30.8	12.9 - 26.9
June	23.2	9.8 - 24.4
July	34.0	8.8 - 24.3
August	13.6	9.1 - 26.8
September	12.4	12.7 - 30.1
October	24.3	16.4 – 33.4
November	72.6	19.2 - 34.7
December	67.1	20.6 - 34.9
Annual	**597.3**	**15.8 to 30.5**

5.6.3 Wind

Wind in the region is generally light to moderate, and predominantly from the southeast. Wind speeds are typically between 10 and 20 km/h, although higher speeds can occur during thunderstorms and tropical low-pressure systems. Wind plays an important role in the dispersion of air emissions, and

the prevailing southeast winds are favourable for minimising the risk of emissions impacting sensitive receivers to the north and west of the site. Wind roses for the site (extracted from the *Air Quality Assessment (Trinity 2025)* are shown below in ***Figure 13***.

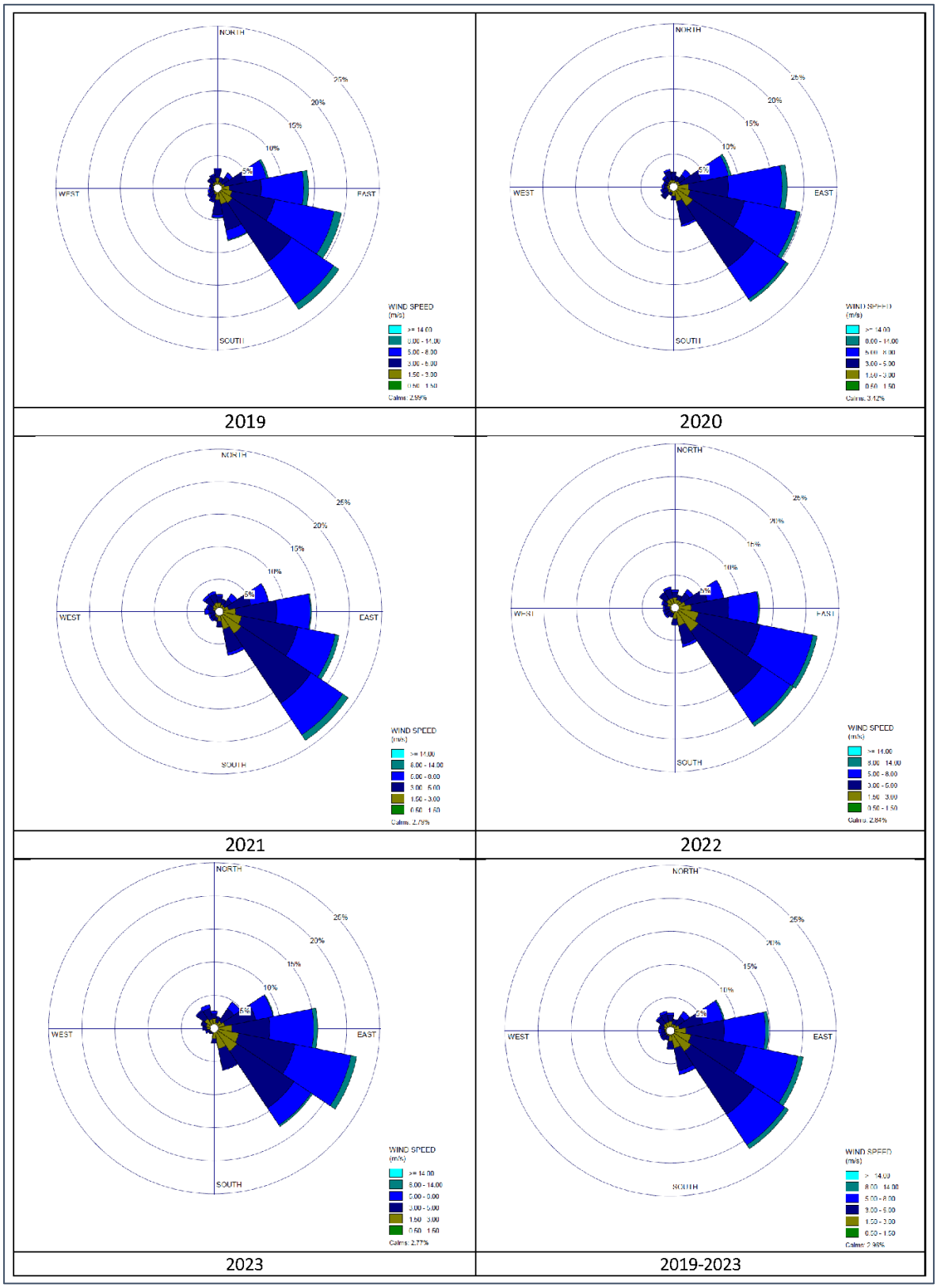


Figure 13 –Annual wind roses (BoM Moranbah Airport)

5.6.4 Evaporation

Evaporation rates in the site area are relatively high, typical for semi-arid climates. Historical data suggests a daily evaporation rate of approximately 6.3 mm, which may affect water management strategies at the facility, particularly during the drier months when rainfall is minimal.

5.6.5 Extreme Weather Events

The facility, like much of Central Queensland, is susceptible to extreme weather events such as tropical cyclones, flooding, and bushfires:

- **Tropical Cyclones:** can cause intense rainfall, flooding, and high winds during the wet season (November to March).
- **Bushfire:** Despite being located on predominantly cleared land, the area surrounding the facility is classified as having a medium potential bushfire hazard, particularly during the dry season when vegetation becomes a potential fuel source for wildfires.
- **Flooding:** Heavy rainfall from tropical systems or summer storms can lead to localised flooding, particularly in low-lying areas near watercourses. The facility is located approximately Goonyella Creek, which drains into the Isaac River. An unnamed, unregistered potential ephemeral water course is located closer to the site beyond the northern and eastern boundary of the cleared area. No surface water was observed during geotechnical assessment in Nov-2025.

5.6.6 Projected Changes to Regional Climate

Climate change is widely acknowledged as potentially increasing the frequency and severity of weather events, in conjunction with increasing average temperatures. Queensland Government[3]. Projections indicate that the region is expected to experience the following changes by 2050:

- Average temperature increase (~1.4 to 1.8°C),
- Average annual rainfall decrease (~ 0.08%),
- More frequent and intense heatwaves and dry periods,
- Increased water stress and bushfire risk,
- More intense rainfall events, increased flooding risks (despite overall decrease in total rainfall).

5.7 MATTERS OF ENVIRONMENTAL SIGNIFICANCE

The project is subject to review in accordance with the provisions of the Queensland *Environmental Protection Act 1994* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Potential impacts on Matters of National, State, and Local Environmental Significance (MNES, MSES, MLES), are included in this assessment). The following subsections present an assessment of the relevant matters of environmental significance that may occur near the project area. The assessment is presented within the context that the site comprises historically disturbed

[3] Climate change in Queensland (Version 1), 2019, Queensland Government

land and has been leased from Centurion Mining as a cleared, stripped, levelled block with little or no intrinsic ecological value.

5.7.1 Matters of National Environmental Significance (MNES)

A search was undertaken of matters of national environmental significance or other matters protected by the *EPBC Act* that may occur within 2km of the proposed facility. The *EPBC Protected Matter Report* is presented in ***APPENDIX F*** and summarised in ***Table 15*** and ***Table*** 16 below.

Table 15 – Matters of national environment significance

Matters of National Environment Significance	Occurrence
World Heritage Properties	None
National Heritage Places	None
Wetlands of International Importance (Ramsar)	None
Great Barrier Reef Marine Park	None
Commonwealth Marine Area	None
Listed Threatened Ecological Communities	3
Listed Threatened Species	21
Listed Migratory Species	9

Table 16 – Other matters protected by the EPBC Act

Other Matters Protected by the EPBC Act	Occurrence
Commonwealth Lands	None
Commonwealth Heritage Places	None
Listed Marine Species	13*
Whales and Other Cetaceans	None
Critical Habitats	None
Commonwealth Reserves Terrestrial	None
Australian Marine Parks	None
Habitat Critical to the Survival of Marine Turtles:	None
Note*: *The listing of marine species is noted. Listed species include birds that may fly over the area or where habitat may exist within the area around the site. Significance is limited as the site is terrestrial, land locked, fully cleared and ~2km from all registered waterways.*	

5.7.2 Matters of State Environmental Significance (MSES)

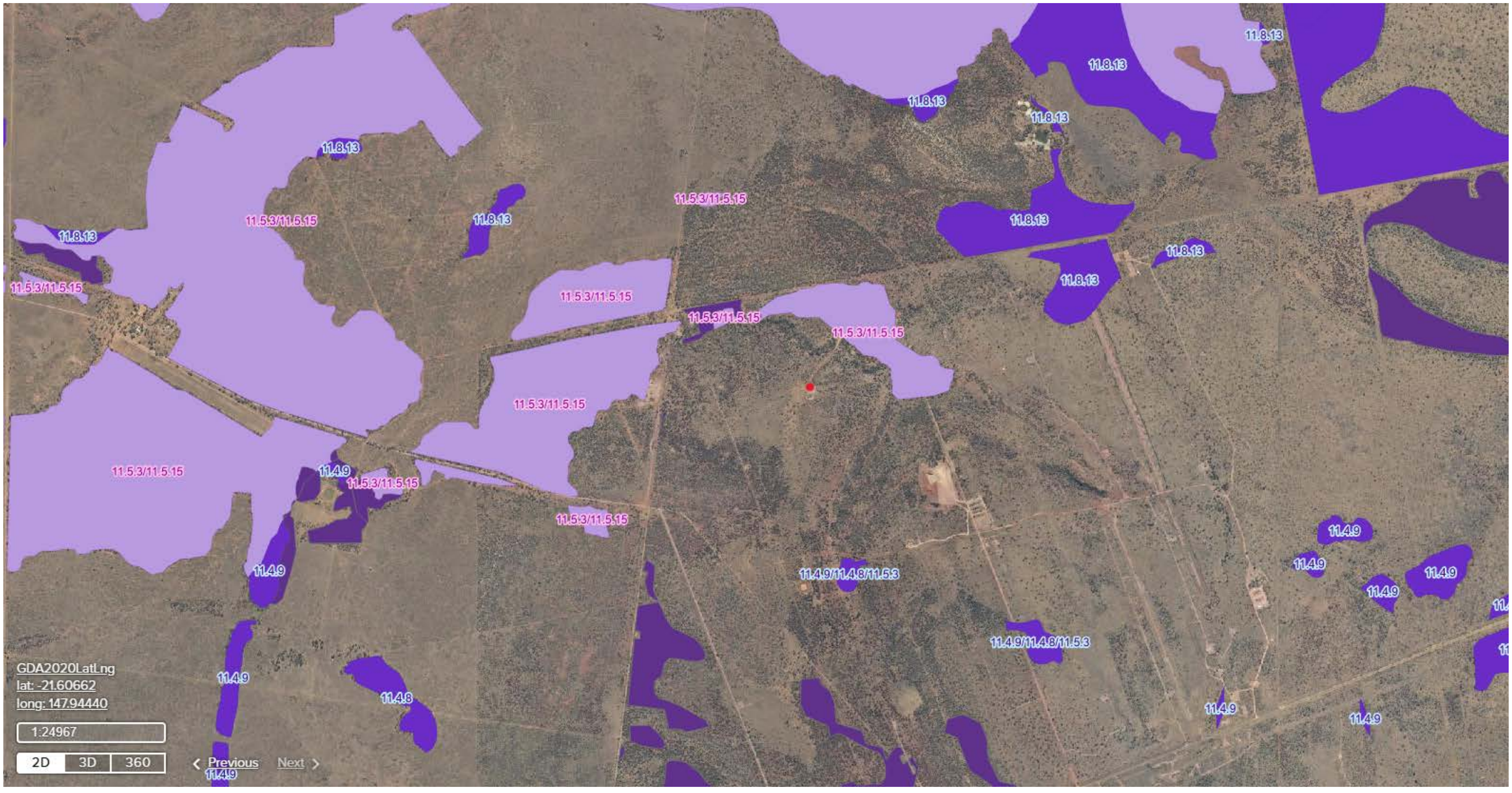
A search of Matters of State Environmental Significance (MSES) was completed for the site and surrounding areas. **As the site is fully cleared and the surrounding land heavily disturbed, the MSES search area was expanded to the relevant land parcel (Lot 412 on SP352711)** and including matters applicable under the *State Planning Policy (SPP)* and the *Environmental Offsets Regulation 2014*. The land parcel was conservatively used as the search criteria for ***MSES*** it covers a much larger surface area and includes all areas within 2km of the site. Findings associated with the MSES Report are detailed in ***APPENDIX G*** and summarised below in Table 17. All MSES apply to land around the site. The site was leased from Centurion Coal Mining as a fully cleared, stripped, levelled block with little or no intrinsic ecological value as shown in ***Figure 6*** (above).

Table 17 – MSES summary

MSES Category	Occurrence on Lot 412
1a. Protected Areas - estates	None
1b. Protected Areas - nature refuges	None
1c. Protected Areas - special wildlife reserves	None
2. State Marine Parks - highly protected zones	None
3. Fish habitat areas (A and B areas)	None
4. Strategic Environmental Areas (SEA)	None
5. High Ecological Significance wetlands	None
6a. High Ecological Value (HEV) wetlands	None
6b. High Ecological Value (HEV) waterways	Not applicable
7a. Threatened (endangered or vulnerable) wildlife	Present
7b. Special least concern animals	Present
7c i. Koala habitat area – core (SEQ)	None
7c ii. Koala habitat area – locally refined (SEQ)	None
7d. Wildlife habitat (sea turtle nesting areas)	Not applicable
8a. Regulated Vegetation – Endangered (Category B)	Present
8b. Regulated Vegetation – Of Concern (Category C)	Present
8c. Regulated Vegetation – Category R (GBR riverine regrowth)	Present
8d. Regulated Vegetation – Essential habitat	Present
8e. Regulated Vegetation – Intersecting Watercourses	Present
8f. Regulated Vegetation – Within 100m of Wetlands	None
9a. Legally Secured Offset Areas	None
9b. Legally Secured Offset Vegetation Offsets	None

MSES mapping indicates that regulated vegetation and essential habitat values cover the site. The LNG facility site was historically disturbed (cleared for a gas vent shaft). The 190m x 190m footprint of the facility site was fully cleared, stripped, and levelled by Centurion Mining in accordance with the gas supply / lease agreement prior to handover to CEFA in December 2025. Evidence of the current cleared condition of the site was presented in ***Figure 6***, above. Following clearing the facility footprint is clear of any intact vegetation communities. The entire facility footprint is devoid of remnant vegetation. The mapped MSES layers do not accurately represent current on-ground conditions. The proposed development will avoid clearing of intact native vegetation or essential habitat and no environmental offsets are triggered under the *Environmental Offsets Regulation 2014*. Any offset requirements for the site are covered under existing approvals held by Centurion Coal Mining.

MSES are relevant to the land around the site. MSES endangered regional ecosystems are shown on ***Figure 14***. MSES vegetation and habitat are shown on ***Figure 15***. MSES wetland values are shown on ***Figure 16***. MSES wildlife habitat is shown on ***Figure 17***.



Source: *Qld Globe, accessed 27-Nov-2025*

Legend:
Purple - Endangered regional ecosystem - Remnant
Dark purple - Endangered regional ecosystem - Regrowth

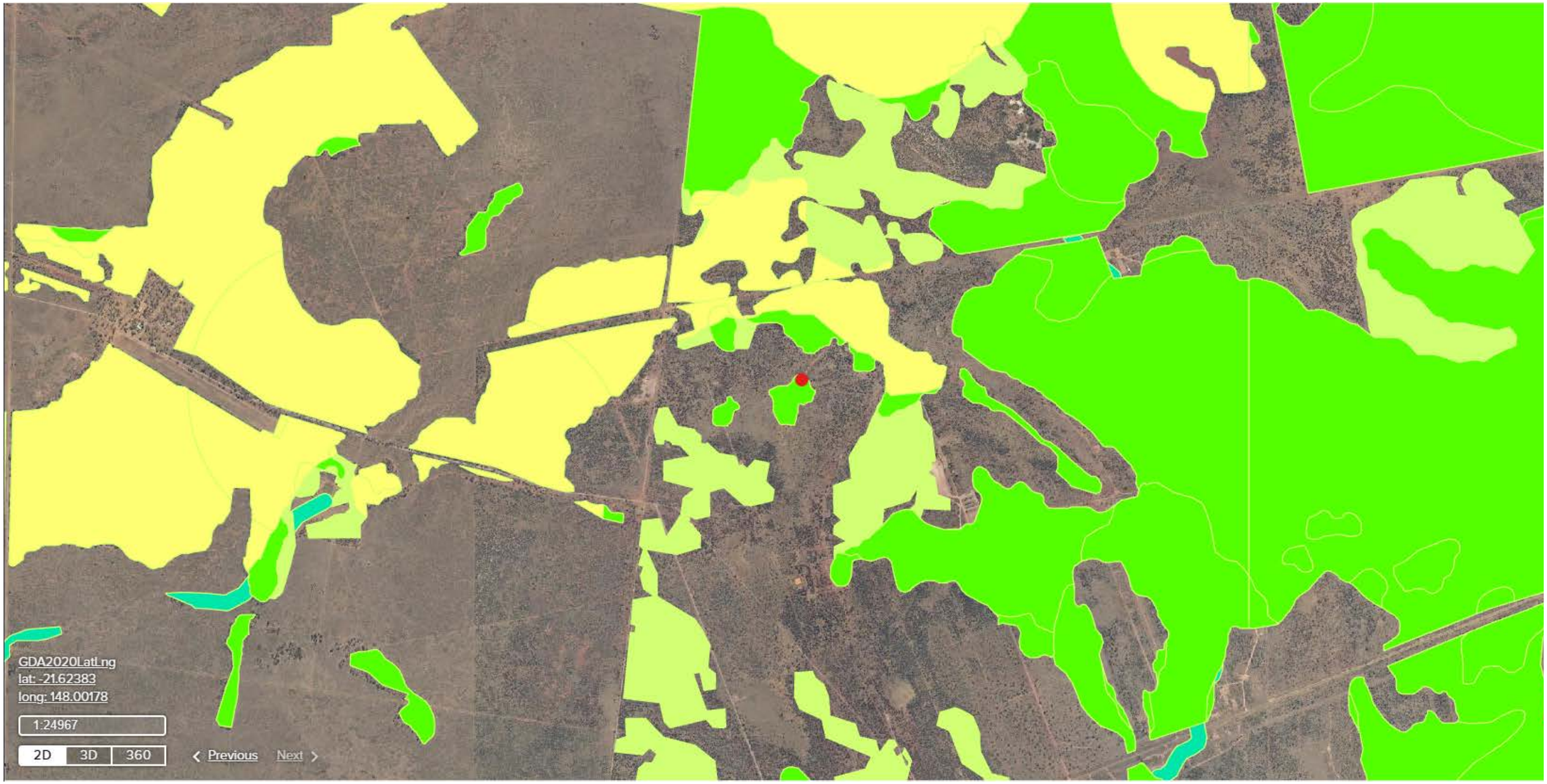
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Client:	CEFA
Drawn:	LD
Date:	27-Nov-2025
Scale:	As Shown

Title: Client CEFA
Site Centurion LNG, Goonyella
Content MSES endangered regional ecosystems

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Figure: 14
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Source: *Qld Globe, accessed 27-Nov-2025*

Legend:
Green - MSES regulated vegetation (category B - endangered or of concern)
Light green - MSES regulated vegetation (category C - endangered or of concern)
Yellow - MSES regulated vegetation (essential habitat)
Aqua - MSES regulated vegetation (category R - GBR riverine)

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Client:	CEFA
Drawn:	LD
Date:	27-Nov-2025
Scale:	As Shown

Title: Client CEFA
Site Centurion LNG, Goonyella
Content MSES vegetation and habitat

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Figure: 15
Revision: 1.0



Source: *Qld Globe, accessed 27-Nov-2025*

Detail:
Goonyella Creek located East of the site
Gum Tree Creek located West of the site

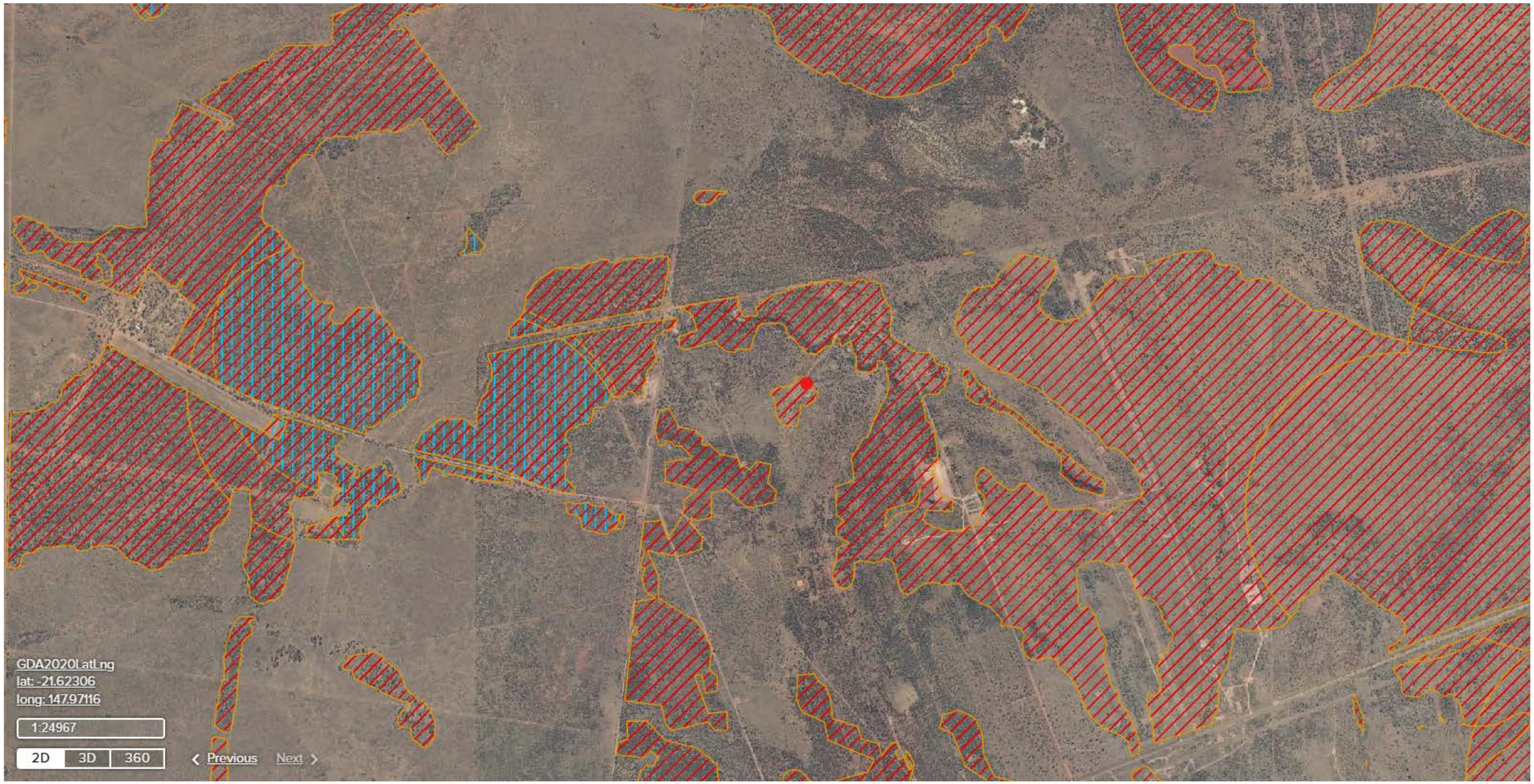
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Client:	CEFA
Drawn:	LD
Date:	27-Nov-2025
Scale:	As Shown

Title:
Client: CEFA
Site: Centurion LNG, Goonyella
Content: MSES wetland values - MSES regulated vegetation (defined watercourse)

CLEAN ENERGY FUELS AUSTRALIA

Figure: 16
Revision: 1.0



Source: *Qld Globe, accessed 27-Nov-2025*

Legend:
Red diagonal - MSES wildlife habitat (endangered or vulnerable)
Bluestripe - MSES wildlife habitat (special least concern)

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Client:	CEFA
Drawn:	LD
Date:	27-Nov-2025
Scale:	As Shown

Title:
Client: CEFA
Site: Centurion LNG, Goonyella
Content: MSES wildlife habitat located near site

CLEAN ENERGY FUELS AUSTRALIA

Figure: 17
Revision: 1.0

5.7.3 Matters of Local Environmental Significance (MLES)

The local planning authority, Isaac Shire Council, manages land use and development in the area, ensuring compliance with environmental and community impact standards under the local Planning Scheme. Issac Regional Council Online Mapping Tool shows only MSES criteria. Mining tenements authorised under the *Mineral Resources Act 1989* are typically exempt from regular local government planning scheme provisions. As the proposed PFL area will be located within the boundaries of ML6949, no relevant matters of local environmental significance have been identified.

5.8 AQUATIC ECOLOGY

No surface water features were observed on site. All registered waterways within the vicinity of the site are located ~2km from the site. Aquatic ecology assessment was accordingly not required and was beyond the scope of this assessment.

5.9 TERRESTRIAL ECOLOGY

The site is located wholly within mining lease ML 6949 in the Bowen Basin of Central Queensland, within the Brigalow Belt bioregion. The site comprises a cleared, stripped, levelled block that was cleared by Centurion Coal Mining prior to hand over to CEFA. Following clearing the facility footprint was clear of any intact vegetation communities. The full 190m x 190m facility footprint is devoid of remnant and regrowth vegetation and any associated habitat. The site has little to no ecological value as shown in ***Figure 6*** (above). Accordingly, the remainder of this terrestrial ecology section is focussed on regional ecology and the ecological values that may be represented on the land around the site.

The terrestrial ecology of the region is characterised by a mix of remnant native vegetation, disturbed landscapes due to mining operations and associated activities, and a variety of fauna and flora species. This section outlines the terrestrial ecological features relevant to the land around the site, including vegetation communities, fauna, and flora, based on available regional studies.

5.9.1 Regional Ecosystems & Vegetation Communities

The Centurion Mining lease is located in the Brigalow Belt bioregion, which is known for its significant ecological communities, some of which are classified under both state and federal conservation frameworks. Key vegetation types present in the area around the site may include:

- **Brigalow (*Acacia harpophylla*) Woodlands:** Classified as endangered under the *EPBC Act and* Queensland *Vegetation Management Act 1999*, these woodlands are a priority for conservation due to extensive historical clearing.

- **Eucalypt Woodlands and Open Forests:** Some are listed as of concern under state legislation. Eucalypt communities dominate the higher elevations and ridgelines.

Land immediately adjoining the site boundaries does not include endangered regional ecosystems (remnant or regrowth). Nearby communities to the north and east of the site (~230m to the north east), as shown on ***Figure 14*** (above) include:

- **RE ID 11.5.3:** Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana woodland on Cainozoic sand plains and/or remnant surfaces. **Least Concern / No concern at present.**

- **RE ID 11.5.15:** Semi-evergreen vine thicket on Cainozoic sand plains and/or remnant surfaces. **Least concern / Endangered.**

A small patch of endangered regional ecosystem is located approximately 1km to the south of the site, and includes:

- **RE ID 11.4.8:** Eucalyptus cambageana woodland to open forest with Acacia harpophylla or A. argyrodendron on Cainozoic clay plains. **Endangered / Endangered.**
- **RE ID 11.4.9:** Acacia harpophylla shrubby woodland with Terminalia oblongata on Cainozoic clay plains. **Endangered / Endangered.**
- **RE ID 11.5.3:** Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana woodland on Cainozoic sand plains and/or remnant surfaces. **Least Concern / No concern at present.**

Adjacent and nearby regulated vegetation, as shown on ***Figure 15*** (above) include:

- MSES regulated vegetation (category B - endangered or of concern), and
- MSES regulated vegetation (essential habitat), and
- MSES regulated vegetation (category C- endangered or of concern).

The area to the immediate south of the site boundary is classified MSES wildlife habitat (endangered or vulnerable) as shown in ***Figure 17***. The value of the area may be limited due to its isolation and separation from higher value Res. Significance is summarised as follows:

- **RE 11.8.11** which comprises habitat for Trioncinia retroflexa (endangered), Dichanthium queenslandicum (vulnerable); supports fauna dependent on grasslands; connectivity between remnant grasslands, and
- **RE 11.8.5** which comprises habitat for Picris evae, Thesium australe, Digitaria porrecta, Discaria pubescens; koalas (Phascolarctos cinereus).

5.9.2 Regional Fauna Species

The site is fully cleared, stripped and levelled and no fauna species of significance or conservation value are likely on site, or likely to be encountered on site at any time. Fencing of the site prior to commencement of construction will further limit the likelihood of fauna incursion onto the site. On-site fauna study was considered inappropriate and accordingly beyond the scope of this assessment. This approach was confirmed in consultation between the suitably qualified person and specialist ecological consultant. The focus of the fauna assessment refers generally to species that may be represented regionally. The list of species that may occur on Lot 412 (the ~7000Ha land parcel on which the site is located) is extensive and presented as ***Wildnet Records*** in ***Appendix G***. The land parcel was conservatively used as the search criteria for ***Wildnet Records*** and includes all areas within 2km of the site.

Table 18 – Significant fauna species possible around the facility area

Species Name	Common Name	EPBC Act Status	Likelihood of Occurrence
Refer to ***MSES Report*** & ***WildNet Records*** in ***Appendix G***.			

5.10 SENSITIVE RECEPTORS

The site is located in an area of ongoing mining development. Sensitive receptors have accordingly been identified through other completed impact assessments for current and proposed mining activities. Background studies have been completed and were used as a reference for the current assessment. Sensitive receptors were reviewed and confirmed by Air and Noise specialists Trinity Consultants as being relevant for consideration in this assessment. The following were drawn from the Trinity Consultants *Centurion LNG Facility Noise Impact Assessment (2025)*:

A sensitive place is defined as:

- A dwelling, mobile home or caravan park, residential marina or other residential place, where dwelling means any of the following structures or vehicles that is principally used as a residence-
    - a house, unit, motel, nursing home or other building or part of a building;
    - a caravan, mobile home or other vehicle or structure on land;
    - a watercraft in a marina.
    - a motel, hotel or hostel;
    - a kindergarten, school, university or other educational institution;
    - a medical centre or hospital;
    - a protected area;
    - a park or gardens; or
    - a place used as an office or for business or commercial purposes.
- A Commercial place:
    - a place used as an office or for business or commercial purposes

Based on the definition, the nearest sensitive uses and separation distances from the development site are defined as follows:

- Residential/accommodation:
    - (R1) Lapunyah Homestead – 8.8 km south-west,
    - (R2) Denham Homestead – 4.3 km west,
    - (R3) Wards Well Homestead – 7.4 km north,
    - (R4) Redhill Homestead – 11.6 km south-east,
    - (R5) Burton Down Homestead – 11.3 km east.

The locations of sensitive receptors are shown in ***Figure 18***.

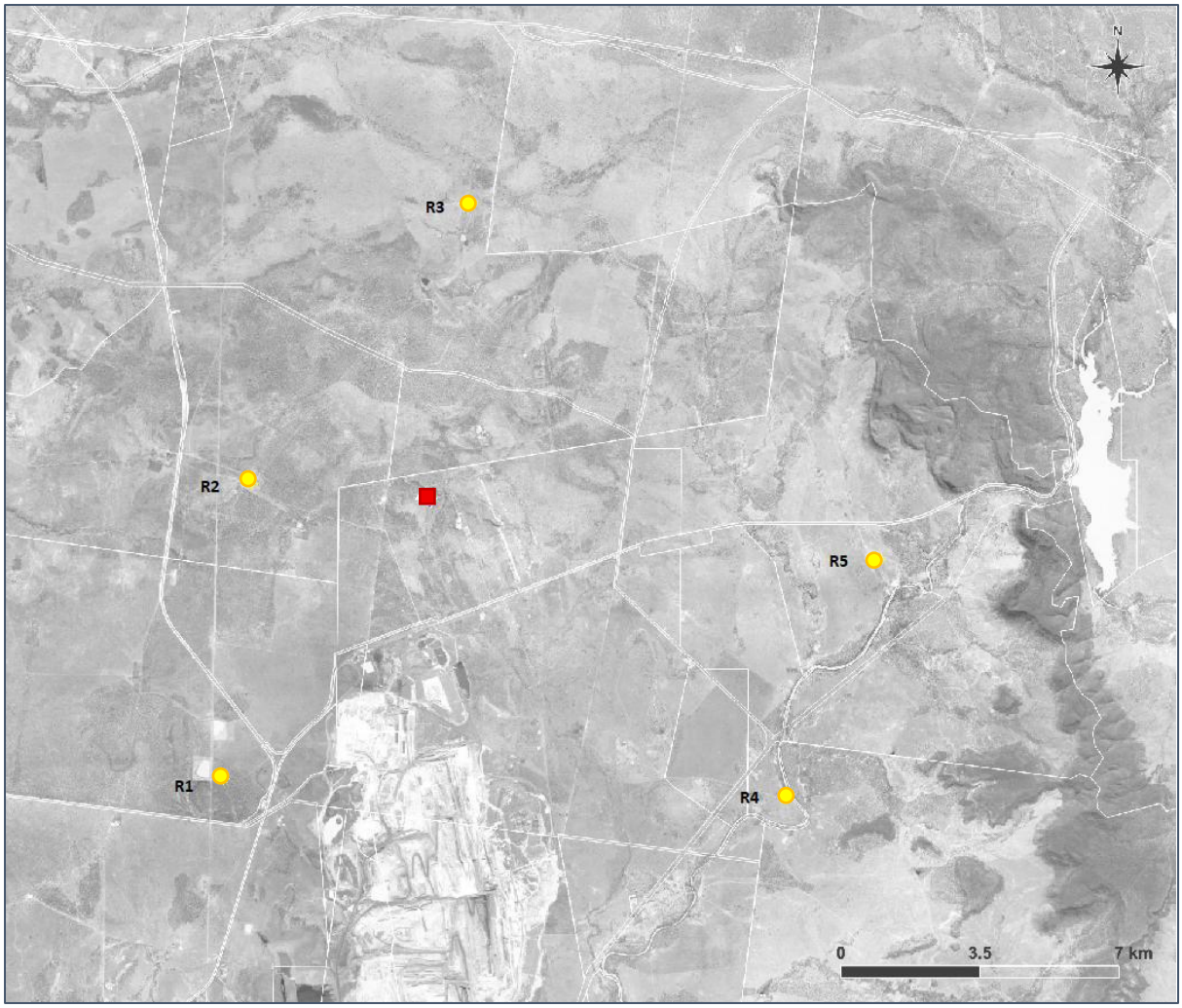


Figure 18 – Sensitive receptors – air and noise

6.0 THE FACILITY – CENTURION LNG FACILITY DETAILS

6.1 FACILITY & PROCESS OVERVIEW

The micro-LNG facility equipment that will be installed at the CENTURION LNG FACILITY (the facility), was manufactured in modules in 2022 and was installed, and commissioned at CEFA's flagship Mid-West LNG Hub facility at Mount Magnet in Western Australia in Jan-2023. The facility was operated for over 18 months before additional demand generated the trigger for replacement of the plant with a larger (240 tonnes per day (tpd) LNG) plant. The existing facility was decommissioned in 2024, to facilitate installation of the larger plant. The larger LNG facility was successfully commissioned by CEFA at Mt Magnet in early 2024. The existing facility equipment was mothballed in preparation for mobilisation and re-establishment in Queensland.

The facility is a state-of-the-art micro–Liquefied Natural Gas (LNG) production facility designed as a modular, multi-train facility with an initial production capacity of **70tpd LNG**. The modular design makes it possible for the facility to be moved, installed, and commissioned rapidly and efficiently, and decommissioned and relocated as required. The relocation of this facility to Goonyella will bring proven technology and operational experience to the Centurion site and enable the efficient production of LNG from ICSG sourced from the Centurion Coal Mine. The history of successful operations of the facility in Western Australia significantly limits risk associated with operation in Queensland.

The micro-LNG facility features advanced proprietary pre-treatment and mixed refrigerant technologies. Processes include:

- **Pre-treatment:** to remove physical impurities in the gas stream,
- **Pre compression:** to boost gas pressure from the infield gathering line pressure of ~0.05 Bar to the facility operational pressure of 6 Bar,
- **Gas Sweetening:** treatment using an amine contactor system to remove process gas impurities (such as CO_2, and noting that H_2S is not anticipated to be produced in any significant volume at the facility),
- **Polishing:** further purification through filters and molecular sieves, to eliminate dust, debris, and moisture.
- **Liquefaction:** cooling to -161°C using cross-exchanged mixed refrigerants to convert gas to LNG.
- **Storage:** LNG is piped to 3 x 365kl cryogenic storage tanks at the facility (2 tanks will be installed prior to commissioning the third tank will be added when gas supply increases).
- **Transfer:** to A double configuration cryogenic road tankers for trucking offsite to Rolleston, approximately 400km south of the facility for regassification and injection into the east coast natural gas grid.

Note: *an alternative destination for the produced LNG is mining and industrial customers in remote locations in Queensland. Contingent upon appropriate commercial arrangements being established, LNG alternatively or additionally may be trucked offsite to industrial customers for use in a variety of applications, including power generation and industrial heating. Should this commercial avenue be established in Queensland, the LNG has the potential to displace 30 million litres per annum of more carbon intensive diesel fuel.*

The modularity of the micro-LNG facility is a key feature of CEFA's LNG supply chain. Modularity of all components allows for easy expansion or relocation of production modules (trains) and LNG satellite

stations based on customer demand. This flexibility ensures that the facility can be adapted or scaled as needed, making it a highly efficient and versatile solution for LNG production at the Centurion site.

Relocation of the micro-LNG facility equipment to the Centurion project will bring a tried, tested and efficient LNG production facility to Queensland. The facility's ability to process ICSG from an operating coal mine and turn waste gas into a valuable energy resource aligns with CEFA's commitment to sustainability and energy efficiency.

6.2 DESIGN, PROCESS, COMPONENTS & CONFIGURATION

The Centurion LNG Facility will be constructed and configured using a modular design, maximising the operational value of components that were specifically designed and prefabricated for rapid installation and efficient operation. The modules are configured in ISO container sections, making transportation, setup, and installation highly efficient. This efficiency accordingly minimises the environmental footprint associated with deployment of the facility. Modularity is key to the flexibility and ease of redeployment of the plant. The facility, including modular components, in the typical configuration operated at Mount Magnet in Western Australia is shown below in ***Figure 19***.



Figure 19 – Centurion LNG Facility – micro LNG plant equipment (in operation at Mt Magnet, WA)

6.2.1 Facility Configuration & Standards

The facility consists of several modular units that perform specific functions in the LNG production process, including:

- **Precompression and conditioning unit:** compresses field gas and removes physical impurities.

- **Gas sweetening and conditioning units:** treats incoming ICSG by removing process gas contaminants, dust, moisture, and debris.

- **Cryogenic units:** cools the gas to -161°C to produce LNG.

- **Storage and loading modules:** LNG is stored in cryogenic tanks and then loaded onto road tankers for transportation.

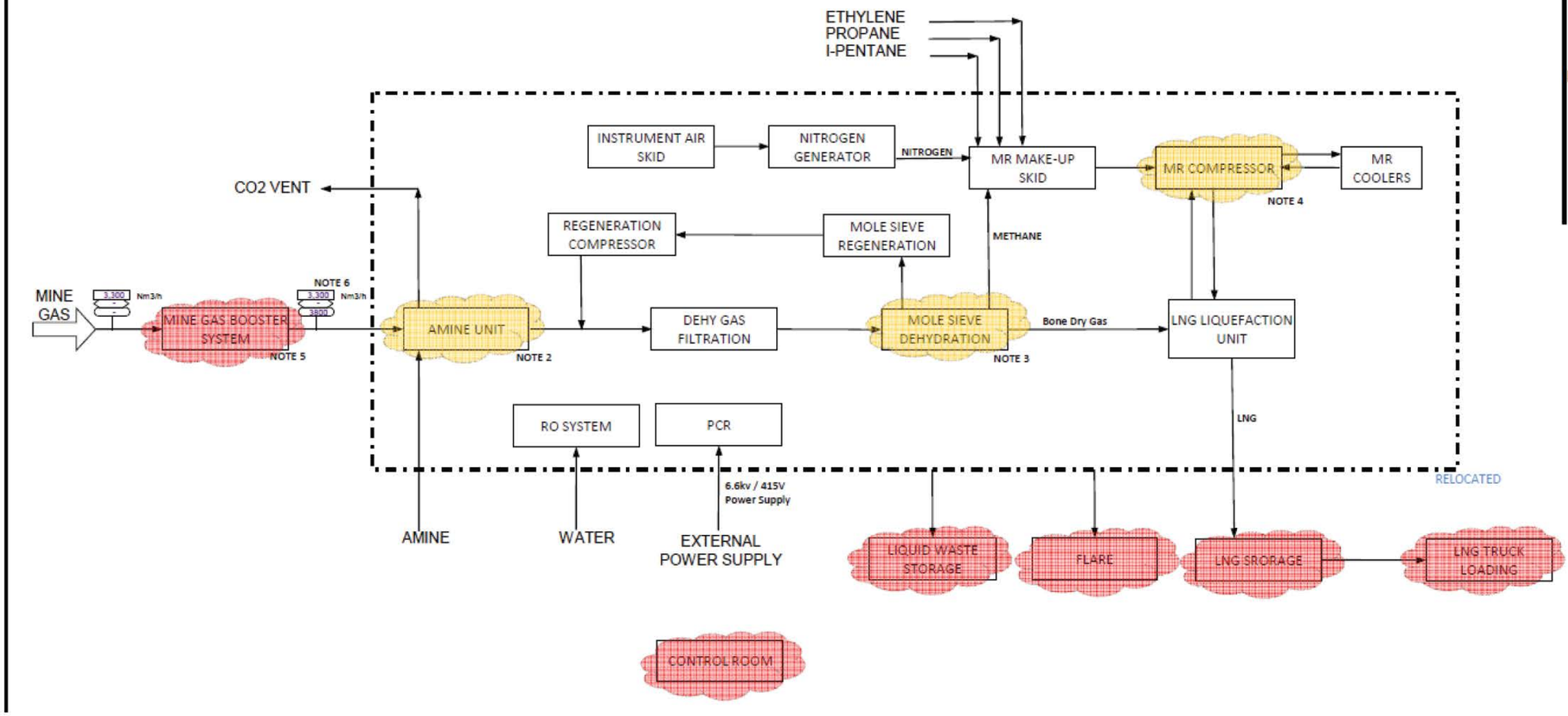
The key components of the facility are mounted on skid frames for ease of transport and installation. Each module is designed to work as a "plug-and-play" system, with interconnections made on-site between the various units. The modularity allows the facility to be expanded or reconfigured in the future should production requirements increase, or additional gas sources become available. Major components of the facility are outlined below in ***Table 19***. All modules have been designed and constructed in accordance with relevant Australian Standards as outlined in the Basis of Design presented in ***APPENDIX H***. An overview of the facility process flow is shown in ***Figure 20***. The facility general layout is shown in ***Figure 21***. The site elevation is shown in ***Figure 22***.

Table 19 – Major facility components

Major Component	Major Component Description
Inbound gas receipt	ICSG transferred from Centurion Coal Mining to the facility is received (and accountability transfers) at the battery limit of the facility.
Inlet gas filtration	Receives feed gas from the pipeline to a Feed Gas Filter Separator.
Amine treating system	Operates on a regenerative amine process using formulated methyl diethanolamine to reduce CO_2 content. Components include but are not limited to gas chromatograph, amine contactor, and circulation pumps.
Molecular sieve dehydration	Reduces water content of the inlet gas using a temperature swing adsorption system. Components include molecular sieve vessels, gas scrubbers, and moisture analyser.
Mixed refrigerant (MR) liquefaction system	Produces LNG at -161°C. Components include MR compressor, heat exchangers, and gas chromatograph.
MR makeup system	Allows real-time adjustments to optimise MR composition LNG production. Components include MR accumulator, transfer compressor, and makeup dryer. Optimised mixed refrigerant (OMR) is used to liquefy gas to LNG.
Supervisor control system	Allen Bradley PLC-based system for plant monitoring and control. Features local instrumentation, remote input / output (I/O) panels, and a graphical human machine interface (HMI) for operation from local or remote control rooms.
Power & control room	Modular building that houses LNG plant electrical control equipment. Components include distribution panels, motor control centres, uninterruptible power supply (UPS), and fire detection systems.
Nitrogen generator	Provides nitrogen purge for the cold box and compressor seals, also used as instrument air. Includes air compressor, PSA vessels, and PLC control system.
Flare system	Decompresses and burns non-liquefied gases, includes a knock-out drum, automatic ignition, and nitrogen purging to minimise environmental impact.
Water, reverse osmosis plant, ablutions	Potable water trucked to the site and stored will be processed using reverse osmosis (RO) to produce demineralised water for the amine system (amine solution), RO plant reject water will be recycled for ablutions.

NOTES:
1) SEE DRAWING PFD-005 FOR STANDARD SYMBOLS AND NOMENCLATURE.
2) CHANGE THE AMINE TYPE
3) MODIFY REGEN HEATER SYSTEM
4) MODIFY MR COMPRESSOR SKID STRUCTURE.
5) NEW MINE GAS BOOSTER COMPRESSOR SYSTEM.
6) OPERATING RANGE.
   - 3300 Nm3/h @ 3800 kPAG
   - 4150 Nm3/h @ 6600 kPAG

LEGEND:
NEW
MODIFIED
25,678 FLOW KG/H IF NOT STATED
159.5C TEMP DEGC
32.5 PRESS KPA G
STREAM DETAILS



CRYOSYS PROPRIETARY INFORMATION

Source: *CEFA / CRYOSIS*

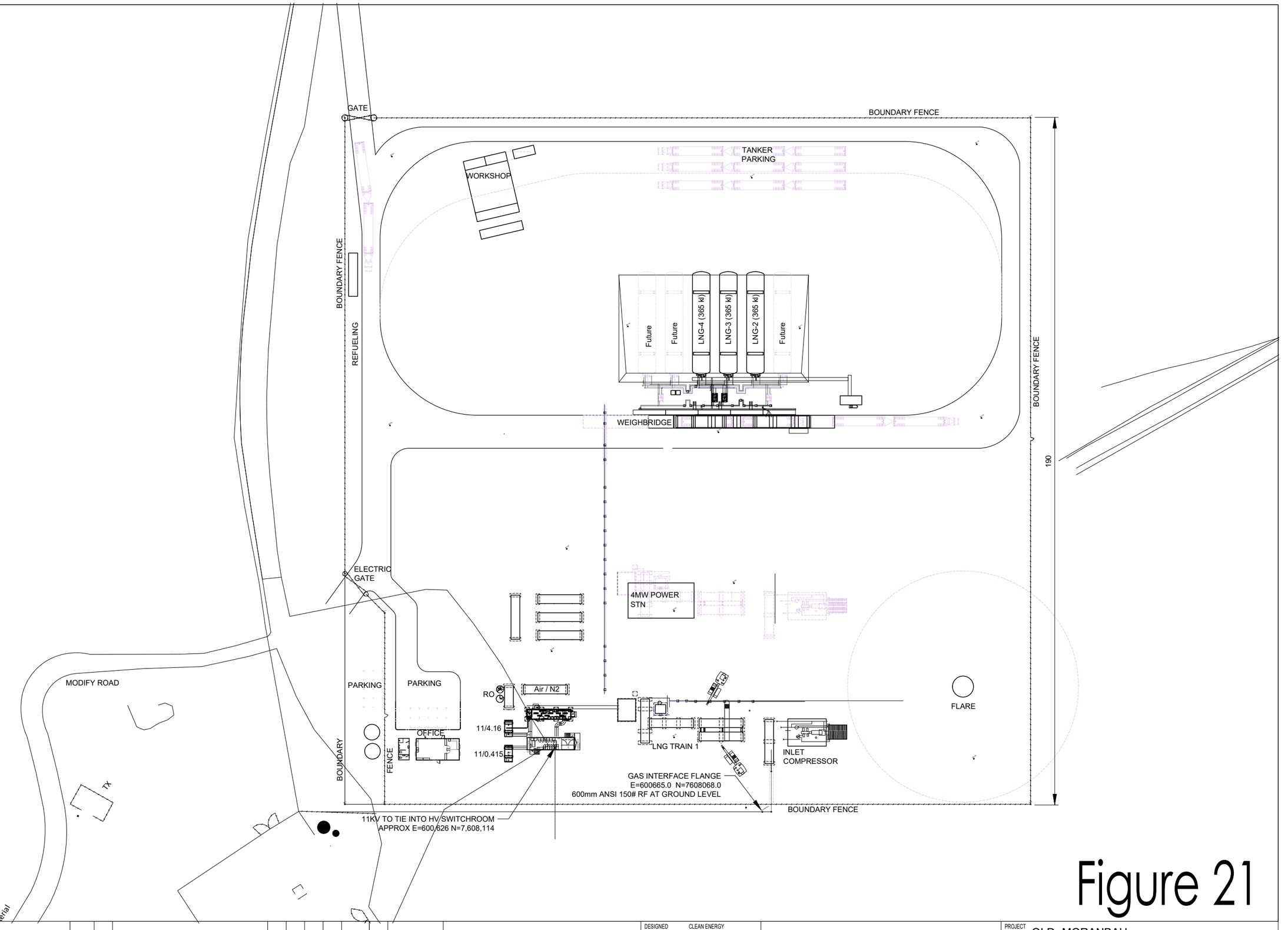


Figure 21

South Queensland Environmental Expertise & Services Pty Ltd

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REVISIONS	REV	DESCRIPTION	DRN	CHK'D	ENG	PROJ	DATE
	H	RE-ISSUED FOR INTERNAL REVIEW	DW				14.11.25
	G	RE-ISSUED FOR INTERNAL REVIEW	DW				02.09.25
	F	RE-ISSUED FOR INTERNAL REVIEW	DW	GI			06.08.25
	E	RE-ISSUED FOR INTERNAL REVIEW	DW	BL			07.04.25
	D	RE-ISSUED FOR INTERNAL REVIEW	DW	BL			24.03.25
	C	RE-ISSUED FOR INTERNAL REVIEW	DW	NP			20.03.25
	B	ISSUED FOR REVIEW	DW	NP			13.03.25
	A	INTERNAL REVIEW	DW	-			09.03.25

REFERENCES

FIG - 21

DRAWING N° -

CENTURION LNG - GENERAL ARRANGEMENT (GA) - SITE LAYOUT

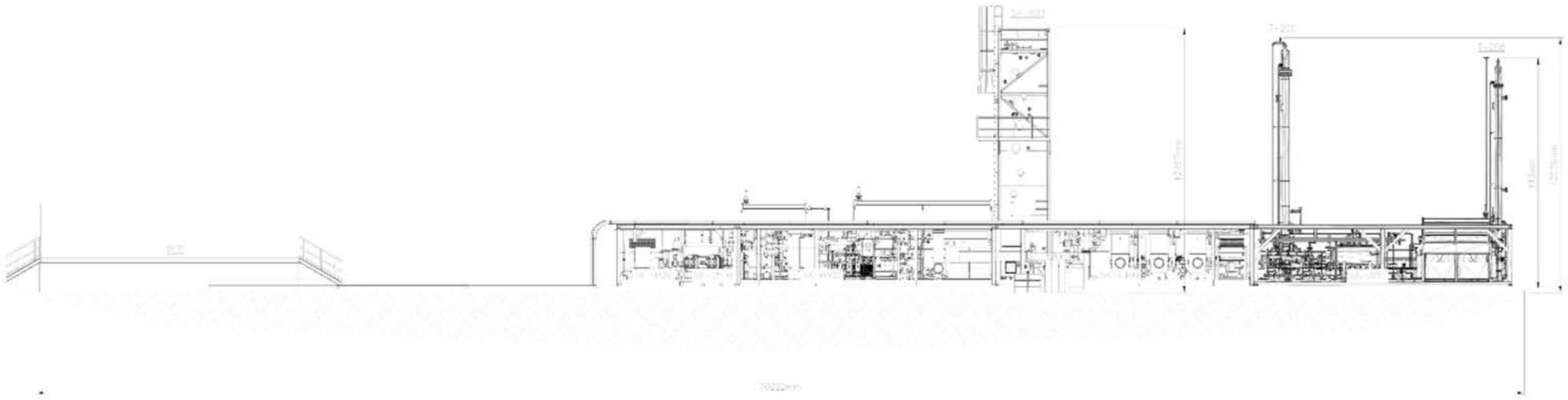
TITLE -

DESIGNED	CLEAN ENERGY
DATE	17.10.2022
DRAWN	DW
SCALE	1:1000
	A3

CLEAN ENERGY FUELS AUSTRALIA

239 PLANET STREET
WELSHPOOL WA 6106, Australia
Phone: +61(0) 8 9212 6700. www.cefa.com.au

PROJECT	QLD -MORANBAH
CLIENT	CLEAN ENERGY FUELS MARKETING
TITLE	QLD - MORANBAH PLANT GENERAL ARRANGEMENT SITE LAYOUT - V3
DRAWING N°	C12-DR-GA-001
REV	H



NO.	DATE	REVISION DESCRIPTION	BY

F&C ENGINEERS

CRYOSYS

CLEAN ENERGY

CLIENT : CLEAN ENERGY FUELS AUSTRALIA
PROJECT : WD-WTST NG PROJECT – 40TPD
TITLE : OVERALL FACILITY ELEVATION FACING EAST

DRAWN	CHECKED	SCALE	DATE	JOB NO.	DRAWING NO.	SHEET NO.
LMD	SH	N.T.S.	2/04/25	CR/201125	WE-DAL-03-1	1 OF 1

A

South Queensland Environmental Expertise & Services Pty Ltd (SQEES)
www.sq-ees.com | ABN: 54 614 031 837

Client: CEFA
Drawn: LD
Date: 5-Jan-2026
Scale: As Shown

Title: Client CEFA
Site Centurion LNG, Goonyella
Content Facility Elevation

CLEAN ENERGY FUELS AUSTRALIA

Figure: 22
Revision: 1.0

6.2.2 Inherently Sustainable Design Features

The design of the facility emphasises inherent sustainability, efficiency and minimal environmental impact. Key features are included on the site layout in ***Figure 21*** above, and include:

- **Prefabricated modules:** All production modules were prefabricated off-site, which reduces the need for complex construction activities on-site. The modules are delivered to the site in ISO container sections.

- **Equipment re-use and deployment near resources:** All production modules were designed for re-use, rapid installation and connection, and mobilisation from site to site to access resources 'at the source'.

- **Waste re-use:** The facility was designed and developed to maximise the use of natural gas resources that would otherwise be wasted.

- **Minimal concrete footings:** The facility will be installed predominantly on pre-cast concrete footings, with very limited use of in-situ concrete. The design reduces the need for extensive ground disturbance and excavation further minimising the facility's environmental footprint.

- **Compact footprint and use of disturbed land:** The facility will occupy a 190m x 190m area and be located on previously disturbed land that was leased to CEFA as a cleared, stripped, and levelled block, ensuring minimal impact on the natural environment.

6.2.3 Gas Gathering & Delivery to Site

Gas gathering is beyond the scope of the project and occurs beyond the battery limits of the facility. Incidental coal seam gas (ICSG) will be sourced from Centurion Coal Mining operations on ML1790. Gas transfers to CEFA at the battery limit of the facility (nominally at the fenceline). Feed gas enters the plant under specific low pressure and temperature conditions. The gas passes through an inlet pressure control valve and a flow transmitter. Key details are as follows:

- Gathering and delivery pipe construction is high density poly ethylene (HDPE) (12 x wellheads to 3 x DN315 HDPE pipelines which merge into a HDPE DN630 SDR 21 header).

- Minimum temperature = 0°C

- Maximum temperature = 50°C,

- Pressure = 5kPA (0.05 bar)

The facility will not process large volumes of water typically generated through traditional coal seam gas processes. Accordingly, the site will not collect, store, handle, treat, condense or evaporate the large volumes of water, brine, or salt that are typically associated with CSG processes. The gas is typically delivered as 'dry gas'. A small amount of water does need to be removed from the gas prior to compression and liquefaction, but this is a very minor consideration in the design and operation of the facility. Gas composition is as outlined in ***Table 20*** below.

Table 20 – Gas composition

Gas Component	Upper Limit (mol%)
Methane	92
Nitrogen	6
Carbon Dioxide	1.2
Oxygen	0.8
Argon	0.08
Helium	0.01
Hydrogen	0.0005

6.2.4 Gas Processing

Pre-treatment is necessary to remove impurities:

- **Carbon dioxide (CO_2):** must be reduced to less than 50 ppm to prevent solidification,
- **Hydrogen sulphide (H_2S):** must be reduced to below 3 ppm to minimise corrosion (noting that based on the quality of the incoming gas, significant volumes of H_2S are not anticipated at the facility),
- **Water (H2O):** must be reduced to below 0.1 ppm to avoid blockages during refrigeration.

Gas undergoes pre-separation and filtration in a Feed Gas Filter Separator to removes entrained liquids and particles. Collected liquids are directed to a SLOP tank. Separated gas is directed to the Amine System. Solvent absorption processes removes process waste gases (e.g., CO_2 and H_2S). The system is designed to regenerate the amine solution, allowing it to be reused for further gas treatment. Process waste gases are either vented (CO_2) or recycled back through the process. The volumes and concentrations of amine used are minor and below dangerous goods trigger levels.

Following amine treatment, the gas is directed to a molecular sieve through which it is dehydrated to ensure the gas has a water content of less than 0.1 ppm. This process involves a two-bed system that alternates between adsorption and regeneration cycles to maintain efficiency.

Fully dried gas is directed to the cryogenic module for liquefaction. The gas, which following pre-treatment primarily comprises dry methane, is liquefied by cooling it to around -161°C. In the liquefaction phase, the Optimised Mixed Refrigerant (OMR) cycle is used, which minimises compression power. This cycle utilises a proprietary refrigerant mixture that is optimised for the plant's design. The process includes a three-stage centrifugal compressor and a cold box for heat exchange and hydrocarbon removal. The cold box also serves as a secondary containment vessel.

Finally, the Mixed Refrigerant Storage and Make-Up System replenish refrigerant components lost during operation. This system uses dry gas for methane makeup and nitrogen from a nitrogen generator for additional makeup. A surge tank is used to manage refrigerant during system downtime, allowing for a seamless restart without the need for a boil-off compressor.

6.2.5 Gas Storage & Distribution

LNG will be transferred from the Cold Box to the LNG Storage Tank farm through a rundown line. LNG is stored in 3 x 365kl (50t), horizontal, vacuum double-wall storage tanks. The tanks will have a common supply line header allowing individual or simultaneous filling controlled by a PLC-based supervisory control system (SCS).

Double configuration (A Double) road tankers will be loaded using a centrifugal cryogenic loading pump system for delivery to customers. The loading system is capable of discharging approximately 100 m^3/hr. Concurrent tanker loading is possible with cryogenic couplings that minimise loss during transfer.

6.2.6 Service Connections

Centurion Coal Mining Pty Ltd will supply all necessary site services, including power, raw and potable water, communications, and waste services. Grid electricity will be used to power the facility. Services will be connected to the respective modules during the installation process. Gas from the Centurion Coal Mine will be piped into the facility through the gas gathering network of the mine as outlined above. Site data and phone services will utilise Starlink satellite connections. Raw and potable water will be trucked to site as outlined below in ***Section 6.2.11***. Waste sewage will be collected in a 6000 litre septic system that will be pumped out by a suitable contractor, trucked away from site, and discharged to the Centurion Mine existing sewage treatment plant.

6.2.7 Water Supply & On-Site Management

Raw water and potable will be trucked to site and stored in 2 x 25kl storage tanks. Potable water will be controlled and used on site for the office and safety showers. Raw water will be controlled and used for ablutions and as feedstock for the RO plant. The RO plant will produce demineralised water for use in the amine plant. RO rejects / water from the slops interceptor pit will be collected and added back into the site raw water supply (for use in the ablutions block and as feedstock for the RO plant. A high level overview of the proposed site water system is shown below in ***Figure 23***.

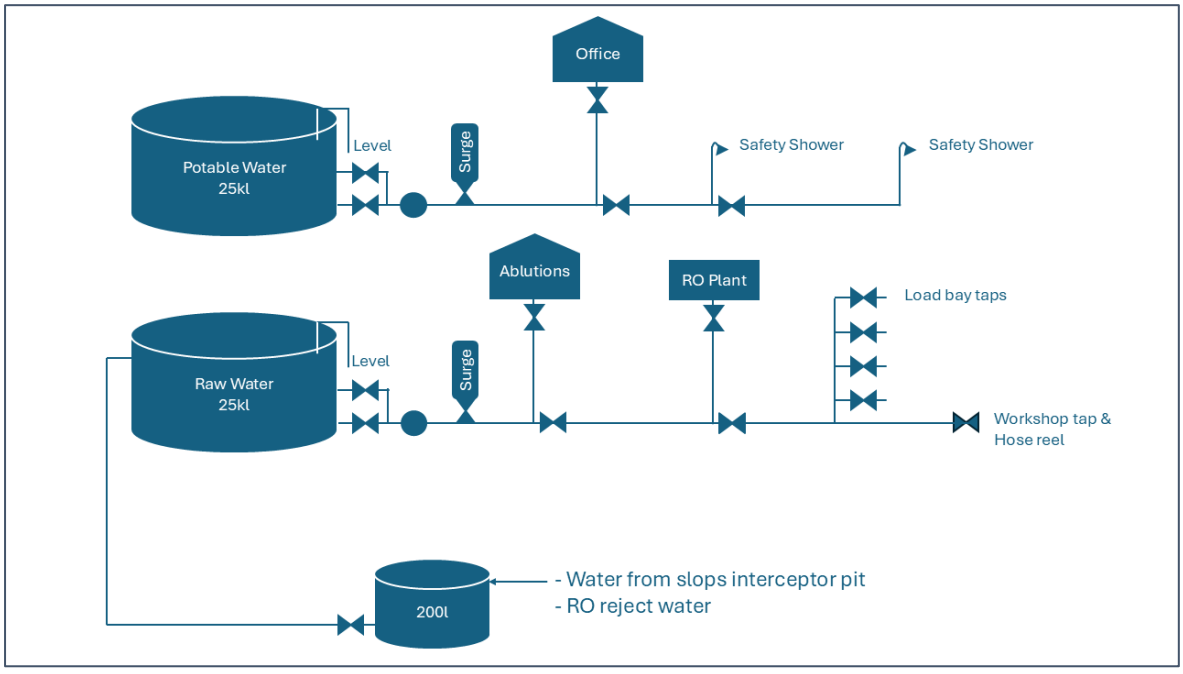


Figure 23 – Water process overview

Process modules are typically not roofed. Rainwater accordingly will typically go to ground and become surface runoff / overland flow. No significant volumes of rain water will be collected for storage on site. The proposed site grading and stormwater management plan are shown below in ***Figure 24***. Centurion Coal Mining have engaged a civil consultant to design and implement stormwater drainage outside the facility boundary.

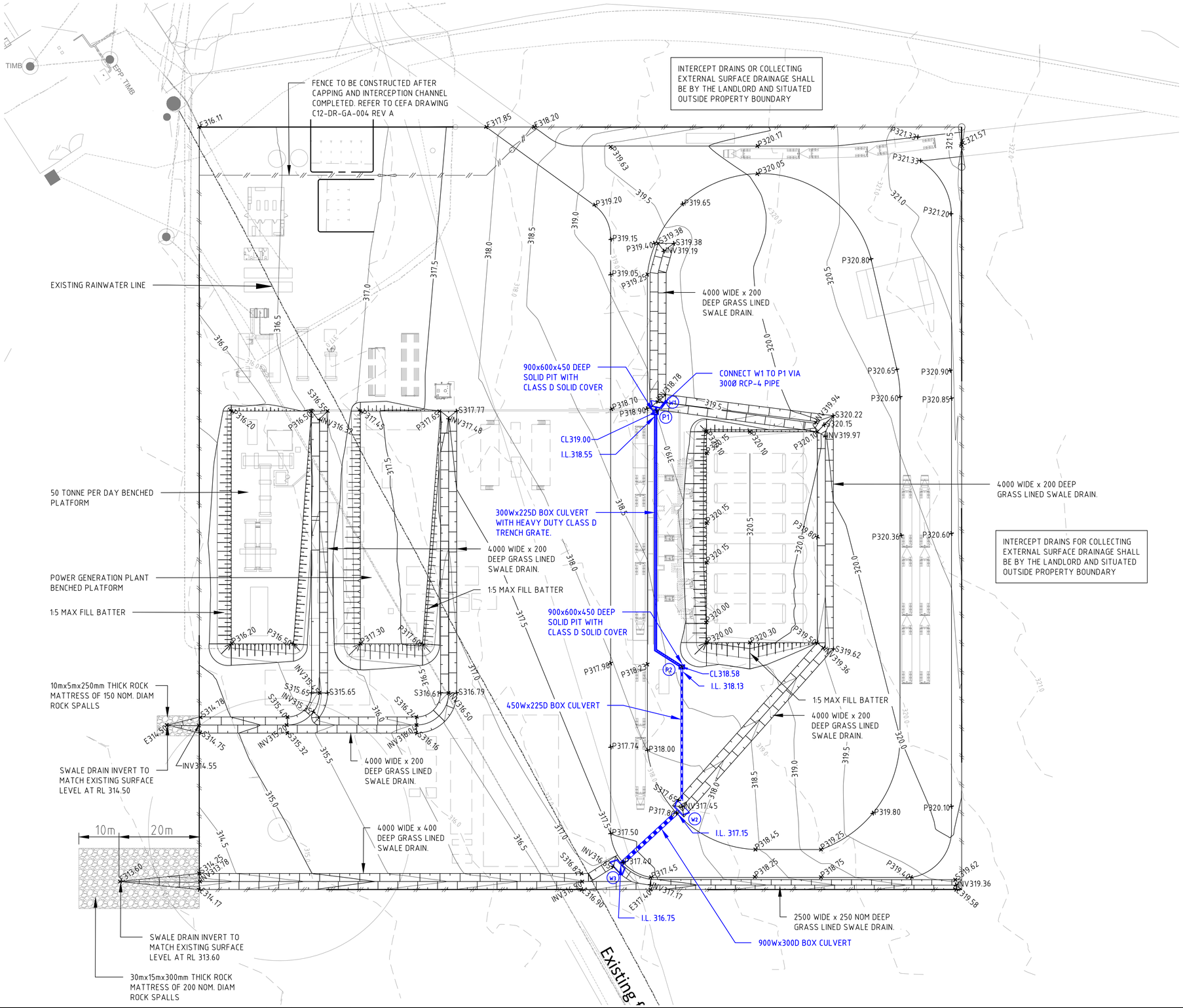
6.2.8 Dangerous Good Storage & Handling

Bulk dangerous goods stored on site include natural gas (in process), Liquefied Natural Gas (refrigerated methane), ethylene, propane, and isopentane. The quantities of dangerous goods to be stored on site in intermediate bulk containers (IBCs) or small packages (e.g., lubricants, diesel, cleaning fluids) are yet to be determined but will be minimised to levels necessary for sustained operation. Diesel will be stored in internally bunded (secondary containment) self-contained storage tanks. All dangerous goods will be stored and handled in accordance with the *Australian Dangerous Goods Code*. IBCs and small packages will, where applicable be stored on secondary containment (e.g., portable pallet bunds). The *DRAFT Dangerous Goods Manifest* is presented in ***APPENDIX I***.

6.2.9 Fencing, Security, Access & Remote Monitoring

The facility will be secured through fencing and access controls to ensure the safety and security of both the LNG facility and the broader mining operations. The facility site will be fully fenced to ensure security and safety before the commencement of site construction. The fencing will encompass the hardstand area where facility modules are located. Fencing shall comprise 1.8m high chain wire mesh with three strands of barbed wire in accordance with Australian Standard AS1725-2003 as shown below in ***Figure 25***. Access to the site will be via 2 x 10m vehicle access gates, and 2 x personnel entry gates, all gates will be operated using a dedicated access control system.

The site will be monitored remotely with 24/7 coverage achieved through use of monitoring centres (control rooms) located in multiple time zones.



LEGEND

000.00	EXISTING SURFACE LEVEL CONTOUR. (APPROXIMATE ONLY)
000.00	PROPOSED SURFACE LEVEL CONTOUR
P000.00 +	PROPOSED ROAD PAVEMENT AND PLATFORM LEVEL
S000.00 +	PROPOSED SURFACE LEVEL
E000.00 +	EXISTING SURFACE LEVEL
INV000.00 +	PROPOSED SWALE INVERT LEVEL
	FENCE AS SPECIFIED, REFER TO CEFA DRAWING C12-DR-GA-004 REV A
P1	STORMWATER PIT NUMBER
W1	STORMWATER CULVERT HEADWALL NUMBER
CL146.80	STORMWATER PIT COVER LEVEL
IL146.80	STORMWATER INVERT LEVEL
	STORMWATER PIT
	STORMWATER PIPE/BOX CULVERT
	STORMWATER CULVERT HEADWALL

EXISTING SERVICES

NOTWITHSTANDING THAT EXISTING SERVICES MAY OR MAY NOT BE SHOWN ON THESE DRAWINGS, NO RESPONSIBILITY IS TAKEN BY THE ENGINEER OR THE PRINCIPAL FOR THIS INFORMATION WHICH HAS BEEN SUPPLIED BY OTHERS. THE DETAILS ARE PROVIDED FOR INFORMATION ONLY. THE CONTRACTOR SHALL ASCERTAIN THE POSITION OF ALL UNDERGROUND SERVICES PRIOR TO EXCAVATION AND SHALL BE RESPONSIBLE FOR THE COST OF REPAIRS TO DAMAGES CAUSED AS A RESULT OF THE WORKS.

STORMWATER PIT NOTE:

1. SOLID COVER TO BE GATIC, WEBFORGE OR EQUIVALENT COVERS OF AS3996 CLASS NOMINATED IN SCHEDULE.
2. PROVIDE STEP IRONS TO CURRENT CODE REQUIREMENTS FOR ALL PITS GREATER THAN 1000 DEPTH.
3. ALL GRATED COVERS TO BE HEEL GUARD UNLESS NOTED OTHERWISE.
4. COVER LEVELS ARE NOMINAL ONLY AND SHALL BE ADJUSTED IF REQUIRED ON SITE TO SUIT EXISTING SURFACE LEVELS OR PROPOSED SURFACE LEVEL
5. PIT DEPTHS ARE NOMINAL ONLY AND SHALL BE CONSTRUCTED TO SUIT COVER LEVELS AND INVERT LEVELS.

Figure 24

PRELIMINARY DRAWING ONLY
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ROTABOND CONSULTING

Project: LNG PLANT CENTURION MORANBAH, QLD

Title: PROPOSED SURFACE GRADING AND STORMWATER DRAINAGE PLAN

Client: *CLEAN ENERGY FUELS AUSTRALIA*

Draftsperson:	Checked:	Sheet Size	Job No.	Drawing No.
AS	RB	A1	RB025-015	C02
Designer: RB	Approved:			
Scale: 1:500		Date: NOV' 2025		P1

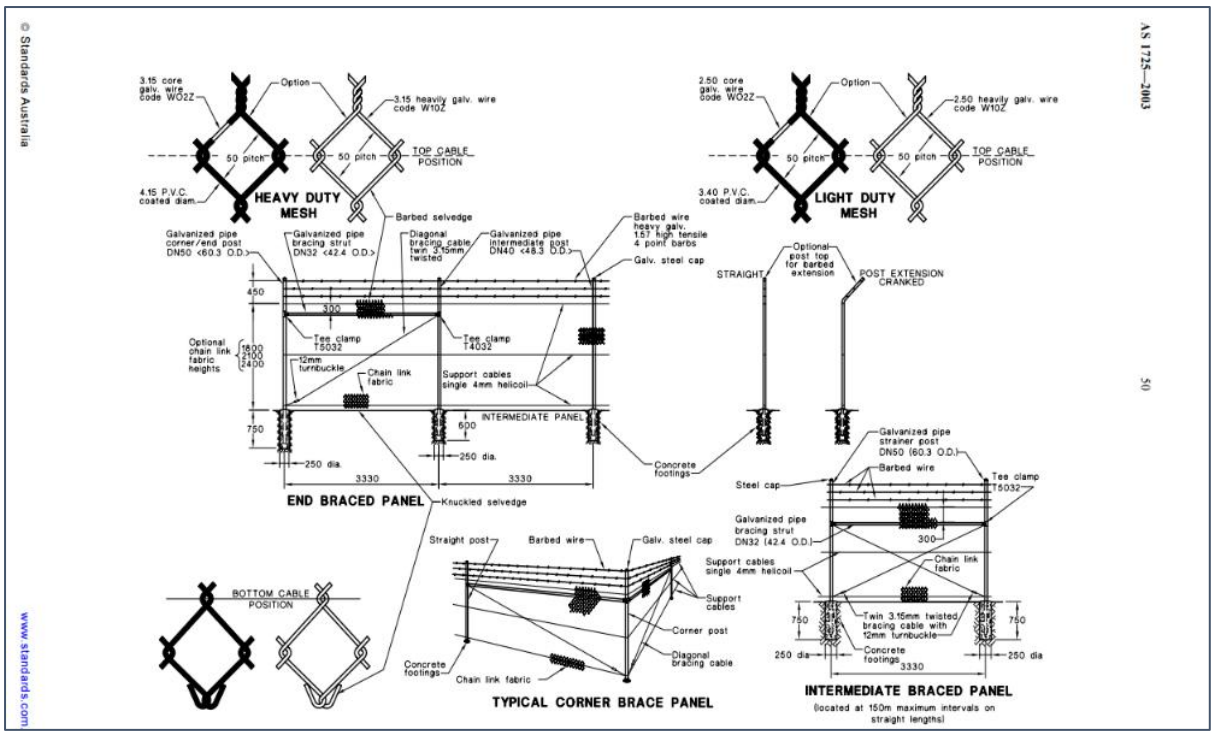


Figure 25 – Centurion LNG – fencing specifications

6.2.10 Air & Noise Emissions Sources

The facility process modules represent multiple potential sources of continuous or intermittent noise and air emissions. Air and Noise Assessment were completed by Trinity Consultants. Trinity have confirmed the following operational noise sources upon which they have based their assessment, and reported the following:

- The primary operational noise sources include:
    - Compressors (MR compressor, gas booster) – continuous, high sound power levels.
    - Cold Box Fans – continuous airflow noise.
    - Pumps (amine circulation, MR makeup) – continuous.
    - Flare System – intermittent during venting or upset conditions.
    - Nitrogen Generation Package – compressors and PSA vessels.
    - Road Tanker Loading – intermittent truck movements and loading pump noise.

Noise emissions from these sources are expected to be continuous or quasi-continuous, dominated by pumps and compressors. Tonal components and low-frequency noise (<250 Hz) may occur from compressors and fans. Supplier data indicates typical sound pressure levels in the range of 68–95 dBA close to each source. The dominant noise sources are continuous in nature. The flare represents the main intermittent since it will be used during upset conditions only.

The only significant air emission source during the operational phase is the gas flare. The flare operates intermittently and is not used during normal operations. Emissions occur during venting events and upset conditions, when excess gas is directed to the flare for controlled combustion to maintain safe operation of the facility.

Note: *An additional minor source is waste CO_2 from the amine system which is sent to the CO_2 vent. This and other minor emissions are not considered significant sources for air quality assessment.*

Construction emissions would be limited to short-term fugitive dust and vehicle exhaust from minor construction activities. Given the separation distance of approximately 4.3 km to the nearest sensitive receptor and the limited duration of works, off-site air quality impacts are expected to be negligible. Accordingly, construction emissions were not quantitatively assessed or modelled.

Air and noise point sources are shown on the annotated general site layout below in ***Figure 26***. Air and noise emissions by point source are summarised below in ***Table 21***. Air and Noise Assessment Reports are presented in ***APPENDIX J*** & ***APPENDIX K*** respectively.

Table 21 – Air & Noise – emissions sources (summary)

Source of emission or discharge	Emission or discharge type	Volume and frequency	Location on annotated site layout (*Figure 26*)
Regen Gas Compressor - Gas Conditioning Cube	Noise	Continuous 72dBA @1M	9
Regen Gas Cooler - Gas Conditioning Cube	Noise	Continuous 87dBA @1M	9
MR Evacuation Compressor - Refrigeration Cube	Noise	Continuous 78dBA @1M	9
MR Compressor - Compressor Cube	Noise Air	Continuous 94dBA @1M 0.9 SCFM N_2 1.8 SCFM MR	8
MR Compressor Lube Oil Cooler - Compressor Cube	Noise	Continuous 88dBA @1M	8
MR Compressor Inter Cooler - Cooler Cube	Noise	Continuous 88dBA @1M	8
MR Compressor After Cooler - Cooler Cube	Noise	Continuous 88dBA @1M	8
Nitrogen Package - Instrument Air/Nitrogen Building	Noise	Intermittent 68dBA @1M	7
RO Unit - RO Building	Noise	Intermittent 65dBA @1M	6
Inlet Filter skid	Noise	77 dBA @1M	5
Pre-compression skid Compressor	Noise	108 dBA @1M	4
Pre compression skid cooler	Noise	95 dBA @1M	3
Pre compression skid Motor	Noise	85 dBA @1M	2
Flare 0.3m diameter ~15m elevation	Noise Air	Rare 95dBA @1M 2.25 SCFM N_2	1
Road Train	Noise	110 dBA @1M	Site internal roadway

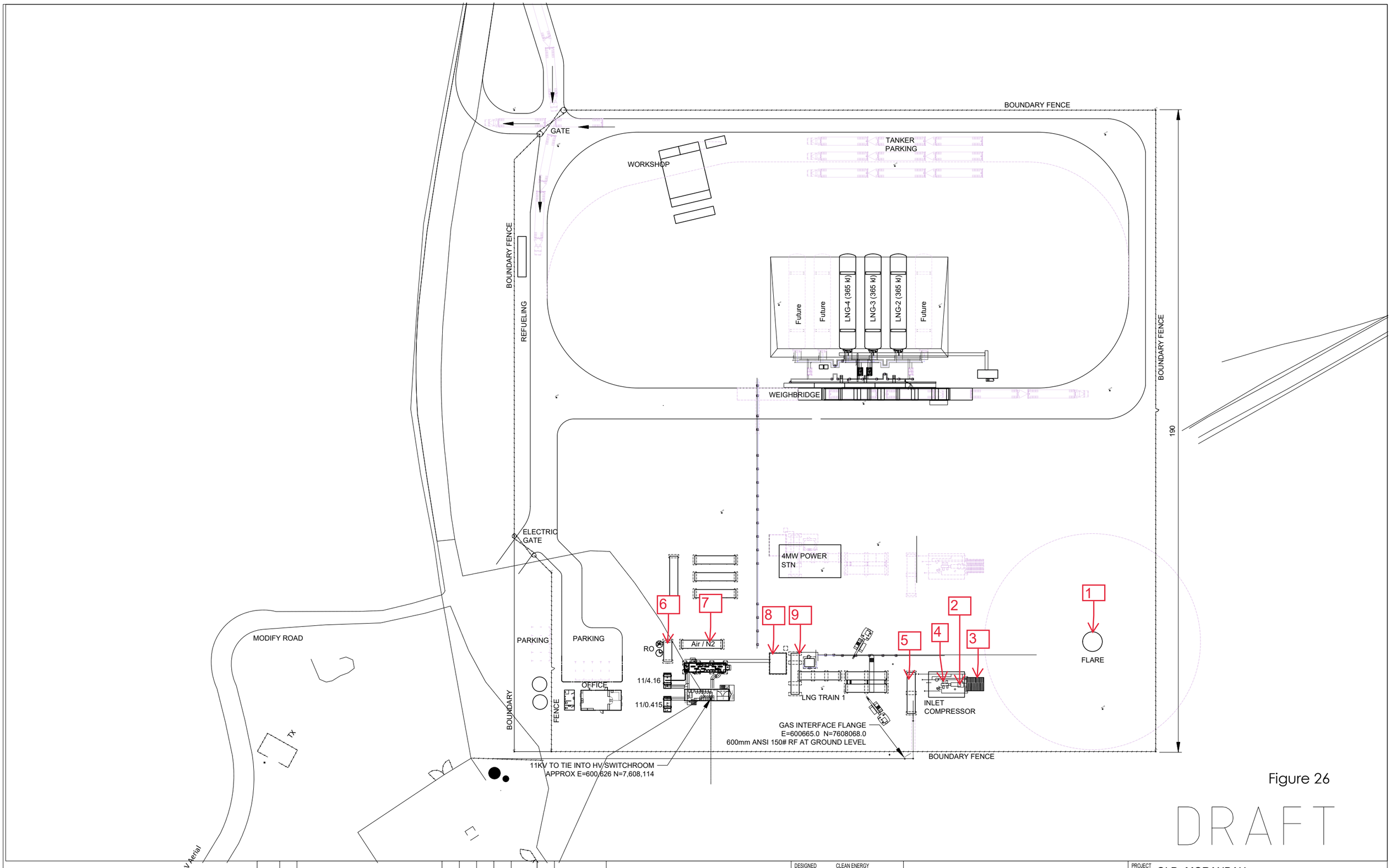


Figure 26

DRAFT

South Queensland Environmental Expertise & Services Pty Ltd

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REVISIONS	REV	DESCRIPTION	DRN	CHK'D	ENG	PROJ	DATE
	H	RE-ISSUED FOR INTERNAL REVIEW	DW				14.11.25
	G	RE-ISSUED FOR INTERNAL REVIEW	DW				02.09.25
	F	RE-ISSUED FOR INTERNAL REVIEW	DW	GI			06.08.25
	E	RE-ISSUED FOR INTERNAL REVIEW	DW	BL			07.04.25
	D	RE-ISSUED FOR INTERNAL REVIEW	DW	BL			24.03.25
	C	RE-ISSUED FOR INTERNAL REVIEW	DW	NP			20.03.25
	B	ISSUED FOR REVIEW	DW	NP			13.03.25
	A	INTERNAL REVIEW	DW	-			09.03.25

REFERENCES

FIG - 27

DRAWING N° .

CENTURION LNG
AIR AND NOISE
EMISSION SOURCES

TITLE .

DESIGNED	CLEAN ENERGY
DATE	17.10.2022
DRAWN	DW
SCALE	1:1000
	A3

CLEAN ENERGY FUELS AUSTRALIA

239 PLANET STREET
WELSHPOOL WA 6106, Australia
Phone: +61(0) 8 9212 6700. www.cefa.com.au

PROJECT	QLD -MORANBAH
CLIENT	CLEAN ENERGY FUELS MARKETING
TITLE	QLD - MORANBAH PLANT GENERAL ARRANGEMENT SITE LAYOUT - V3
DRAWING N°	C12-DR-GA-XXXX
REV	H

6.2.11 Waste Management

The predominant waste generated on site will be waste oil from the inlet compressor. The volume of oil produced will be limited and is estimated at approximately five (5) litres per day. Oily water will be diverted to a SLOPS separator. Oil will be collected and disposed as a regulated waste by a suitable contractor (and will be recycled if a reasonably practicable recycling pathway is available. Water from the slops separator will be sent back to the raw water supply for filtration and use in ablutions and reverse osmosis (RO) plant feedstock.

RO plant reject water will be diverted back to raw water and sent back to the raw water supply for filtration and use in ablutions and reverse osmosis (RO) plant feedstock.

Waste sewage (grey water and black water) will be collected in a 6000 litre septic system that will be pumped out by a suitable contractor, trucked away from site, and discharged to the Centurion Coal Mining existing sewage treatment plant. As the site will be predominantly remotely monitored, the volume of grey water and black water produced is expected to be low (nominally <2 equivalent persons) under normal operations.

Process waste gases will be produced through the gas stream preconditioning and sweetening process modules. Gases such CO_2 will be vented, other gases will be recycled back through the process.

All other waste streams are minimal. All wastes from construction to decommissioning will be removed from the site, recycled if a reasonably practicable pathway exists, and disposed appropriately if not.

6.2.12 Potential Future Upgrade: Power Generation Facility

In future the facility may be upgraded to include a dedicated power generation system designed to maintain critical operations in the event of loss of grid supply. Upon start up, the facility will be powered with grid electricity. Details of the power generation facility is presented in the interests of openness and clarity with respect to future expansion but is beyond the scope of this assessment. The system will operate on pipeline-quality natural gas from the LNG feed source and will provide up to 4 MW of installed backup capacity as follows:

- Fuel gas will be drawn from the facility's existing inlet pipeline downstream of gas conditioning, using the same specification gas supplied to the cryogenic process. Abatement benefits cannot be double accounted – waste is still avoided; power emissions change from Scope 2 to Scope 1.

- Each generator set will be installed within a self-contained, fully welded steel enclosure (40 ft ISO container) with an integral ventilation system and vertical discharge ducting, and incorporating compact air filtration, the engine, alternator, radiator pack, silencer, gas train, and all associated control and protection equipment, and include the following main components:

    - Two (2) CEFA gas generator sets, each rated at ~2 MW electrical output.
    - Approximate enclosure dimensions are 12m long × 3.5m high × 3.4m wide.
    - Factory-integrated switchgear, control, and protection systems within each unit.
    - Medium-voltage switchboard and auxiliary transformer. Step-up transformer connection (415 V to 11 kV) interfacing with the facility electrical distribution system.
    - Local control panel with synchronisation and load transfer functionality.
    - Explosion-proof exhaust gas silencer fabricated from alloy steel rated for 7 bar at 550 °C, and explosion-proof exhaust bellows constructed from 316 stainless steel.
    - Acoustic enclosures integrated into each ISO module, compliant with AS/NZS3814 and 3000, and achieving acoustic attenuation to a typical noise level of 85 dBA at 1 metre.
    - IP65 weather protection.

6.3 CONSTRUCTION & DELIVERY METHOD

The engineering, relocation and assembly of micro-LNG modular equipment to the CENTURION LNG FACILITY (the facility) will be undertaken by CEFA's LNG project delivery team, utilising local specialists and sub-contractors as required. CEFA will engage the original equipment manufacturer (OEM) as principal site project manager for the installation of the facility. CEFA will retain control of design, procurement, fabrication, delivery, installation, commissioning and testing of the facility and all associated infrastructure.

The construction of the facility will be a streamlined process due to the modular design of the plant. Preparation and installation of process modules is expected to be completed within 8-weeks of commencement, to be followed by connection and commissioning. The full site preparation, installation, commissioning phase is scheduled to be completed through the second and third quarters of calendar year 2026. The process involves minimal site preparation, installation of pre-cast concrete footings, placing the prefabricated modules onto the footings, and connecting all necessary services. The construction process is outlined below. Photos of the installation process from Western Australia are included as ***Figures 27 to 35*** demonstrating the relative simplicity of the construction process.

6.3.1 Site Preparation:

The facility will be located on previously disturbed land, that was leased to CEFA under Gas Sales Agreement as a cleared, stripped, levelled, block within Mining Lease (ML 6949). Clearing was completed under Centurion Coal Mining's existing approvals. The civil engineering site stripping plan (by *Rotabond Consulting*) is shown on ***Figure 27***. No land clearing will be completed by CEFA. There will be no additional disturbance of environmentally sensitive areas. No vegetation offsets are applicable to CEFA.

- The site compound will be fenced as described above in ***Section 6.2.9*** and shown on ***Figure 24***.

- The site will be graded for installation of modules, storage tanks, and stormwater management as show above in ***Figure 24***, and specifically for the LNG storage tank area in ***Figure 28***.

- Storage areas, access ways, visitor car park, tanker parking area, turning circles and tanker filling area will be constructed. The gravel hardstand and access roads will be constructed to accommodate the facility's operational requirements. The design allows for future scalability should additional gas resources become available, with minimal need for further site disturbance. The site will be surfaced, and finished with crushed rock pavement for roadways, compacted structural fill for plant, and native soils or crushed rock capping as a reinstated surface cover as shown on the pavement plan in ***Figure 29***. A stockpile of native crushed rock on site that was generated during the installation of a vent shaft (~100m northwest of the site) will be used for site surfacing.

- An earth berm will be installed near the site northern and eastern boundaries to minimise the impact of overland flow onto the site. Stormwater will accordingly be diverted away from the process on the facility.

- The use of prefabricated modules and minimal in-situ concrete reduces the overall construction footprint. Pre-cast concrete footings will be positioned at the designated locations, minimising the need for additional concrete works on-site. The cold box and mixed-refrigerant compressor modules are the only modules requiring an in-ground concrete foundation. Indicative storage tank footings are shown in ***Figure 30***.

- Installation of various support function buildings including first aid, ablutions, stores and workshop. Potable and raw water tanks will be installed.

- A photo of site preparation (previous installation at Mt Magnet in Western Australia) is shown in ***Figure 31***.

6.3.2 Facility Installation:

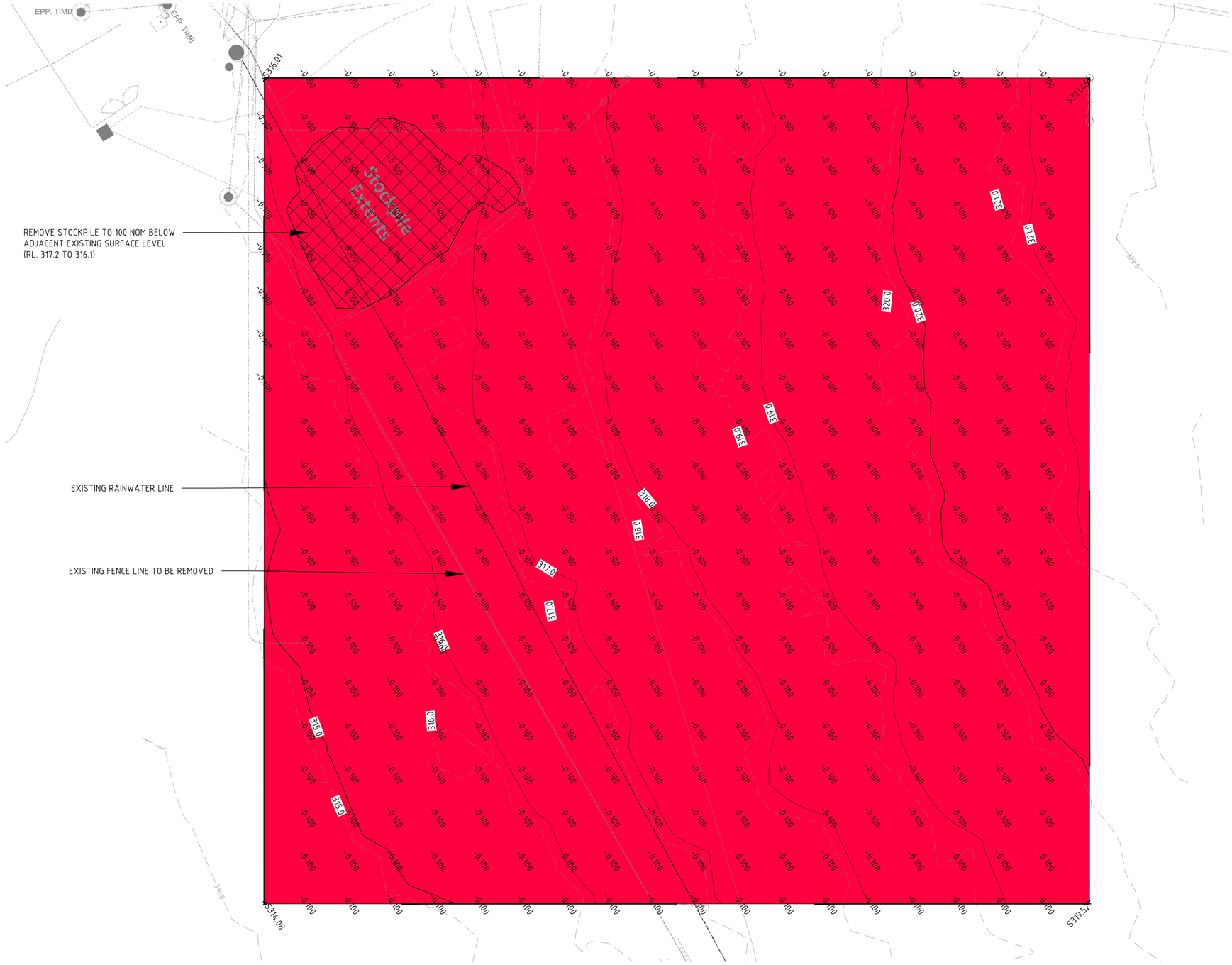
Modules will be delivered to the site by road. Fifteen (15) to eighteen (18) container transportation truck journeys will be used to deliver the modules to the site. Each module is constructed as an ISO standard module (40 foot or 12 metres in length). In addition, one over size over mass (OSOM) load will be required. Each module is pre-configured for easy assembly, with interconnections for power, water, gas, and communications integrated during installation, described as follows

- Mobile cranes will be used to lift and position modules onto the pre-placed pre-cast concrete footings.

- Mobile cranes will be used to lift and position 2 x 365m^3 (50T) LNG storage tanks onto the pre-placed pre-cast concrete footings.

- Associated LNG tanker filling equipment will be installed, with capacity to expand through addition of extra storage tanks in the future.

Photos of module installation (at Mt Magnet in Western Australia) are shown below in ***Figures 32*** to ***35***.



LEGEND

- 000.00 — EXISTING SURFACE LEVEL CONTOUR. (APPROXIMATE ONLY)
- 000.00 — PROPOSED STRIPPED LEVEL CONTOUR. (APPROXIMATE ONLY)
- -0.100 — SURFACE STRIPPED DEPTH
- S000.00 — NOMINAL STRIPPED SURFACE LEVEL
- DENOTES STRIPPED AREA. APPROXIMATE VOLUME 3600m^3 (SOLID)

EXISTING SERVICES

NOTWITHSTANDING THAT EXISTING SERVICES MAY OR MAY NOT BE SHOWN ON THESE DRAWINGS, NO RESPONSIBILITY IS TAKEN BY THE ENGINEER OR THE PRINCIPAL FOR THIS INFORMATION WHICH HAS BEEN SUPPLIED BY OTHERS. THE DETAILS ARE PROVIDED FOR INFORMATION ONLY. THE CONTRACTOR SHALL ASCERTAIN THE POSITION OF ALL UNDERGROUND SERVICES PRIOR TO EXCAVATION AND SHALL BE RESPONSIBLE FOR THE COST OF REPAIRS TO DAMAGES CAUSED AS A RESULT OF THE WORKS.

Figure 27

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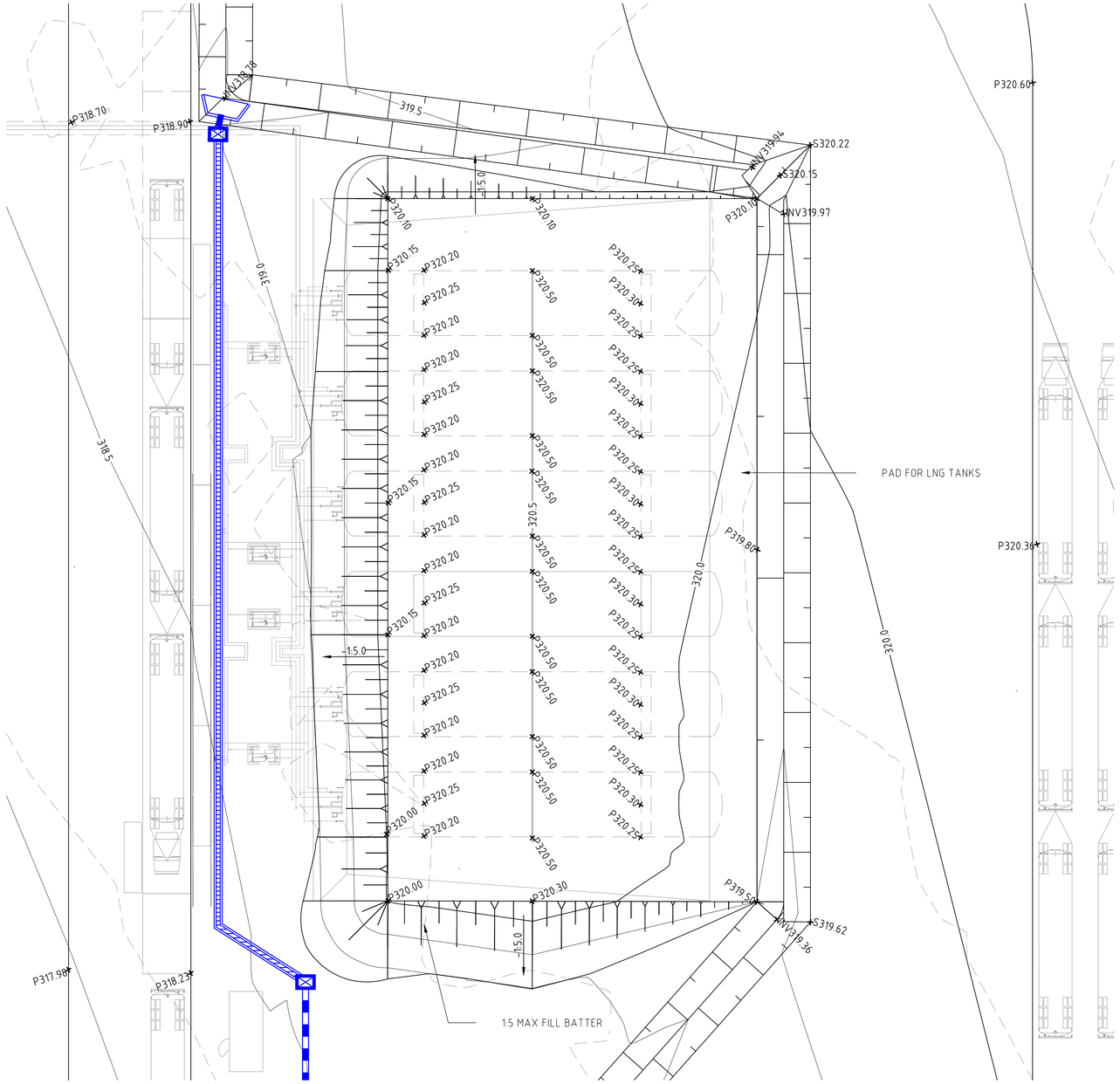
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Project: LNG PLANT CENTURION
MORANBAH, QLD

Title: PROPOSED SITE STRIPPING PLAN

Client: *CLEAN ENERGY FUELS AUSTRALIA*

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LEGEND

- 000.00 — EXISTING SURFACE LEVEL CONTOUR. (APPROXIMATE ONLY)
- 000.00 — PROPOSED SURFACE LEVEL CONTOUR
- P000.00 + PROPOSED ROAD PAVEMENT AND PLATFORM LEVEL
- S000.00 + PROPOSED SURFACE LEVEL
- E000.00 + EXISTING SURFACE LEVEL
- INV000.00 + PROPOSED SWALE INVERT LEVEL

Figure 28

PRELIMINARY DRAWING
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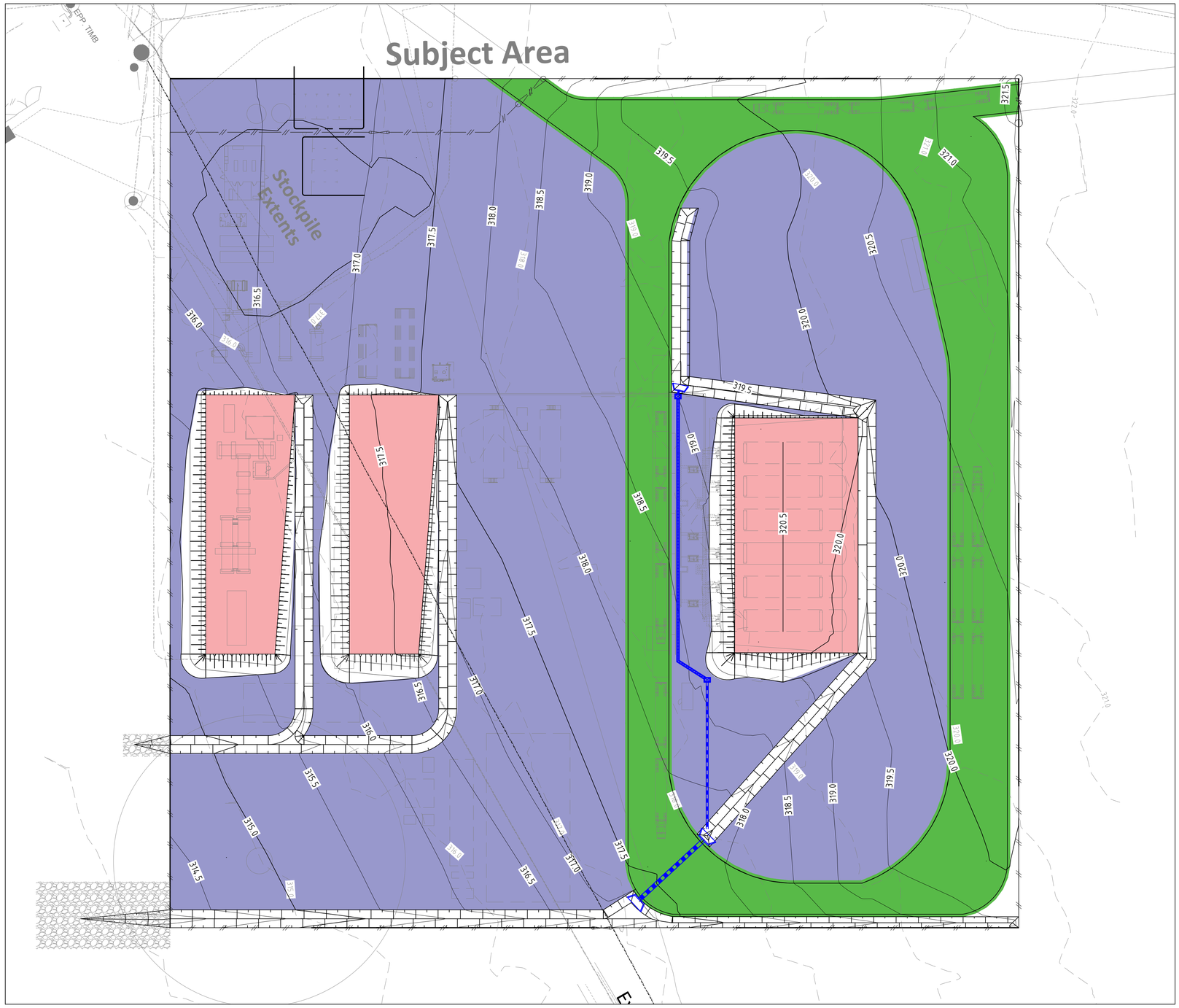
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Project: LNG PLANT CENTURION
MORANBAH, QLD

Title: LNG TANK PLATFORM GRADING PLAN

Client: *CLEAN ENERGY FUELS AUSTRALIA*

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Designer: RB	Approved:			
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LEGEND

- EXISTING SURFACE LEVEL CONTOUR. (APPROXIMATE ONLY)
- PROPOSED STRIPPED LEVEL CONTOUR. (APPROXIMATE ONLY)
- CRUSHED ROCK PAVEMENT FOR ROAD, REFER DETAIL
- COMPACTED STRUCTURAL FILL FOR PLANT PLATFORM. STRIP 100 NOM OF EXISTING SURFACE AND BACKFILL WITH CLEAN EXCAVATED OR IMPORTED STRUCTURAL FILL COMPACTED TO 98% SMDD
- CRUSHED ROCK CAPPING REINSTATED AREA

Figure 29

PRELIMINARY DRAWING ONLY
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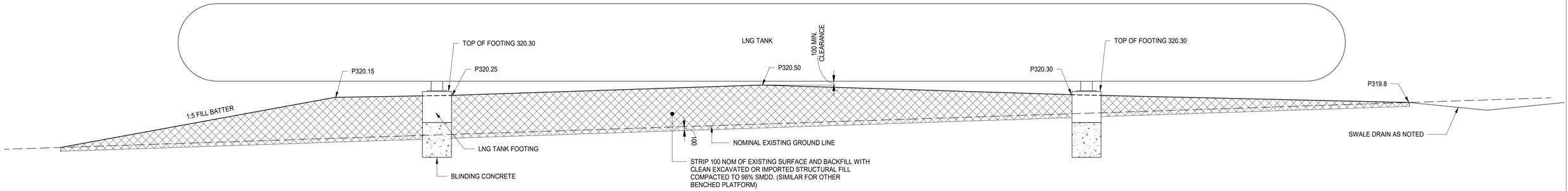
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Project: LNG PLANT CENTURION
MORANBAH, QLD

Title: PROPOSED PAVEMENT PLAN

Client: *CLEAN ENERGY FUELS AUSTRALIA*

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Designer: RB	Approved:			
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LNG PLANT PLATFORM SECTION
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Figure 30

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Project: LNG PLANT CENTURION
MORANBAH, QLD

Client: CLEAN ENERGY FUELS AUSTRALIA

Title: DETAILS SHEET 2

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AS	-	RB025-015	C11
Designer: RB	Approved	Sheet Size: A1	
Scale: 1 : 50		Date: DEC' 2025	REV: P1



Figure 31 – Site preparation – installation of pre-cast footings

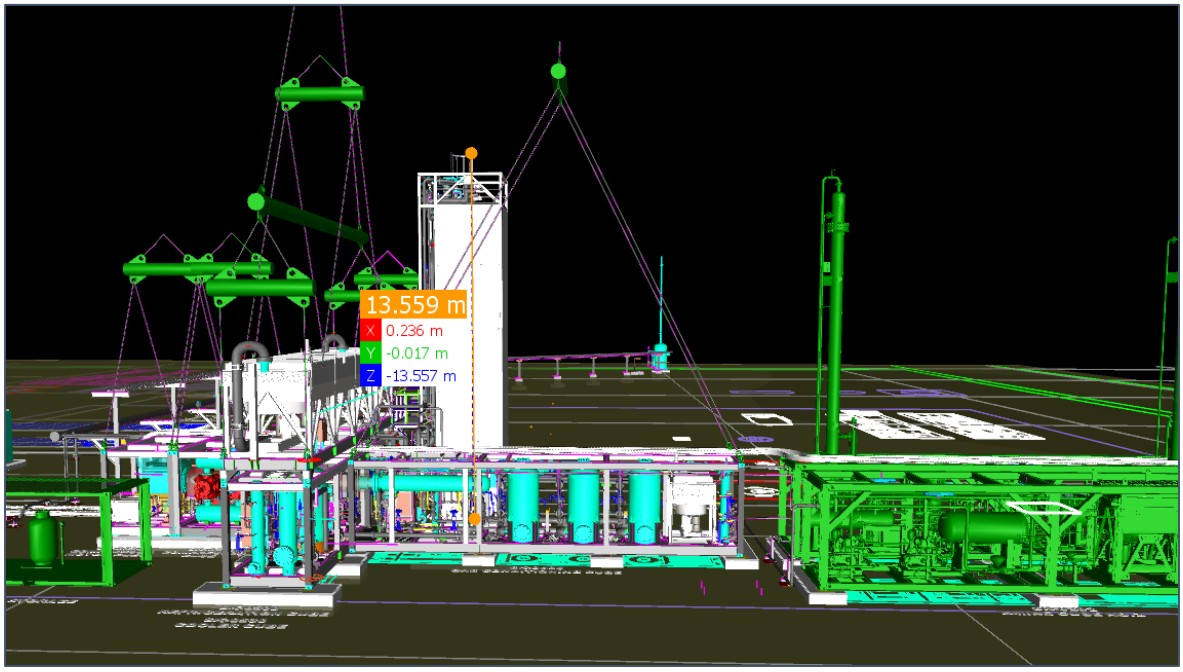


Figure 32 – Site installation – module lifting plan



Figure 33 – Site installation – modules placement using mobile cranes (Mt Magnet, WA)



Figure 34 – Site installation – gas modules placement (Mt Magnet, WA)

The facility will remain modular in nature with the majority of the supporting infrastructure constructed off-site reducing the need for manning on-site during installation.

Installation will comprise of installation of fencing, minor civils and foundations/earthing grid installation, placing of equipment and interconnection (limiting the number of site welds), electrical components and instruments (pre-wired where possible), pressure testing, electrical testing and control systems testing, pre-cooling of the facility and final introduction of LNG.

Machinery utilised in the installation will include telehandlers, excavators, bobcat, and Franna cranes. Centurion Coal Mining will provide instrument air, power, potable water, communications and

suitable fire services to the facility battery limit. Connection to the mines in-field surface gas gathering network will be made at the battery limit. The completed facility layout (at Mount Magnet, Western Australia) is shown in ***Figure 35*** below.

The installation and commissioning team will comprise of the following personnel at various stages of the project:

- Construction Manager x 1
- Safety and Training x 1
- Mechanical Fitter x 1
- Welder x 1
- Labourer x 3
- Electrician x 3
- Control Systems Engineer x 1
- Crane Operator x 1
- Rigger/Dogman x 1

The proposed construction team organisation chart is presented below in ***Figure 36***.

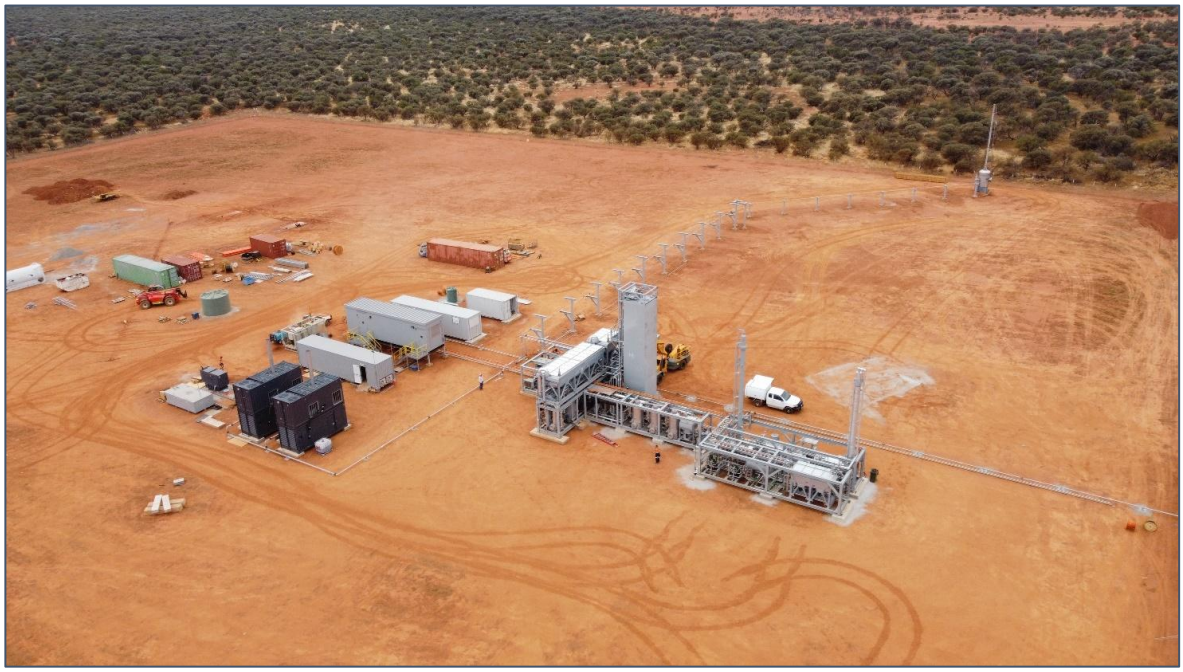


Figure 35 – Site Installation – completed facility layout (Mt Magnet, WA)

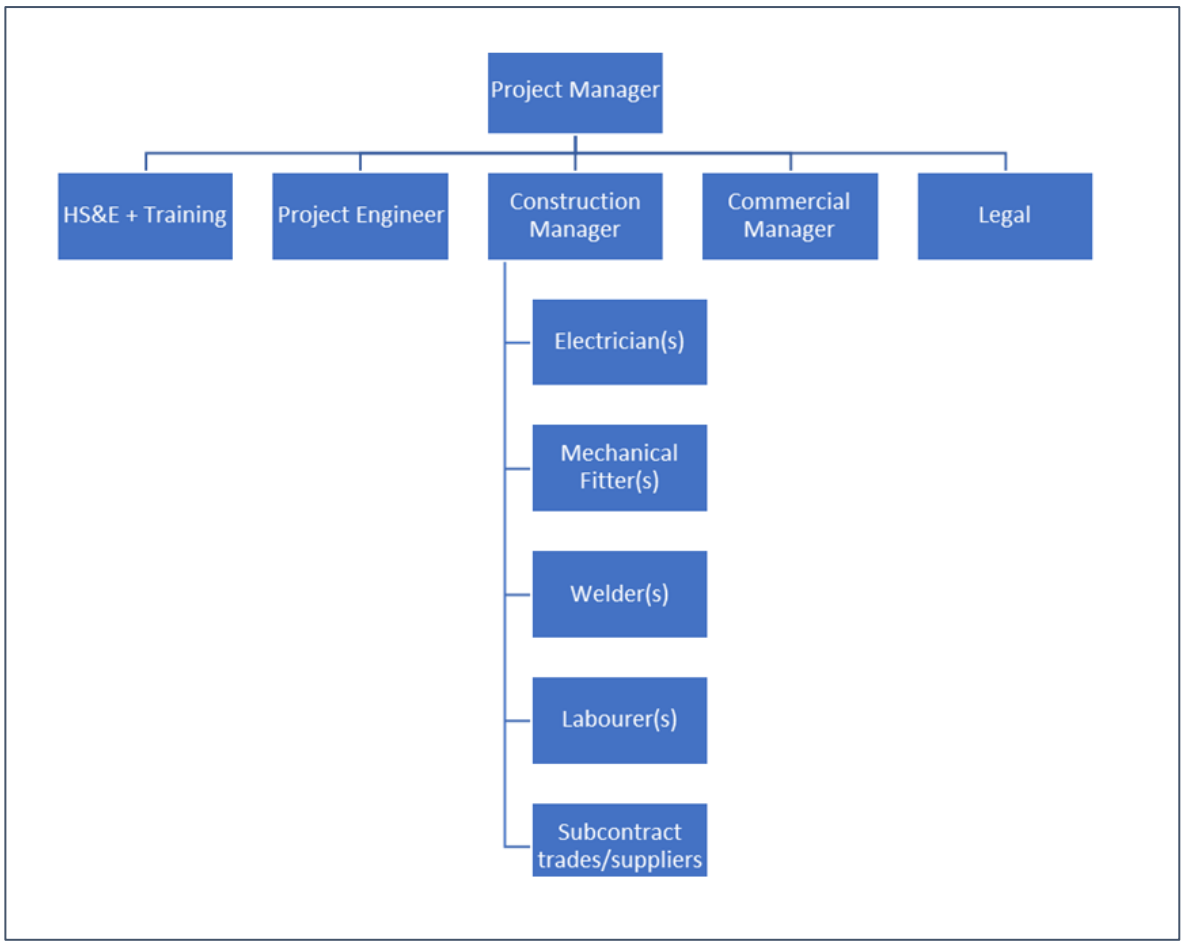


Figure 36 – Construction team – organisation chart

6.4 SITE COMMISSIONING & OPERATION

6.4.1 Commissioning

Once all modules are in place and connected, and the services are in place, and connected the Centurion LNG Facility will be commissioned using structured, risk managed, processes in accordance with the *CRYOSYS Commissioning Plan (CS20039-PE-CP001)*. The commissioning process is conducted in a manner that ensures that all systems are functional before the facility commences full-scale operation. This includes testing all process components (pre-compressions, treatment, filtration, sweetening, liquefaction, and storage) and all support services.

6.4.2 Operations

The facility will operate 24 hours a day, seven days a week. Construction, maintenance and operational works will typically be limited to daytime hours. Vehicle loading will typically be limited to daytime hours. Work activities may be conducted outside daylight hours, but this will be limited to the greatest extent possible through coordination and scheduling of works. All works and processes will be controlled in compliance with relevant standards and codes of practice, as outlined in the Basis of Design presented in ***Appendix H***, and using robust engineering and operational systems, procedures, and other controls.

The site will be managed in accordance with an *Environmental Management Plan (EMP)* that covers construction and operations. The EMP will incorporate content addressing all relevant environmental

aspects, potential impacts and preventative and mitigative controls as outlined in ***Section 7***, and include but not be limited to:

- Site access and egress routes, no-go areas, limited access to protected areas, and vehicle controls,
- Ground disturbance, site surfacing, sediment, erosion, stormwater, dust and controls,
- Dangerous goods storage and handling,
- Avoidance of soil, water, and groundwater contamination,
- Machinery, refuelling, maintenance, and controls,
- Air and noise emissions controls, consultation and response to complaints,
- Environmental incident management, spill kits, and emergency management plans,
- Waste management, waste streams, hierarchy of controls (avoidance, reduce, reuse, recycling, disposal, management and controls.

The site will also be operated as a Major Hazard Facility. It is understood that the facility will be regulated by the Petroleum and Gas Inspectorate of Resource, Safety & Health Queensland. The site will accordingly be managed in compliance with a Safety Case developed specifically for the site. The Safety Case includes, but is not limited to the following:

- CEFA structure, leadership and execution teams, governance processes,
- Site description, facility description, and process overview,
- The *Safety Management System (SMS)* to be applied at the site,
- Dangerous goods storage and handling,
- Plant control philosophy, plant controls, alarms and emergency shutdown systems,
- Security and monitoring,
- Emergency management plans,
- Interaction with Centurion Coal Mining,
- Identification of Major Incident Event (MIE) scenarios,
- Risk assessments of likelihood, consequence, and risks associated with MIEs, and controls to prevent or mitigate incidents.
- Demonstration that risks are managed ***So Far as Reasonably Practicable (SFARP)***.

Key elements of the safety case are directly applicable to environmental management. The systems (policies, standards, procedures, identification of hazards, assessment of risks, and controls to prevent and mitigate risks) used to ensure safe operations and the safety of the workforce and the public, will have the effect of also ensuring environmental protection. CEFA remains committed to managing

protection of environmental values using their internal systems that are applied to health, safety, security, environment and quality.

The facility will have full remote operations capability, with back to base monitoring and 24/7 operations control. The site will be monitored remotely 24/7. Round the clock monitoring will be achieved through use of control rooms in different time zones (Houston, London, and Perth). The site will be regularly attended. As the facility will produce 70 tonnes per day of LNG, it is envisaged that there will be at least 2 road tanker filling operations per day. CEFA will conduct scheduled, proactive, preventative and reactive maintenance. The facility will

Local personnel and contractors will be engaged to respond to plant trips, upset situations, and incidents. Response times will be established and assured contractually. Importantly, all site systems fail safe including upon emergency shutdown.

6.4.3 Monitoring & Response

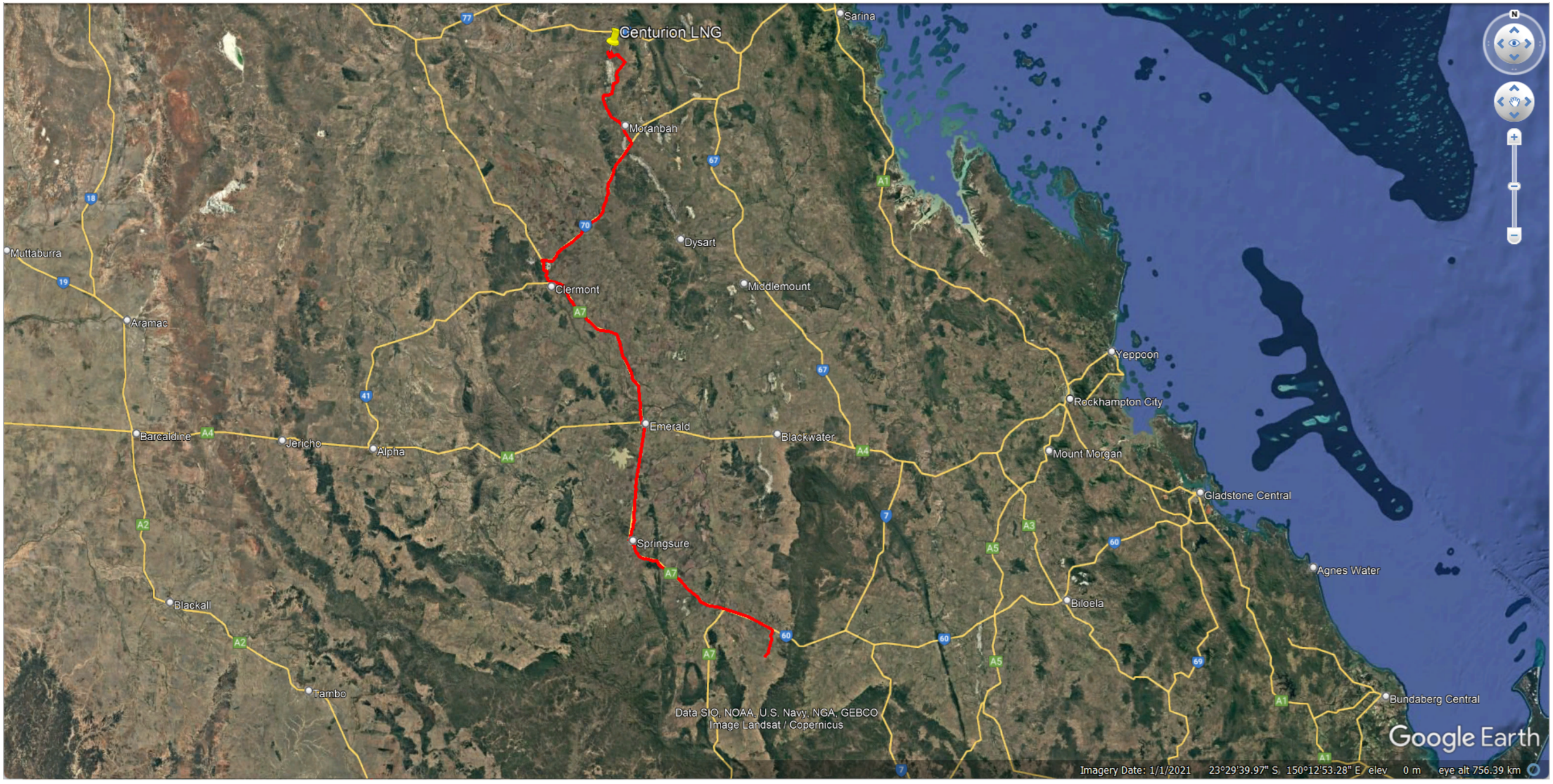
The site will be predominantly operated and monitored remotely. 24/7 monitoring will be maintained through the use of remote attended control rooms in different time zones (London, Houston, Perth). The site operator will be based at a camp in Moranbah and will typically attend site during normal operational hours. In the event of after-hours trips, excursions, events, or incidents the remote monitoring centre will take action to make the facility safe and contact the operator where a response to site is required. The operator will respond as soon as possible when a physical site response is required. The operator will activate incident and emergency response procedures as required. The operator will respond next day if the site has shut down to a safe condition (e.g., a routine loss of power supply with fail safe to flare operation).

6.5 VEHICLE MOVEMENTS & LNG DISTRIBUTION

LNG will be distributed from the site in double configuration road trains (A-Double). The vehicle fleet includes CEFA owned and subcontracted prime movers and cryogenic tankers. LNG will be loaded at site at a rate of typically two double road tankers per day. Loading may occur at any time but will be scheduled during normal operational hours (day time).

Road tankers will transport LNG on existing roads that are publicly accessible and have existing classification as heavy vehicle and dangerous goods routes. The road tankers will transport the LNG to Rolleston for injection into the east coast gas grid. The LNG transport route includes travel via Moranbah, Clermont, Emerald, and Springsure (and using routes 60, 70, and A7 including approved heavy vehicle and dangerous goods routes through or bypassing these towns as applicable) as shown on ***Figure 37***. A typical A Double configuration road tanker is shown in ***Figure 38***.

Additional vehicle traffic due to the project will be limited. Facility module delivery is as outlined in the construction phase. Traffic during the operations phase will be limited to minimal light vehicle movements (operator daily arrival and departure from their base in Moranbah). Heavy vehicle movements will typically be limited to 2 x road tankers (inbound and outbound) per day.



Source: *Google Earth, accessed 8-Jan-2026*

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Client:	CEFA
Drawn:	LD
Date:	8-Jan-2026
Scale:	As Shown

Title: Client CEFA
Site Centurion LNG, Goonyella
Content LNG Transportation Route

CLEAN ENERGY FUELS AUSTRALIA

Figure: 37

Revision: 1.0



Figure 38 – Centurion LNG – A double configuration road tanker

6.6 GREENHOUSE GAS EMISSIONS

Centurion routinely flares large volumes of methane gas from its pre-mine gas drainage activities. Flares are located adjacent to surface-in-seam (SIS) and gas risers connected to underground-in-seam boreholes, operating on a continuous basis. Flaring is an approved activity for underground coal mining and is a requirement for safe mining of underground coal seams.

The engagement with a 3rd party (CEFA) to capture and convert ICSG that would otherwise be flared is a key component of the *Centurion Coal Mining Greenhouse Gas Abatement Plan (SLR Consulting Feb-2025).* The facility will utilise gas that would otherwise be flared as the feedstock for conversion into LNG, to be exported from the site. Through the operation of the facility, Centurion mine will significantly reduce the greenhouse gas emissions associated with current flaring activities by converting waste gas into a marketable product. In accordance with the *National Greenhouse and Energy Reporting Act (2007) (NGER Act),* through the CENTURION LNG PROJECT Centurion Coal Mining will be able to claim a reduction in *Scope 1* direct emissions (measured as CO_2 equivalents (CO_2-e)).

In accordance with the *NGER Act*, the CENTURION LNG PROJECT may be required to report:

- **Scope 1 emissions:** including direct emissions from the site flare which will operate intermittently under plant upset (e.g., trip or shutdown) conditions, and CO_2 vent which will emit waste CO_2 from the amine plant,
- **Scope 2 emissions:** including indirect emissions from energy used to produce LNG,
- **Scope 3 emission:** from other sources including downstream emissions (voluntary reporting).

To understand the overall greenhouse gas benefit of the project it is essential to acknowledge that gas not sent to flaring represents an immediate environmental improvement, energy used to produce

LNG represents emissions that must necessarily occur to facilitate recovery of the product that would otherwise be wasted, and that gas in sent to the grid will offset gas used (understanding that there is an overall shortfall of gas in the domestic market and all gas injected to the grid will benefit the broader community). It is accordingly essential for the project to consider the following (without double accounting but beyond the strict reporting requirements of NGER) to determine operations phase net environmental benefit:

- ICSG not sent to flaring by Centurion Coal Mining (positive impact),
- Electrical energy used by the facility to produce LNG (negative impact),
- Gas flared by the facility (plant upset conditions only) (negative impact),
- Waste CO_2 from the amine system vented (small negative impact),
- Emissions from other sources (e.g., transport, LNG usage) (negative impact)).

The following are relevant:

There are multiple elements to Centurion Coal Mining's GHG abatement program. In terms of flaring of CSG in isolation, the potential emissions that may be abated through production of LNG is reported *(SLR Feb-2025)* as being 292,191 tonnes CO_2-e in FY2026 and 302,355 tonnes CO^2-e in FY2026. The potential to achieve this level of abatement will be limited by the capacity of the facility. Centurion Coal Mining are aiming for a 25% greenhouse gas reduction in FY2026 and 33% in FY2027. The savings inherent in the recovered ICSG supplied to the site are as follows:

- **ICSG not sent to flaring** (coal mine waste gas supply):
    - ≤4.0 Terajoules per day,
    - ≤14.6 Petajoules - 10 year life of project,
- Contained emissions in gas supply:
    - ≤70,000t CO2-e p.a.
    - ≤700,000t CO2-e 10 year life of project,
- **Electrical Energy:** The facility will utilise approximately 2.5 MW continuous (which allowing for system peak and troughs in demand averages to ~650 MWh per annum) of grid power to operate the LNG processing systems. This supply will be drawn from the National Electricity Market (NEM) and will comprise a mix of renewable and thermal generation. Accordingly, indirect scope 2 emissions from grid power consumption will depend on the prevailing energy mix of grid-supplied electricity. Using the 2023 national average emission intensity of 549 g CO_2-e/kWh, grid-related emissions are estimated at
    - ~356 tonnes CO_2-e per annum.
- **Gas flared by the facility:** Flaring on site is expected to be extremely limited. The following are assumed:
    - Plant trip estimated to seven (7) times per annum (conservative for grid supplied electricity),
    - Controlled shutdowns will be coordinated with Centurion Mining and gas supplies will be run down prior to shutdown minimising flaring,

- Each flaring event will be limited in duration. Total flaring is conservatively estimated at 20 hours per annum which will contribute negligible emissions in terms of CO2-e.

- **Other emissions:** will be calculated and reported accordingly. The critical element of this component is that LNG injected to the grid will offset other gas being used.

Other emissions and on-site flaring will contribute relatively minor emissions. The two (2) order of magnitude difference between contained emissions in the gas supply and the project electricity use supports the development of the project on greenhouse gas abatement grounds alone. An estimated inventory of greenhouse gas emissions is presented below in ***Table 22***.

Note: In future, at a time when plant expansion is required, in addition to grid supply, the facility will include an onsite gas-fired power generation system comprising two containerised reciprocating internal combustion gas generator units with a total installed capacity of ~4 MW. These units will operate on high-methane (>97%) gas from the facility feed line and are fitted with high-efficiency combustion systems and integrated emission controls. The onsite generation will offset a significant proportion of grid-derived electricity and provide secure power for auxiliary and process operations. Overall greenhouse-gas intensity from these generators is expected to be lower than Queensland's grid-average emission factor due to the high-methane, low-carbon-intensity nature of the fuel. Routine maintenance and adherence to AS 3814 (Gas Fuel Systems for Industrial Engines) will ensure optimal combustion efficiency and minimal unburnt hydrocarbon release.

Table 22 – Greenhouse Gas Emissions – inventory & summary estimates

GHG Emissions Source	Out of Scope ($t CO_2$-e)	Scope 1 ($t CO_2$-e)	Scope 2 ($t CO_2$-e)	Scope 3 ($t CO_2$-e)
Construction Phase				
Construction materials (embodied emissions)				811.00
Construction equipment (cranes, earthmoving etc.)				44.56
Transport equipment (trucking modules etc.)				64.88
Electricity / onsite generation		39.02		9.62
Commissioning & Operations Phase				
Waste gas recovered (Centurion Coal abatement)	-70,000			
Waste process gas (vent)		212.80		
Flare (upset conditions)		168.19		
Fugitive emissions (limited)				
LNG tankers (2 p.d.)				1331.41
Field vehicles etc.		46.29		11.41
Onsite Power Generation (Gas Set)		144.45		24.67
Grid electricity (continuous 650MWh p.a.)			16433.76	2207.52
Decommissioning & Rehabilitation Phase				
Construction equipment (cranes, earthmoving etc.)		4.55		41.06
TOTAL	**-70,000**	**615.30**	**16,433.76**	**4,546.12**

6.7 REHABILITATION

6.7.1 Post Construction

As a major hazard facility, producing and handling LNG the site footprint will be maintained predominantly clear of vegetation and combustible material. Following the completion of construction activities for the facility, site rehabilitation will focus on stabilising disturbed areas and ensuring that the land is restored to a condition that is safe, stable, and supports the surrounding environment. Given the minimal site disturbance, rehabilitation will be relatively straightforward, with emphasis on site surfaces that limit erosion and sedimentation, and to a lesser extent restoring soil integrity (and vegetation cover where applicable in cleared areas, for example in off-site drainage channels). Key aspects of post-construction rehabilitation include:

- **Surface restoration**: Site surfaces will be finished in native sandy soils, crushed rock, or crushed rock compacted hardstand to minimise soil erosion, and control and direct runoff.

- **Sediment & erosion control**: Disturbed soil surfaces will be stabilised using erosion control measures, where required, to prevent sediment runoff. To minimise the risk of erosion post-construction, any required silt fences, sediment traps, and water diversion structures will be maintained until final surface cover is established. These controls will prevent runoff from exposed soil and ensure that surface water quality is protected in nearby waterways such as **Goonyella Creek**.

- **Revegetation of cleared areas**: Where required, surfaces that do not comprise hardstand or concrete footings, access roads or laydown area), may be rehabilitated by replanting native grasses and local flora to prevent soil erosion and promote the restoration of habitat (this is most likely to be applicable off-site in areas controlled by Centurion Coal Mining).

- **Waste Removal**: Construction waste will be collected in appropriate skips. All construction debris, excess materials, and temporary infrastructure will be removed from the site and disposed of in accordance with a project *Waste Management Plan*. This will ensure that no residual construction waste remains on-site, reducing the potential for contamination or hazards.

Overall, the post-construction rehabilitation program for the facility will ensure that disturbed areas are stabilised and returned to a condition that is compatible with site operation and the surrounding environment, minimising the facility's long-term footprint.

6.7.2 Post Operation & Facility Decommissioning

Following the completion of operations at the facility, CEFA will be responsible for the rehabilitation of the site under the terms of the lease agreement with Centurion Coal Mining to return the land to original condition (as at the start of the lease). Minimum requirements include restoring the site to a stable condition, which may involve:

- Protection of existing crushed rock and hard stand for future industrial uses, or

- Revegetation and erosion control measures as required to prevent long-term environmental impacts.

The rehabilitation plan will be aligned with Centurion's broader rehabilitation strategy for the ML 6949, ensuring that the land is returned to an agreed post-operational state.

Upon the decommissioning of the facility, site rehabilitation will focus on the removal of all remaining infrastructure and the restoration of the site to a natural or productive state, as per the lease agreements and regulatory requirements. The target of decommissioning and rehabilitation of a site used for an Environmentally Relevant Activity is to leave the site in a **safe** and **stable** condition that is **not polluting**. The modular nature of the facility entirely supports decommissioning and removal of facility modules for use at another location. The decommissioning is seen as low risk, given the proponent has previously decommissioned this facility in Western Australia and has generated knowledge and learnings of the most efficient and effective process.

Key aspects of post-facility decommissioning include:

- **Infrastructure Removal**: All surface-mounted equipment, including modular LNG processing units, pipelines, and ancillary infrastructure, will be dismantled and removed from the facility site. Given the modular design of the facility, the removal process will have minimal impact on the land, as much of the equipment will be lifted and transported off-site.

- **In-Situ Concrete Slab**: The only permanent structure on-site, the in-situ concrete slab, will be assessed for either removal or repurposing. If required to be removed, the concrete will be broken up and disposed of in accordance with environmental guidelines, and the underlying soil will be rehabilitated.

- **Soil and Vegetation Restoration**: Any remaining disturbed areas will be regraded, and natural drainage patterns will be restored. Native vegetation will be re-established across the site to return the land to a stable, vegetated state. Rehabilitation efforts will prioritise the restoration of local flora to support the return of wildlife and prevent erosion.

- **Contaminated Site Management**: If any contamination is detected during the decommissioning process, particularly from hydrocarbons or chemicals used during operations, remediation activities will be implemented. Soil testing and environmental monitoring will guide the appropriate clean-up methods, ensuring that the facility site is free from hazardous materials. Contamination will refer to baseline soil conditions established prior to commencement of project activities and processes outlined in the *National Environmental Protection (Contaminated Site Assessment) Measure*.

- **Monitoring and Maintenance**: Post-decommissioning monitoring will be conducted to ensure that rehabilitation efforts are successful. This will include, as required, monitoring vegetation regrowth, soil stability, and the effectiveness of erosion control measures. If necessary, corrective actions will be taken to address any issues that arise during the rehabilitation process.

6.7.3 Future Land Use

The construction and operation of the facility will be integrated into the existing mining activities on the site. Once the facility has completed its operational lifecycle, the land will be subject to rehabilitation in accordance with the lease agreement, the Environmental Authority and relevant environmental regulations governing ML6949 (as they apply to the land leased by CEFA from Centurion Coal Mining). The rehabilitation process will involve returning the land to a stable and sustainable condition, with the potential for future land uses such as:

- **Continued Mining Operations:** Mining activities may continue in other parts of the lease following the decommissioning of the facility.

- **Grazing:** Depending on the post-closure land use plan, the site may be restored to a condition suitable for grazing or agricultural use, consistent with the surrounding rural properties.

- **Industrial Use:** Given the region's focus on mining and energy production, the facility site may be repurposed for other industrial uses following appropriate environmental assessments.

6.7.4 Estimated Rehabilitation Cost (ERC)

The Estimated Rehabilitation Cost (ERC) will be presented under separate cover when required (as outlined in the *Statutory Guideline Estimated rehabilitation cost under the Environmental Protection Act 1994)*. Whilst the ERC will consider worst reasonably foreseeable contamination scenarios, it is recognised that the use of potential contaminants of concern, and potentially contaminating processes on site are limited. The following considerations (provided by the suitably qualified person) inform CEFA's estimation:

- The process is enclosed. Modules and associated connections are above ground.

- Processes are predominantly gaseous. Raw products (ICSG), refrigerants (MR), and products (LNG) are gaseous or will gasify upon release from pressurised / cryogenic storage.

- Dangerous goods storage will be minimised. Dangerous goods shall be stored in infrastructure with secondary containment and handled in accordance with operational procedures and the ADG Code.

- Process wastes generated are estimated to be minimal. The most significant waste generated on site will be oily water from the inlet compressors. Oily water will be treated through a separator and accumulated oil will be collected in above ground storage.

- Site inspection regimes will be maintained. CEFA has a mature incident reporting culture. Material releases will be managed as incidents. Spill kits will be deployed to minimise the impact of any releases that do occur. In the event of any significant material release to ground, assessment and remediation will be completed to the extent reasonably practicable (ensuring that remediation required after cessation of operations will be minimised.

7.0 ENVIRONMENTAL IMPACT ASSESSMENT

The following section describes environmental values potentially affected by the facility, provides details of emissions or releases likely to be generated, the risk and likely magnitude of impacts on environmental values, and outlines measures to prevent or minimise adverse impacts.

7.1 LAND

7.1.1 Land – Environmental Values

The site is located on disturbed land, previously cleared for mining-related activities, and leased to CEFA as a cleared, stripped and levelled block. The site area (190m x 190m) contains no remnant or regrowth vegetation and comprises predominantly clayey sandy soils. The site has little to no ecological value. The surrounding land comprises previously disturbed land and a range of remnant and regrowth ecological communities. Environmental values on and around the site include:

- **Soil Integrity:** The soils in the project area are predominantly sandy loams and black cracking clays (vertosols). These soils have moderate to high erosion potential, particularly in areas that have been cleared of vegetation. Maintaining soil integrity is critical to preventing erosion and sedimentation during construction, operation, and rehabilitation.

- **Land Use:** The facility site is situated within a mining lease and has been subject to prior mining and associated activities. The land has limited agricultural value but holds industrial importance for ongoing resource extraction and associated activities. The disturbed land is suited for the proposed facility, as the location minimises the need for clearing of remnant and regrowth vegetation and disruption of associated ecological communities.

- **Soil quality:** Baseline environmental assessment indicated that concentrations of a broad suite of potential contaminants of concern were below relevant industrial human health and ecological investigation thresholds in all samples collected at the site.

7.1.2 Land – Hazards

The construction and operation of the facility will generate emissions and releases that could affect the land environment. Emissions may include:

- **Erosion and sedimentation:** Loss of soil volume or deterioration of soil condition due to uncontrolled surface runoff.

- **Soil Contamination:** The potential for soil contamination arises from the storage and handling of chemicals, fuels, and oils on-site. Spills or leaks from machinery, chemical storage and handling practices, and releases of process fluids, could result in hydrocarbon, lubricant, process fluids and other hazardous substances to the soil, affecting soil quality and potentially harming vegetation.

- **Waste Generation:** Construction and operational activities will generate various types of solid and liquid waste, including general waste, construction debris, and regulated waste. Improper handling or disposal of these materials could lead to land contamination and affect the environmental values of the facility site.

- **Dust Emissions:** Land clearing, excavation, and the movement of vehicles and machinery will generate dust emissions during the construction and operations phase. Dust can settle on

surrounding vegetation, reducing its ability to photosynthesise and impacting local fauna habitats. Additionally, dust emissions may affect air quality in nearby areas.

7.1.3 Land – Potential Environmental Impacts, Controls, & Residual Risks

The facility has the potential to impact the land environment through soil erosion, contamination, and habitat loss or damage. The risk of harm to land environmental values is low due to features inherent in the design of the facility. Additional and effective preventative and mitigative control measures will work to minimise risks so far as reasonably practicable. Due to the flat to gently sloping topography and the nature of the soil types, the risk of erosion at the facility site is considered low. It will be essential to implement control measures during construction and operation, particularly during periods of high rainfall. Aspects, potential impacts, and controls are summarised in ***Table 23***, below.

Table 23 – Land – potential environmental impacts, controls & residual risks

Environmental Aspect	Potential Impact	Controls	Residual risk (after control)
Soil Integrity	Erosion on cleared land and due to earthworks	**Inherent in design:** Minimal disturbance footing installation and modular process units. Earth berm along northern and eastern boundary of site to limits ingress of overland flow. **Preventative:** Minimisation of accumulation of rainwater and surface water. **Mitigative**: surface finishing, stormwater channelling and control, revegetation of disturbed areas if required. **Mitigative:** Erosion and sediment control measures where required (e.g., silt fences, sediment traps retention basins, etc).	Low
Soil Contamination	Contamination from material releases, chemical or fuel spills	**Inherent in design:** Process modules do not require, store or generate significant volumes of potential contaminants. Enclosed process. Predominantly gaseous product and active refrigerants. **Preventative:** Avoidance of storage of unnecessary chemicals, oils, lubricants, weedicides etc. on-site. **Preventative:** *Environmental Management Plan (EMP)* controls applied to refuelling and maintaining construction machinery and equipment on site. **Mitigative:** Secondary containment for all chemical storages. **Mitigative:** Spill kits. Response plans.	Low
Habitat Loss	Clearing of remnant vegetation, loss of biodiversity, weed incursion	**Inherent in design:** Location of facility on disturbed, cleared land. **Preventative:** *Environmental Management Plan (EMP)* including control of machinery and equipment access and avoidance of further disturbance of sensitive habitats. Site fenced prior to commencement of construction works. Surface finishing and weed control. **Mitigative:** Site rehabilitation after construction. Site rehabilitation after operation.	Low
Waste Disposal	Land contamination from improper waste disposal	**Inherent in design:** process modules do not produce large volumes of waste materials. Predominantly remote / low occupancy operation limits generation of wastes such as sewage. **Preventative:** *Waste Management Plan*, applies hierarchy of controls (avoid, reduce, reuse, recycle, dispose). **Preventative:** Disposal of hazardous materials to registered facilities by registered contractors using authorised transport.	Low
Dust Emissions	Dust generation from construction activities	**Preventative:** *Environmental Management Plan (EMP)*: Dust suppression used where appropriate (e.g., water sprays). Vehicle speed limits on unsealed roads. **Preventative:** Site surfacing plan including crushed rock on roads and hard stand areas.	Low
Impact on Surrounding Land Use	Loss of amenity for existing land uses	**Inherent in design:** Facility located within designated mining lease and an area already used for industrial purposes. Nearest rural properties are several kilometres away from the site. Facility is relatively isolated and will have limited visual, noise, air impacts on neighbouring properties. Impacts on grazing activities expected to be negligible. Heavy vehicles use existing mining access roads. **Preventative:** Incursion onto adjacent lands prohibited. Maintenance of relationship with neighbours, consultation when practicable.	Low

7.2 WATER

7.2.1 Water – Environmental Values

The proposed facility is situated within the Isaac River catchment, specifically within the Goonyella Creek sub-catchment. The environmental values of these water resources are protected under the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (*EPP Water*). These values include quality of surface water and groundwater for ecological, agricultural, and cultural purposes. Key environmental values identified in the project area include:

- **Aquatic Ecosystems:** The ephemeral Goonyella Creek is approximately 2km from the site and serves as an important seasonal component of the local aquatic ecosystem, providing habitat during wet seasons for aquatic and semi-aquatic species. While the creek only flows during significant rainfall events, it plays an essential role in maintaining local biodiversity. No surface water was encountered on or near the site during geotechnical investigations completed in 2025.

- **Agricultural Uses:** Downstream, water from the Isaac River catchment is used for agricultural irrigation. It is vital that water quality remains within acceptable levels to support these agricultural activities.

- **Cultural Significance:** Watercourses in the region, including Goonyella Creek, hold cultural value for local Indigenous communities. These sites are traditionally significant, and protecting water quality is important for preserving these cultural values.

Groundwater in the region is primarily contained within Permian coal seam aquifers and Quaternary alluvial aquifers. While the groundwater in this region is generally saline and unsuitable for potable or agricultural uses, it supports localised ecosystems. Protecting the integrity of these aquifers ensures that the broader environmental values of the region are maintained. No shallow groundwater was encountered during intrusive geotechnical investigations completed in 2025. Drilling near the site (nearby vent shaft) indicated depth to groundwater was approximately 110mBGS.

7.2.2 Water – Hazards

The construction and operation of the facility have the potential to cause emissions and releases that may affect the water resources within the Isaac River catchment.

- **Emissions to Surface Water:** The primary risk to surface water quality is associated with construction activities, such as land clearing and excavation, which can lead to increased sediment loads in watercourses. Stormwater runoff from the site could transport sediments, oils, fuels, and chemicals into Goonyella Creek, especially during periods of heavy rainfall. This poses a risk of increased turbidity and the release of contaminants into the creek.

- **Emissions to Groundwater:** Groundwater contamination risks arise primarily from accidental spills or leaks of chemicals, fuels, or saline water during facility operation. Any spills that permeate the soil could affect shallow aquifers. Given the naturally saline nature of the groundwater, it is important to monitor any changes in salinity or chemical composition due to project activities.

- **Stormwater Runoff:** Uncontrolled stormwater from hardstand areas could lead to erosion and the transport of sediments and pollutants, including hydrocarbons, and other contaminants, into nearby watercourses. This is a particular concern during peak rainfall events, which could exacerbate the potential for surface water contamination.

7.2.3 Water – Potential Environmental Impacts, Controls, & Residual Risks

Potential impacts of the facility on water resources include changes to water quality, sedimentation, and contamination of both surface water and groundwater. The risk of harm to water environmental values is low due to features inherent in the design of the facility. Additional and effective preventative and mitigative control measures will work to minimise risks so far as reasonably practicable. Environmental aspects, potential impacts, and proposed controls are summarised in ***Table 24***, below.

Table 24 – Water – potential environmental impacts, controls, & residual risks

Environmental Aspect	Potential Impact	Controls	Residual risk (after control)
Surface Water Quality	Increased sediment load in Goonyella Creek due to erosion	**Inherent in design:** Minimal disturbance footing installation and modular process units. Earth berm to the north and east boundaries of the site to minimise overland flow onto the site. **Preventative:** Minimisation of accumulation of rainwater and surface water. **Mitigative**: surface finishing, stormwater channelling and control, revegetation of disturbed areas if required. Erosion and sediment control measures where required (silt fences, sediment traps retention basins, etc). Response plans.	Low
Surface Water Quality	Contamination from stormwater runoff containing pollutants	**Inherent in design:** gas arrives at site as predominantly dry gas, the facility does not accumulate or store large quantities of coal seam gas water, brine, or salt. Process modules do not require, store or generate significant volumes of potential contaminants. Enclosed process. Predominantly gaseous product and active refrigerants (in the event of material release contaminants go to air rather than ground). Earth berm to the north and east boundaries of the site to minimise the impact of overland flow onto the site. **Preventative:** Avoidance of storage of unnecessary chemicals, oils, lubricants, weedicides etc. on-site. **Preventative:** *Environmental Management Plan (EMP)* controls applied to refuelling / maintaining construction equipment. **Mitigative:** Secondary containment for all chemical storages. **Mitigative:** Spill kits. Response plans.	Low
Groundwater Resource	Impact to groundwater resource Reduction in groundwater recharge due to site compaction	**Inherent in design:** Site located in an area where shallow groundwater was not encountered (nearby drilling indicated depth to groundwater of 110mBGS). **Inherent in design:** The facility does not collect, accumulate or store large quantities of coal seam gas water, brine, or salt. Site footprint minimised to 190m x 190m. **Preventative:** Surface finishing, permeable surfaces maintained in areas not required for hard stand and roadway. Excessive compaction of soil avoided.	Low
Groundwater Quality	Contamination from chemical or fuel spills	**Inherent in design:** Site located in an area where shallow groundwater was not encountered (nearby drilling indicated depth to groundwater of 110mBGS). Process modules do not require, store or generate significant volumes of potential contaminants. Enclosed process. Predominantly gaseous product and gaseous active refrigerants (in the event of material release contaminants go to air rather than ground). **Preventative:** Avoidance of storage of unnecessary chemicals, oils, lubricants, weedicides etc. on-site. **Preventative:** *Environmental Management Plan (EMP)* controls applied to refuelling and maintaining construction equipment. **Mitigative:** Secondary containment for all chemical storages. **Mitigative:** Spill kits. Response plans.	Low
Watercourse integrity	Disturbance to Goonyella Creek from construction activities	**Inherent in design:** the site is located up to 2km from the nearest registered water course Goonyella Creek. **Preventative:** *EMP* controls applied to access and work locations. No go zones established and demarcated. Site fenced prior to commencement of construction works. Construction avoided in proximity to watercourses, buffer zones implemented. **Mitigative:** Response plans.	Low

7.3 AQUATIC ECOLOGY

7.3.1 Aquatic Ecology – Environmental Values

The facility site is located on disturbed land within ML 6949 that was leased by CEFA as a cleared, stripped and levelled block. The site is approximately 2km from the nearest registered watercourse Goonyella Creek. There are areas of Goonyella Creek that may be closer to the site but are uphill of the site and upstream of locations that may be affected by the site. No aquatic ecosystems were identified within or adjoining the footprint of the site. Key environmental values identified in the project area include:

- **Aquatic Ecosystems:** The ephemeral Goonyella Creek is approximately 2km from the site and serves as an important seasonal component of the local aquatic ecosystem, providing habitat during wet seasons for aquatic and semi-aquatic species. While the creek only flows during significant rainfall events, it plays an essential role in maintaining local biodiversity. No surface water was encountered on or near the site during geotechnical investigations completed in 2025.

- **Cultural Significance:** Watercourses in the region, including Goonyella Creek, hold cultural value for local Indigenous communities. These sites are traditionally significant, and protecting the aquatic ecosystems of the waterways is important for preserving these cultural values.

7.3.2 Aquatic Ecology – Hazards

The main hazards from the project to aquatic ecosystems include:

- **Disturbance and disruption:** Direct disturbance of water courses and associated littoral vegetation and associated aquatic ecological communities.

- **Emissions to surface water:** The primary risk to surface water quality stems from construction activities, such as land clearing and excavation, which can lead to increased sediment loads in watercourses. Stormwater runoff from the site could transport sediments, oils, fuels, and chemicals into Goonyella Creek, especially during periods of heavy rainfall. This poses a risk of increased turbidity and the release of contaminants into the creek.

- **Stormwater runoff:** Uncontrolled stormwater from hardstand areas could lead to erosion and the transport of sediments and pollutants, including hydrocarbons, and other contaminants, into nearby watercourses. This is a particular concern during peak rainfall events, which could exacerbate the potential for surface water contamination.

7.3.3 Aquatic Ecology – Potential Environmental Impacts, Controls, & Residual Risks

The potential impacts of the facility on aquatic ecology include direct disturbance and changes to water quality, sedimentation, and the contamination of surface water. The risk of harm to aquatic ecology environmental values is low due to the location of, and features inherent in the design of the facility. Additional and effective preventative and mitigative control measures will work to minimise impacts so far as reasonably practicable. Environmental aspects, potential impacts, and proposed controls are summarised in ***Table 25***, below.

Table 25 – Aquatic Ecology – potential environmental impacts, controls, & residual risks

Environmental Aspect	Potential Impact	Controls	Residual risk (after control)
Ecological Communities & Littoral vegetation	Direct disturbance	**Inherent in design:** the site is located up to 2km from the nearest registered water course Goonyella Creek. **Preventative:** *Environmental Management Plan (EMP)* controls applied to access and work locations. Site fenced prior to commencement of construction works. No go zones established and demarcated where required. Construction avoided in proximity to watercourses, buffer zones implemented.	Low
Surface Water Quality	Increased sediment load in Goonyella Creek due to erosion	**Inherent in design:** Minimal disturbance footing installation and modular process units. **Preventative:** Minimisation of accumulation of rainwater and surface water. **Mitigative**: surface finishing, stormwater channelling and control, revegetation of disturbed areas if required. **Mitigative:** Erosion and sediment control measures where required (e.g., silt fences, sediment traps retention basins, etc).	Low
Surface Water Quality	Contamination from stormwater runoff containing pollutants	**Inherent in design:** gas arrives at site as predominantly dry gas, the facility does not accumulate or store large quantities of coal seam gas water, brine, or salt. Process modules do not require, store or generate significant volumes of potential contaminants. Enclosed process. Predominantly gaseous product and active refrigerants (in the event of material release contaminants go to air rather than ground). **Preventative:** Avoidance of storage of unnecessary chemicals, oils, lubricants, weedicides etc. on-site. **Preventative:** Environmental Management Plan (EMP) – controls applied to refuelling and maintaining construction machinery and equipment on site. **Mitigative:** Secondary containment for all chemical storages. **Mitigative:** Spill kits. Response plans.	Low

7.4 TERRESTRIAL ECOLOGY

7.4.1 Terrestrial Ecology – Environmental Values

The site is located on disturbed land, previously cleared for mining-related activities, and leased to CEFA as a cleared, stripped and levelled block. The site area (190m x 190m) contains no remnant or regrowth vegetation and comprises predominantly clayey sandy soils. The site has little to no ecological value. The terrestrial ecology of the region around the site is characterised by a mix of remnant native vegetation, disturbed landscapes due to mining operations and associated activities, and a variety of fauna and flora species. Land immediately adjoining the site boundaries does not include endangered regional ecosystems (remnant or regrowth). Environmental values around the site include:

- **Brigalow (Acacia harpophylla) Woodlands:** Classified as endangered under the EPBC Act and Queensland Vegetation Management Act 1999, these woodlands are a priority for conservation due to extensive historical clearing.

- **Eucalypt Woodlands and Open Forests:** Some are listed as of concern under state legislation. Eucalypt communities dominate the higher elevations and ridgelines.

Nearby communities to the north and east of the site (~230m to the north east) include:

- **RE ID 11.5.3:** Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana woodland on Cainozoic sand plains and/or remnant surfaces. **Least Concern / No concern at present.**

- **RE ID 11.5.15:** Semi-evergreen vine thicket on Cainozoic sand plains and/or remnant surfaces. **Least concern / Endangered.**

A small patch of endangered regional ecosystem is located approximately 1km to the south of the site, and includes:

- **RE ID 11.4.8:** Eucalyptus cambageana woodland to open forest with Acacia harpophylla or A. argyrodendron on Cainozoic clay plains. **Endangered / Endangered.**
- **RE ID 11.4.9:** Acacia harpophylla shrubby woodland with Terminalia oblongata on Cainozoic clay plains. **Endangered / Endangered.**
- **RE ID 11.5.3:** Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana woodland on Cainozoic sand plains and/or remnant surfaces. **Least Concern / No concern at present.**

Adjacent and nearby regulated vegetation, as shown on ***Figure 15*** (above) include:

- MSES regulated vegetation (category B - endangered or of concern), and
- MSES regulated vegetation (essential habitat), and
- MSES regulated vegetation (category C- endangered or of concern)

7.4.2 Terrestrial Ecology – Hazards

The main hazards from the project to terrestrial ecosystems include:

- **Disturbance and disruption:** Direct disturbance of vegetation and associated terrestrial ecological communities. Direct harm to fauna species. Indirect harm through placement of an industrial facility within community habitat areas.

7.4.3 Terrestrial Ecology – Potential Environmental Impacts, Controls, & Residual Risks

The potential impacts of the facility on terrestrial ecology include direct disturbance of vegetation and to ecological communities and direct harm to fauna. The risk of harm to terrestrial ecological values is low due to the location on disturbed land and features inherent in the design of the facility. Additional and effective preventative and mitigative control measures will work to minimise the risk of harm so far as reasonably practicable. Environmental aspects, potential impacts, and proposed controls are summarised in ***Table 26***, below.

Table 26 – Terrestrial Ecology – potential environmental impacts, controls, & residual risks

Environmental Aspect	Potential Impact	Controls	Residual risk (after control)
Ecological Communities & Vegetation	Direct disturbance and disruption	**Inherent in design:** the site is located on previously disturbed and fully cleared, stripped and levelled land. The site has little to no ecological value. The site will comprise a cleared industrial block with little to no attraction to fauna. **Preventative:** *Environmental Management Plan (EMP)* controls applied to access and work locations. Site fenced prior to commencement of construction work. No go zones established and demarcated. Construction avoided in proximity to remnant and regrowth vegetation and ecological communities, buffer zones implemented. In the event that land clearing IS required, or fauna are encountered, a fauna spotter catcher will be engaged.	Low
Ecological Communities & Vegetation	Indirect disturbance and disruption	**Inherent in design:** Predominantly remote operation. **Preventative:** Construction and operational vehicles will use existing roads. Additional light vehicles will be limited in number. Additional heavy vehicles will be limited in number (~2 per day). **Mitigative:** Operational controls: Optimised and scheduled vehicle movements. Air and noise emissions	

Environmental Aspect	Potential Impact	Controls	Residual risk (after control)
		controls on site. Vehicle speed limits enforced on mine roads. Dust control (water sprays) when required. Centurion Mining stormwater controls outside fence line of site. Centurion Mining controlled access roads under their existing permits.	

7.5 AIR QUALITY

7.5.1 Air Quality - Environmental Values

The facility is located in an industrial and rural area within mining lease ML 6949. Trinity Consultants were engaged to complete air quality assessment for the project. Trinity Consultants' report is presented in ***Appendix J.*** The key environmental values of air in the region are established in the *Environmental Protection Air Policy (EPP Air)* and detailed in the Trinity Consultants report. Modelling was completed to assess impacts at identified sensitive receptors. The nearest sensitive receptor was identified as Denham Homestead located approximately 4.3 kilometres west of the proposed site, with other receptors further away from the site.

At a high level environmental values for air in the project area include:

- **Human Health:** Maintaining acceptable air quality levels is critical for protecting workers at the facility and any nearby residents.
- **Ecosystem Health:** Local vegetation and wildlife may be sensitive to changes in air quality, particularly dust and industrial emissions.
- **Amenity:** Dust and airborne particulates can reduce visibility, affecting the visual amenity of the region and possibly interfering with nearby industrial, mining, and agricultural operations.

7.5.2 Air Quality – Hazards

The construction and operation of facility will result in air emissions that could affect local air quality. The following key points were extracted from the air impact assessment report *(Trinity Consultants 2025)*:

- The main air emission sources during operation are intermittent flaring events associated with start-up, shutdown, commissioning, and upset conditions. The facility will be powered by the grid, therefore, there will be no combustion emissions from a site power station or generators.
- Construction emissions are limited to minor fugitive dust and vehicle exhaust during plant installation and minimal earthworks.
- The key pollutants considered included nitrogen dioxide, carbon monoxide, and volatile organic compounds associated with the proposed flare, with particulate matter and sulfur dioxide deemed negligible.

7.5.3 Air Quality – Potential Environmental Impacts, Controls, & Residual Risks

The facility has the potential to impact local air quality through the release of identified potential contaminants during construction and operations. The following key conclusions were extracted from the air impact assessment report *(Trinity Consultants 2025)*:

- **Impact to sensitive receptors:** Air dispersion modelling predicts compliance with all relevant ambient air quality objectives for nitrogen dioxide, carbon monoxide, and volatile organic compounds at the nearest sensitive receptor, even under conservative assumptions such as continuous flare operation, full conversion of NOx to NO2 and elevated background levels. Overall, the low predicted concentrations demonstrate that the facility is suitably located and designed with respect to minimising air quality impacts.

These impact outcomes are the result of, the location of, and features inherent to the design of the facility. Additional and effective preventative and mitigative control measures will work to minimise risks so far as reasonably practicable. Environmental aspects, potential impacts, and proposed controls are summarised in ***Table 27***, below.

Table 27 – Air Quality – potential environmental impacts, controls, & residual risks

Environmental Aspect	Potential Impact	Controls	Residual risk (after control)
Air quality	Deteriorated air quality at sensitive receptors during operations	**Inherent in design:** the site is located in an existing mining and industrial area remote from sensitive receptors Nearest sensitive receptor is >4km from site. Process systems are fully contained. Emissions only occur intermittently under upset conditions. **Preventative:** Use of fuel-efficient equipment, regular maintenance of machinery, reducing idle times when loading LNG trucks. Storage and handling of chemicals in accordance with the ADG Code. Dust suppression (e.g., water sprays), limiting vehicle speeds, using dust barriers. **Mitigative:** Spill kits. Response plans.	Low
Air quality	Deteriorated air quality at sensitive receptors during construction	**Inherent in design:** Modular construction method limits the duration and impact associated with construction. **Preventative:** *Environmental Management Plan (EMP)* controls applied to access and work locations, times, and durations. Dust suppression (e.g., water sprays). Vehicle speed limits enforced, using dust barriers. **Mitigative:** Response plans.	Low

7.6 NOISE

7.6.1 Noise – Environmental Values

The facility is located in an industrial and rural area within mining lease ML 6949. Trinity Consultants were engaged to complete noise assessment for the project. Trinity Consultants' report is presented in ***Appendix K.*** The key environmental values relating to noise in the region are established in the *Environmental Protection Noise Policy (EPP Noise)* and include acoustic quality objectives that are detailed in the Trinity Consultants report. Modelling was completed to assess impacts at identified sensitive receptors. The nearest sensitive receptors were identified as:

- (R1) Lapunyah Homestead – 8.8 km south-west,
- (R2) Denham Homestead – 4.3 km west,
- (R5) Burton Down Homestead – 11.3 km east.

with other receptors located further away from the site. The key acoustic environmental values are associated with wellbeing and amenity at the sensitive receptor and are established as proposed noise limits for sensitive receptors as shown in ***Table 28*** below.

Table 28 – Noise – proposed limits for sensitive receptors

Location	Lapunyah	Denham Park	Burton Downs
Period	**Noise Limit, LAeq**	**Noise Limit, LAeq**	**Noise Limit, LAeq**
Day (7am to 6pm)	35	35	35
Evening (6pm to 10pm)	35	35	35
Night (10pm to 6am)	31	28	27

7.6.2 Noise – Hazards

The construction and operation of the facility will generate various noise emissions, which could impact the surrounding acoustic environment. Emissions may include:

- **Construction noise**: Noise will be generated from activities such as earthworks, machinery operation, and vehicular movement including heavy machinery (e.g., cranes) during construction.
- **Operational Noise**: Noise from equipment such as compressors, pumps, and generators. Continuous noise sources may arise from gas processing equipment and transportation vehicles.
- **Traffic Noise**: Increased vehicular traffic to and from the site, particularly during construction, will result in elevated noise levels along access roads and in the vicinity of the facility area.

Key operational noise sources and associated continuous and intermittent emissions are as outlined below in ***Table 29***.

Table 29 – Noise – key emissions sources

Source of emission or discharge	Emission volume	Location on annotated site layout (Figure 26)
Regen gas compressor - gas conditioning cube	Continuous / 72dBA @1M	9
Regen gas cooler - gas conditioning cube	Continuous / 87dBA @1M	9
MR evacuation compressor - refrigeration cube	Continuous / 78dBA @1M	9
MR compressor - compressor cube	Continuous / 94dBA @1M	8
MR compressor lube oil cooler - compressor cube	Continuous / 88dBA @1M	8
MR compressor inter cooler - cooler cube	Continuous / 88dBA @1M	8
MR compressor after cooler - cooler cube	Continuous / 88dBA @1M	8
Nitrogen package - instrument air/nitrogen building	Intermittent / 68dBA @1M	7
RO unit - RO building	Intermittent / 65dBA @1M	6
Inlet filter skid	Continuous / 77 dBA @1M	5
Pre-compression skid compressor	Continuous / 108 dBA @1M	4
Pre compression skid cooler	Continuous / 95 dBA @1M	3
Pre compression skid Motor	Continuous / 85 dBA @1M	2
Flare (0.3m diameter ~15m elevation)	Rare (est 7 x p.a.) / 95dBA @1M	1
Road Train	Intermittent (4 moves p.d.) 110 dBA @1M	Site internal roadway

7.6.3 Noise – Potential Environmental Impacts, Controls, & Residual Risks

The facility has the potential to impact local noise environment through noise emissions during construction and operations. The following key conclusions were drawn by *Trinity Consultants 2025*:

- **Impact to sensitive receptors:** The key noise sources are continuous in nature and include compressors, pumps and gas flare stack. Operational noise impact was assessed through computational noise modelling. Full compliance with the noise criteria was predicted for all periods of the day, including the night (associated with the most stringent noise criteria), and at all nearest sensitive receptors.

- **Impact to sensitive receptors:** The potential for noise impacts during other operational phases (e.g. startup, shutdown) and during construction were expected to be no greater than those predicted for normal operations. Ultimately, the nearest sensitive receptors are separated by a large distance, resulting in very low noise levels at these receptors.

- **Impact to sensitive receptors:** Overall, the assessment demonstrated that the Project is suitably located and designed with respect to minimising noise impacts.

The risk of harm to noise environmental values is low due to the location of, and features inherent in the design of the facility. Additional and effective preventative and mitigative control measures will work to minimise impacts so far as reasonably practicable. Environmental aspects, potential impacts, and proposed controls are summarised in ***Table 30***, below.

Table 30 – Noise – potential environmental impacts, controls, & residual risks

Environmental Aspect	Potential Impact	Controls	Residual risk (after control)
Construction Noise	Noise impacts at sensitive receptors during construction	**Inherent in design:** Site is located in an existing mining and industrial area remote from sensitive receptors Nearest sensitive receptor is >4km from site. Modular Process systems limit the duration of the construction phase. **Preventative:** *Environmental Management Plan (EMP)* construction hours limited to daytime, well maintained, low-noise machinery used, white noise reversing alarms etc. **Mitigative:** Response plans.	Low
Operational Noise	Noise impacts at sensitive receptors during operations	**Inherent in design:** the site is located in an existing mining and industrial area remote from sensitive receptors. Nearest sensitive receptor is >4km from site. Modular process systems incorporate acoustic enclosures. **Preventative:** Operations scheduled for daytime (after hours operations possible but limited). **Mitigative:** Response plans.	Low
Traffic Noise	Noise impacts at sensitive receptors due to traffic	**Inherent in design:** The site is located in an existing mining and industrial area remote from sensitive receptors. Nearest sensitive receptor is >4km from site. Vehicle movement during construction and operations will be on existing HV/DG routes. **Preventative:** Speed limits enforced on access roads. Truck movement timing limited. Vehicle filling operations scheduled for daytime (after hours operations possible but limited). **Mitigative:** Response plans.	Low
Wildlife Disturbance	Noise impacts to sensitive fauna in nearby regional ecosystems	**Inherent in design:** Site is located on a disturbed site in an existing mining and industrial area on existing mining roads. Process modules incorporate acoustic enclosures. Site footprint limited to 190m x 190m. Site fenced prior to commencement of construction works avoids encroachment into sensitive communities. **Preventative:** *EMP*. Operations scheduled for daytime. **Mitigative:** Response plans.	Low

7.7 TRANSPORT

7.7.1 Transport – Environmental Values

The transport of materials and personnel to the site, and LNG from the site are key environmental considerations for the facility. The main considerations related to transport in the facility area include:

- **Mining Access Roads:** The access to and egress from the site is on existing mine roads that are rated for heavy vehicles and dangerous goods vehicles. The mine access roads are already in use, and road issues such as vehicle speed and dust generation are managed by Centurion Mining.

- **Public Roads:** The public roads that provide access to and from the site, are in existing use for access to other mining operations. The roads are rated for heavy vehicles and dangerous goods transport. The public access roads are regulated and administered by state authorities such as the Queensland Police Service and Queensland Department of Transport.

7.7.2 Transport – Hazards

The facility will generate new light vehicle and new heavy movements. The additional movements may have an impact on the mining and public roads. Key hazards are common to all vehicle movements but are highlighted when transporting dangerous goods in heavy vehicles. A brief, non-exhaustive summary is outlined below:

- **Driver related hazards:** speeding, dangerous driving, driving under the influence of drugs or alcohol, driver competence, etc.,

- **Vehicle related hazards:** vehicle size and mass, load restraint, condition, maintenance, interaction between vehicles, etc.,

- **Road related hazards:** road geometry and condition, vehicle impact on road condition etc.,

- **Dangerous goods:** the potential for dangerous goods to cause harm if vehicle is involved in any incident or road traffic accident.

7.7.3 Transport – Potential Environmental Impacts, Controls, & Residual Risks

The potential impacts from site generated transport are estimated to be minimal based on the following:

- **Construction vehicle movements:** limited in number and duration by the modular nature of the facility, the small number of modules to be installed, the minimal earthworks required, and the small workforce required to install and commission the site.

- **Operational light vehicle movements:** generated by the site are minimal as the site is predominantly remotely operated and monitored, and accordingly minimally attended (nominally 2 light vehicle movements per day).

- **Operational heavy vehicle / dangerous goods movements:** limited by the production of LNG, which is limited by the production capacity of the facility.

Aspects, potential impacts, and proposed controls are summarised in ***Table 31***, below.

Table 31 – Transport – potential environmental impacts, controls & residual risks

Environmental Aspect	Potential Impact	Controls	Residual risk (after control)
Project use of Mining Access Roads	Impacts to other road users, and sensitive environments	**Inherent in design:** the contribution of additional vehicle movements to mining roads due to the project is very limited (as a % of all existing movements). **Preventative:** *Traffic Management Plan*. controls applied to access and egress routes, no-go areas, scheduling of vehicle movements, enforcement of mining road speed limits etc. etc. Professional dangerous goods / heavy drivers. Compliance with internal mine road rules. Compliance with *National Heavy Vehicles Regulation (NHVR)*. Compliance with *Australian Dangerous Goods Code (ADG Code)*. **Preventative:** Dust control on access roads as required.	Low
Project Use of Public Access Roads	Impacts to other road users, and sensitive receptors	**Inherent in design:** the contribution of additional vehicle movements to public roads due to the project is very limited (as a % of all existing movements). **Preventative:** *Traffic Management Plan*. Heavy vehicle and dangerous goods vehicles on pre-determined routes using existing HV and DG approved routes. Scheduling of vehicle movements, enforcement of mining road speed limits etc. etc. Professional dangerous goods / heavy drivers. Compliance with public road rules. Compliance with *National Heavy Vehicles Regulation (NHVR)*. Compliance with *Australian Dangerous Goods Code (ADG Code)*. **Mitigative:** Not indicated.	Low

7.8 WASTE MANAGEMENT

7.8.1 Waste – Environmental Values

The management of waste is a key environmental consideration for the facility. Effective waste management is crucial for maintaining the integrity of the surrounding environment, reducing the potential for contamination, and ensuring that land and water resources are protected. The main environmental values related to waste management in the facility area include:

- **Soil and Water Quality**: The site is currently cleared, stripped and levelled and baseline assessment indicates the site is free of the impacts of soil and water contaminants.
- **Human Health and Safety**: The site is currently cleared, stripped and levelled and evidently free of existing waste materials, including hazardous or industrial waste that may affect the health and safety of workers.
- **Biodiversity**: The site is currently cleared, stripped and levelled and evidently free of existing waste materials, including hazardous or industrial waste that may impact local flora and fauna.

7.8.2 Waste – Hazards

The facility will generate a variety of waste streams during both the construction and operational phases. These waste streams include:

- **Construction Waste**: Construction activities will generate waste materials such as excess soil, construction debris (e.g., concrete, metals, wood), and packaging materials. These wastes, if not properly managed, could accumulate on-site and potentially lead to soil or water contamination.
- **Operational Waste**: During the operation of the facility, various waste streams will be produced, including general office waste, process waste, and maintenance-related waste such as used oils, filters, and rags.

- **Hazardous Waste**: Hazardous waste generated during both construction and operation may include oils, lubricants, cleaning agents, and other chemicals. Improper disposal of these materials could lead to soil and water contamination, posing risks to both human health and the environment.

7.8.3 Waste – Potential Environmental Impacts, Controls, & Residual Risks

The potential impacts from waste generation at the facility include soil and water contamination, harm to wildlife, and health risks to workers and nearby communities. The risk of harm to environmental values is low due to features inherent in the design of the facility. Effective waste management strategies are necessary to mitigate risks. Additional and effective preventative and mitigative control measures will work to minimise impacts so far as reasonably practicable. CEFA will implement a *Waste Management Plan* to address all waste streams, all waste storage, handling, reduce, reuse, recycling and disposal. Environmental aspects, potential impacts, and proposed controls are summarised in ***Table 32***.

Table 32 – Waste – potential environmental impacts, controls & residual risks

Environmental Aspect	Potential Impact	Controls	Residual risk (after control)
Waste Disposal	Land impact from improper waste handling and disposal – construction	**Inherent in design:** installation of process modules does not produce large volumes of waste materials. **Preventative:** *Waste Management Plan*. Apply hierarchy of controls (avoid, reduce, reuse, recycle, dispose). Segregation of waste streams, use of appropriate waste receptacles (bins, skips, tanks etc.). **Preventative:** Disposal of hazardous materials to registered facilities by registered contractors using authorised transport. Disposal of general and all other wastes by registered contractors using authorised transport.	Low
Waste Disposal	Land impact from improper waste handling and disposal - operations	**Inherent in design:** process modules do not produce large volumes of waste materials. Predominantly remote / low occupancy operation limits generation of wastes such as sewage. **Preventative:** *Waste Management Plan*. Apply hierarchy of controls (avoid, reduce, reuse, recycle, dispose). Segregation of waste streams, use of appropriate waste receptacles (bins, skips, tanks etc.). **Preventative:** Disposal of hazardous materials to registered facilities by registered contractors using authorised transport. Disposal of general and all other wastes by registered contractors using authorised transport.	Low
Hazardous Waste	Contamination of soil, water, groundwater from improper handling and disposal of oils, chemicals, and hazardous substances	**Inherent in design:** site located in an area where shallow groundwater was not encountered (nearby drilling indicated depth to groundwater of 110mBGS). **Preventative:** *Waste Management Plan.* Operational procedures for hazardous materials. Use of designated storage areas with secondary containment for all hazardous waste storage, minimise duration of hazardous waste storage, use proper labelling. Collection and transport by registered waste contractors. Disposal at registered hazardous waste facilities.	Low
Wastewater	Potential contamination of watercourses from wastewater or accidental spills	**Inherent in design:** process modules do not produce large volumes of waste materials. Predominantly remote / low occupancy operation limits generation of wastes such as sewage. **Preventative:** *Waste Management Plan*.	Low

APPENDIX A. – LAND TITLE

Current Title Search

Queensland Titles Registry Pty Ltd
ABN 23 648 568 101

Title Reference:	**51387880**	**Search Date:**	12/12/2025 11:52
Date Title Created:	11/07/2025	**Request No:**	54455048
Previous Title:	40082259		

ESTATE AND LAND

Estate in Fee Simple

LOT 412 SURVEY PLAN 352711
Local Government: ISAAC

REGISTERED OWNER

Dealing No: 724192396 11/07/2025

CENTURION COAL MINING PTY LTD A.C.N. 010 879 526

EASEMENTS, ENCUMBRANCES AND INTERESTS

1. Rights and interests reserved to the Crown by
Deed of Grant No. 40034316 (Lot 1 on CP GV334)
Deed of Grant No. 40050006 (Lot 3 on CP 852527)

2. EASEMENT IN GROSS No 602811172 (A434) 15/10/1970
BURDENING THE LAND
THE NORTHERN ELECTRIC AUTHORITY OF QUEENSLAND
OVER EASEMENT A ON CP GV43

3. TRANSFER No 715398329 31/10/2013 at 10:09
EASEMENT IN GROSS: 602811172 (A434)
QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED
A.C.N. 078 849 233

4. EASEMENT IN GROSS No 602811173 (A800) 29/04/1974
BURDENING THE LAND
UTAH DEVELOPMENT COMPANY AND
MITSUBISHI DEVELOPMENT PTY LTD
OVER EASEMENT B,C & D ON CP GV73

5. EASEMENT No 700143802 03/08/1994 at 12:05
BURDENING THE LAND TO
QUEENSLAND ELECTRICITY COMMISSION
OVER LOT A ON CP846331

6. TRANSFER No 715398325 31/10/2013 at 10:08
EASEMENT: 700143802
QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED
A.C.N. 078 849 233

ADMINISTRATIVE ADVICES

Dealing	Type	Lodgement Date	Status
712013687	VEG NOTICE VEGETATION MANAGEMENT ACT 1999	29/10/2008 08:58	CURRENT
712054186	VEG NOTICE VEGETATION MANAGEMENT ACT 1999	18/11/2008 14:08	CURRENT
712062892	VEG NOTICE VEGETATION MANAGEMENT ACT 1999	21/11/2008 13:14	CURRENT
712285594	VEG NOTICE VEGETATION MANAGEMENT ACT 1999	18/03/2009 11:40	CURRENT
712550690	VEG NOTICE VEGETATION MANAGEMENT ACT 1999	26/06/2009 09:03	CURRENT

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Requested by: D-ENQ TITLES QUEENSLAND

Queensland Titles Registry Pty Ltd
ABN 23 648 568 101

Title Reference: 51387880

ADMINISTRATIVE ADVICES (Continued)

Dealing	Type	Lodgement Date	Status
713429669	VEG NOTICE VEGETATION MANAGEMENT ACT 1999	26/08/2010 11:56	CURRENT
715235628	ADMIN NOTING SEE DEALING FOR RELEVANT LEGISLATION	01/08/2013 14:12	CURRENT
715967871	ADMIN NOTING SEE DEALING FOR RELEVANT LEGISLATION	22/08/2014 09:11	CURRENT
717076202	ADMIN NOTING SEE DEALING FOR RELEVANT LEGISLATION	18/02/2016 08:54	CURRENT
720608092	CON COM AGMT MINERAL AND ENERGY RESOURCES (COMMON PROVISIONS) ACT 2014	23/02/2021 12:46	CURRENT

UNREGISTERED DEALINGS

NIL

Caution - Charges do not necessarily appear in order of priority

** End of Current Title Search **

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Requested by: D-ENQ TITLES QUEENSLAND

APPENDIX B. – EMR / CLR LISTING REPORT

Department of the Environment, Tourism, Science and Innovation (DETSI)
ABN 46 640 294 485
GPO Box 2454, Brisbane QLD 4001, AUSTRALIA
www.detsi.qld.gov.au

SEARCH RESPONSE
ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Louise Doig
PO Box 111
Stanthorpe QLD 4380

Transaction ID: 51093494 EMR Site Id: 246433 08 December 2025
Client Reference:
Cheque Number:

This response relates to a search request received for the site:
Lot: 412 Plan: SP352711

EMR RESULT

The above site IS included on the Environmental Management Register.

The site you have searched has been subdivided from the following site, which IS included on the EMR or the CLR.

Lot: 1 Plan: GV334
Address: RED HILL ROAD
BELYANDO 4721

The site has been subject to the following Notifiable Activity or Hazardous Contaminant.
MINE WASTES -
(a) storing hazardous mine or exploration wastes, including, for example, tailings dams, overburden or waste rock dumps containing hazardous contaminants; or
(b) exploring for, or mining or processing, minerals in a way that exposes faces, or releases groundwater, containing hazardous contaminants.

While sites are listed on the EMR using the lot and plan description, a mining lease may affect only a limited area of the lot. In many instances with rural properties, only a small area may be potentially affected by the mining activities and the ongoing landuse is unaffected. More detailed information relating to the location of the mining activities may be held by the Department of the Environment, Tourism, Science and Innovation or the Department of Natural Resources, Mines and Energy.

PETROLEUM PRODUCT OR OIL STORAGE - storing petroleum products or oil -
(a) in underground tanks with more than 200L capacity; or
(b) in above ground tanks with -
(i) for petroleum products or oil in class 3 in packaging groups 1 and 2 of the dangerous goods code - more than 2, 500L capacity; or
(ii) for petroleum products or oil in class 3 in packaging groups 3 of the dangerous goods code - more than 5, 000L capacity; or
(iii) for petroleum products that are combustible liquids in class C1 or C2 in Australian Standard AS1940, 'The storage and handling of flammable and combustible liquids' published by Standards Australia - more than 25, 000L capacity.
LIVESTOCK DIP OR SPRAY RACE - operating a livestock dip or spray race facility.

For the majority of rural properties only a small area may be affected by the chemicals used in livestock

dips and spray races. The Department of the Environment, Tourism, Science and Innovation may hold further information relating to the location of the dip site within this property.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

All search responses include particulars of land listed in the EMR/CLR when the search was generated. The EMR/CLR does NOT include:-

1. land which is contaminated land (or a complete list of contamination) if DETSI has not been notified
2. land on which a notifiable activity is being or has been undertaken (or a complete list of activities) if DETSI has not been notified

If you have any queries in relation to this search please email emr.clr.registry@detsi.qld.gov.au

Administering Authority

APPENDIX C. – GEOTECHNICAL INVESTIGATION SOIL LOGS

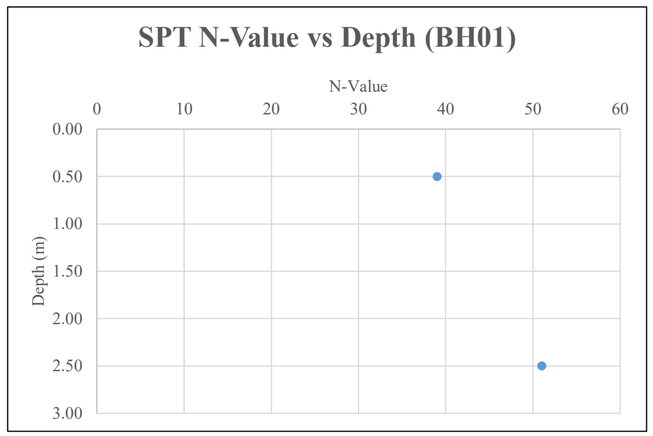
Point	Design Co-ord		As-staked Co-ord			Difference		Note
BH-01	600677.118	7608276.110	600677.1	7608276	321.143	0.005	-0.007	
BH-02	600636.337	7608213.830	600636.3	7608214	318.602	0.000	0.007	
BH-03	600659.984	7608105.310	600660	7608105	316.049	0.004	-0.007	
BH-04	600706.561	7608201.110	600706.6	7608201	319.506	-0.012	0.011	
BH-05	600658.957	7608158.570	600659	7608159	317.75	-0.004	-0.006	
BH-06	600640.085	7608137.040	600640.1	7608137	316.862	0.005	0.008	
BH-07	600614.443	7608119.240	600613.4	7608117	315.99	1.057	2.457	borehole moved to avoid material stockpile
BH-08	600722.218	7608048.590	600722.2	7608049	314.685	-0.002	0.004	
BH-09	600690.010	7608121.260	600690	7608121	316.694	-0.007	0.002	
BH-10	600711.754	7608162.910	600711.8	7608163	318.257	-0.005	0.004	
BH-11	600746.319	7608174.830	600746.3	7608175	318.769	0.004	-0.008	
BH-12	600605.896	7608148.630	600613.7	7608169	317.096	-7.826	-20.612	borehole moved to avoid material stockpile
BH-13	600757.730	7608217.100	600757.7	7608217	320.324	0.002	0.009	
BH-14	600815.138	7608191.090	600815.1	7608191	319.646	-0.003	0.009	
BH-15	600775.163	7608126.700	600775.2	7608127	317.21	0.006	-0.002	
BP-1	600568.963	7608132.510	600569	7608133	316.084	-0.004	0.004	
BP-2	600671.992	7608292.150	600672	7608292	321.498	-0.004	0.002	
BP-3	600831.632	7608189.120	600831.6	7608189	319.648	0.008	0.010	
BP-4	600728.603	7608029.480	600728.6	7608029	314.266	-0.008	-0.003	

Depth (m)	To Depth	Depth ave.	SPT Results	N-Value	Density/Consistency	Refusal Depth
0.5	0.95	0.73	06, 17, 22 N=39	39	Hard	
1.5	1.95	1.73	23, 5/130 N=5/130 mm		Hard	Refusal at 1.78 m
2.5	2.95	2.73	02, 20, 31 N=51	51	Hard	

Penetration Resistance N (blows/ft)	Density	Penetration Resistance N (blows/ft)	Consistency
0-4	Very loose	<2	Very soft
5-10	Loose	2-4	Soft
11-24	Medium	4-8	Medium
25-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very stiff
		>30	Hard

SPT blow count versus relative density of sand and consistency of clay [11]

Depth From (m)	Depth To (m)	Core Length (m)	Material NAME	Material Description
0.00	0.10	0.1	SO	TOPSOIL
0.10	1.78	1.68	CL	CI CLAY trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; w < PL, hard.
1.78	3.00	1.22	CS	CLAYSTONE, very low strength, brown-yellow, residual soil.

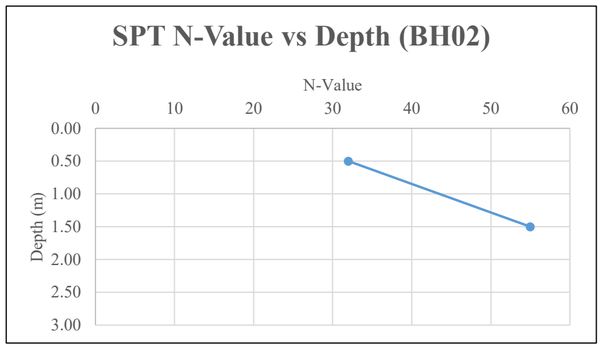


Depth (m)	To Depth	Depth ave.	SPT Results	N-Value	Density/Consistency	Refusal Depth
0.5	0.95	0.73	07, 14, 18 N=32	32	Hard	
1.5	1.95	1.73	16, 24, 31 N=55	55	Hard	
2.5	2.95	2.73	5, 33, 10/5 N=43/155 mm		Hard	Refusal at 2.81 m

Depth From (m)	Depth To (m)	Core Length (m)	Material NAME	Material Description
0.00	0.10	0.1	SO	TOPSOIL
0.10	2.80	2.7	CL	CI CLAY trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; w < PL, hard.
2.80	2.81	0.01	CS	CLAYSTONE, very low strength, brown-yellow mottled grey, residual soil.

Penetration Resistance N (blows/ft)	Density	Penetration Resistance N (blows/ft)	Consistency
0-4	Very loose	<2	Very soft
5-10	Loose	2-4	Soft
11-24	Medium	4-8	Medium
25-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very stiff
		>30	Hard

SPT blow count versus relative density of sand and consistency of clay [11]

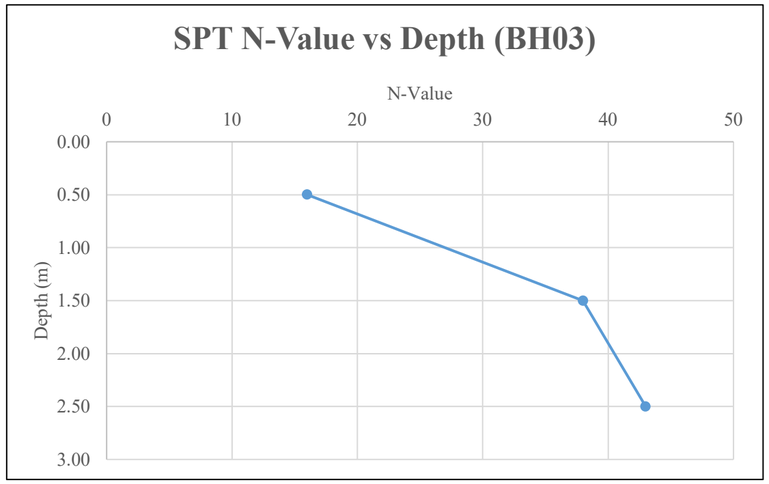


Depth (m)	To Depth	Depth ave.	SPT Results	N-Value	Density/Consistency
0.5	0.95	0.73	06, 07, 09 N=16	16	Very Stiff
1.5	1.95	1.73	04, 17, 21 N=38	38	Hard
2.5	2.95	2.73	02, 11, 32 N=43	43	Hard

Depth From (m)	Depth To (m)	Auger Length (m)	Material NAME	Material Description
0.00	0.10	0.10	SO	TOPSOIL
0.10	1.50	1.40	CL	CI CLAY trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; w < PL, very stiff.
1.50	2.50	1.00	CL	CI CLAY trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; w < PL, hard.
2.50	3.00	0.50	CL	CI CLAY trace Sand, medium plasticity, brown-yellow; sand 10%, fine, well graded, angular, dark yellow; w < PL, hard.

Penetration Resistance N (blows/ft)	Density	Penetration Resistance N (blows/ft)	Consistency
0-4	Very loose	<2	Very soft
5-10	Loose	2-4	Soft
11-24	Medium	4-8	Medium
25-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very stiff
		>30	Hard

SPT blow count versus relative density of sand and consistency of clay [11]

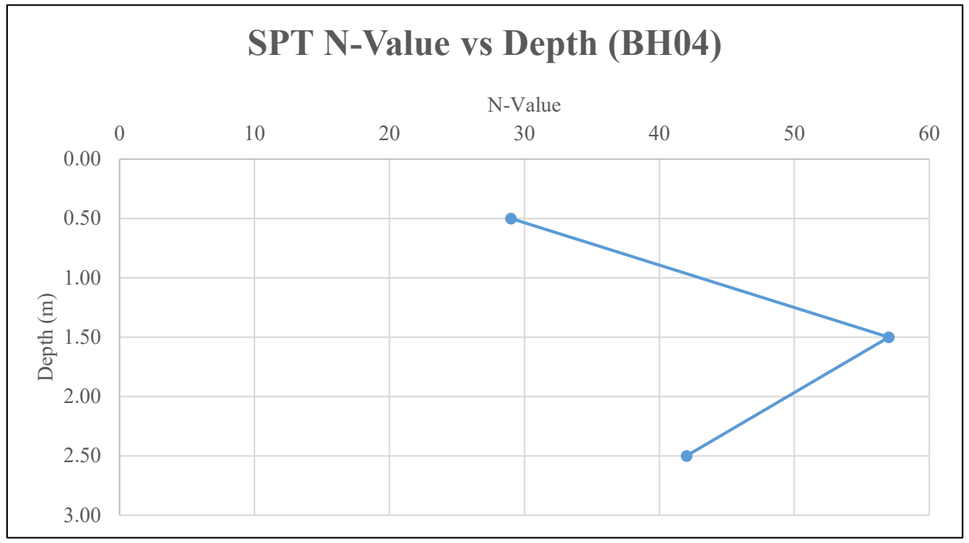


Depth (m)	To Depth	Depth ave.	SPT Results	N-Value	Density/Consistency
0.5	0.95	0.73	06, 14, 15 N=29	29	Very Stiff
1.5	1.95	1.73	14, 30, 27 N=57	57	Hard
2.5	2.95	2.73	05, 20, 22 N=42	42	Hard

Depth From (m)	Depth To (m)	Auger Length (m)	Material NAME	Material Description
0.00	0.10	0.10	SO	TOPSOIL
0.10	3.00	2.90	CL	CI CLAY trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; w < PL, very stiff to hard.

Penetration Resistance N (blows/ft)	Density	Penetration Resistance N (blows/ft)	Consistency
0-4	Very loose	<2	Very soft
5-10	Loose	2-4	Soft
11-24	Medium	4-8	Medium
25-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very stiff
		>30	Hard

SPT blow count versus relative density of sand and consistency of clay [11]

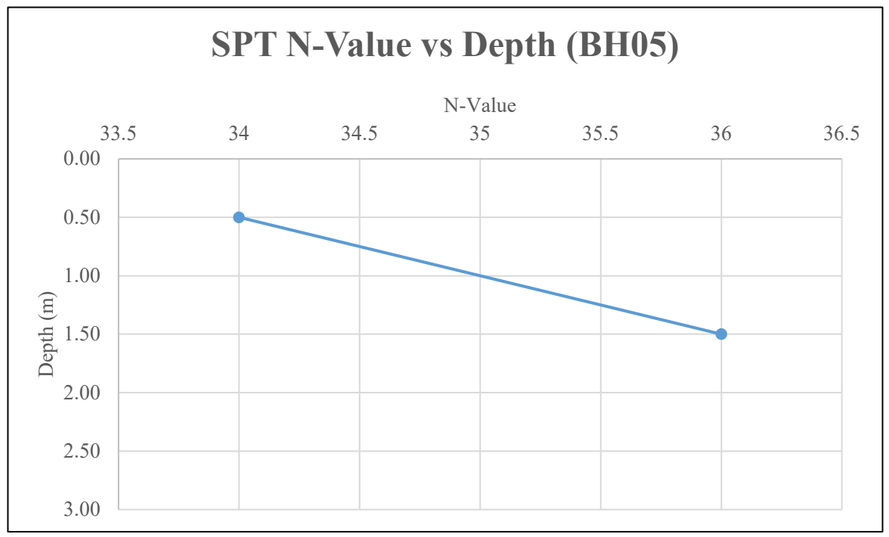


Depth (m)	To Depth	Depth ave.	SPT Results	N-Value	Density/Consistency	Refusal Depth
0.5	0.95	0.73	05, 15, 19 N=34	34	Hard	
1.5	1.95	1.73	07, 17, 19 N=36	36	Hard	
2.5	2.95	2.73	12, 30/50 N=30/50 mm		Hard	Refusal at 2.70 m

Depth Fro	Depth To (	Auger Len	Material N	Material Description
0.00	0.10	0.10	SO	TOPSOIL
0.10	2.50	2.40	CL	CI CLAY trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; w < PL, hard.
2.50	2.70	0.20	CL	CI CLAY trace Sand, medium plasticity, brown-yellow; sand 10%, fine, well graded, angular, brown; w < PL, hard.

Penetration Resistance N (blows/ft)	Density	Penetration Resistance N (blows/ft)	Consistency
0-4	Very loose	<2	Very soft
5-10	Loose	2-4	Soft
11-24	Medium	4-8	Medium
25-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very stiff
		>30	Hard

SPT blow count versus relative density of sand and consistency of clay [11]

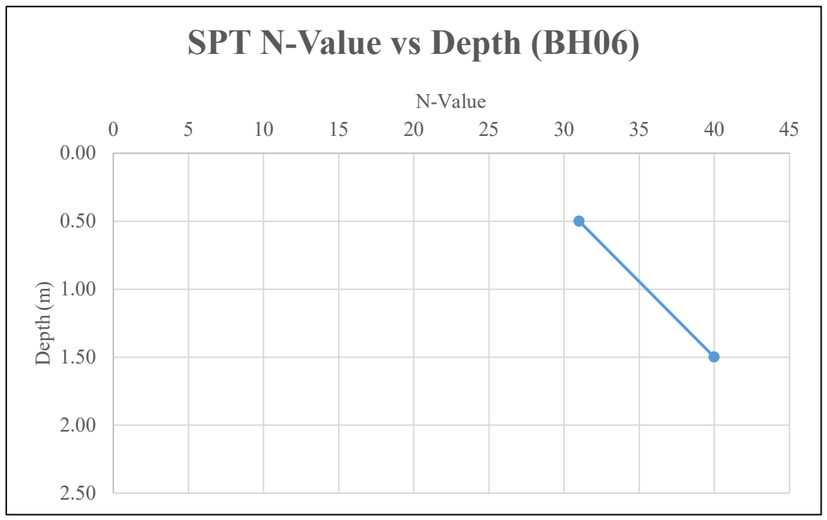


Depth (m)	To Depth	Depth ave.	SPT Results	N-Value	Density/Consistency	Refusal Depth
0.5	0.95	0.73	06, 12, 19 N=31	31	Hard	
1.5	1.95	1.73	13, 19, 21 N=40	40	Hard	
2.2	**2.65**	2.43	4, 9/50 N=9/50 mm		Hard	Refusal at 2.4 m

Depth Fro	Depth To (	Auger Len	Material N	Material Description
0.00	0.10	0.10	SO	TOPSOIL
0.10	2.00	1.90	CL	CI CLAY trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; w < PL, hard.
2.00	2.40	0.40	CL	CI CLAY trace Sand, medium plasticity, brown-yellow; sand 10%, fine, well graded, angular, brown; w < PL, hard.

Penetration Resistance N (blows/ft)	Density	Penetration Resistance N (blows/ft)	Consistency
0-4	Very loose	<2	Very soft
5-10	Loose	2-4	Soft
11-24	Medium	4-8	Medium
25-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very stiff
		>30	Hard

SPT blow count versus relative density of sand and consistency of clay [11]

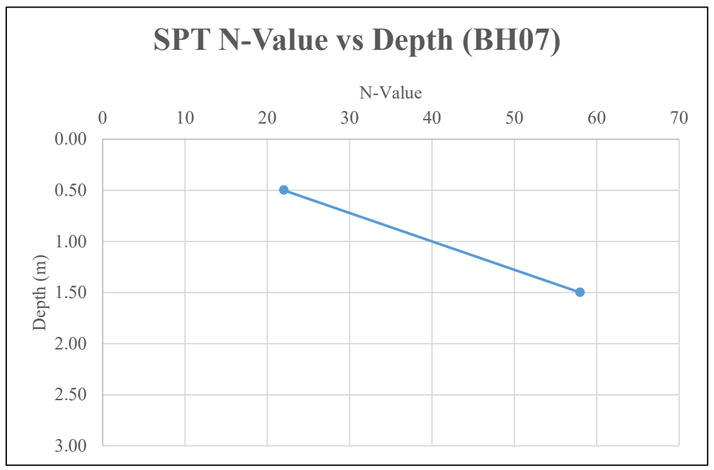


Depth (m)	To Depth	Depth ave.	SPT Results	N-Value	Density/Consistency	Refusal Depth
0.5	0.95	0.73	06, 10, 12 N=22	22	Very Stiff	
1.5	1.95	1.73	13, 24, 34 N=58	58	Hard	
2.5	2.95	2.73	09, 27, 30/75 N=57/225 mm		Hard	Refusal at 2.88 m

Depth From (m)	Depth To (m)	Auger Length (m)	Material NAME	Material Description
0.00	0.10	0.10	SO	TOPSOIL
0.10	1.50	1.40	CL	CI CLAY trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; w < PL, very stiff.
1.50	2.88	1.38	CL	CI CLAY trace Sand, medium plasticity, brown-yellow; sand 10%, fine, well graded, angular, brown; w < PL, hard.
2.88	3.00	0.12	CS	CLAYSTONE, very low strength, brown-yellow, residual soil.

Penetration Resistance N (blows/ft)	Density	Penetration Resistance N (blows/ft)	Consistency
0-4	Very loose	<2	Very soft
5-10	Loose	2-4	Soft
11-24	Medium	4-8	Medium
25-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very stiff
		>30	Hard

SPT blow count versus relative density of sand and consistency of clay [11]

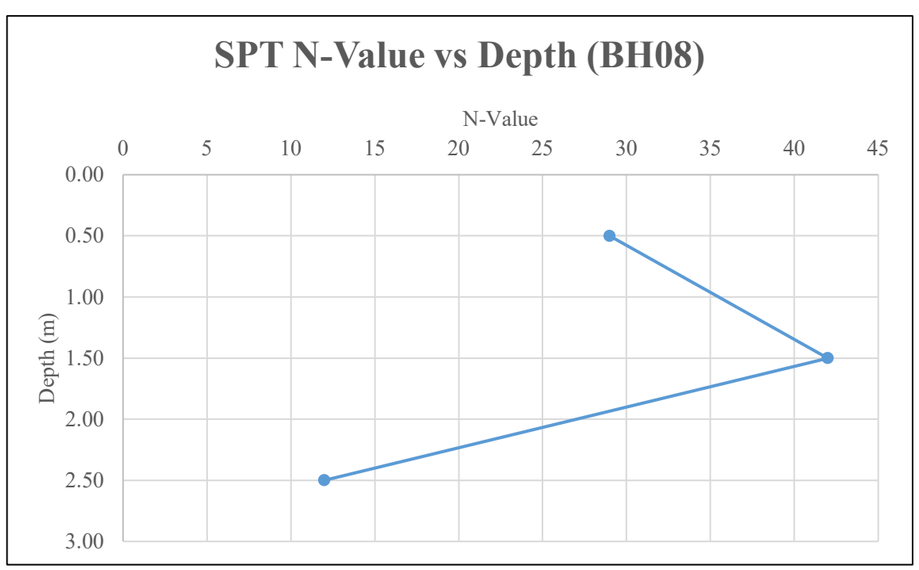


Depth (m)	To Depth	Depth ave.	SPT Results	N-Value	Density/Consistency
0.5	0.95	0.73	07, 14, 15 N=29	29	Very Stiff
1.5	1.95	1.73	10, 20, 22 N=42	42	Hard
2.5	2.95	2.73	02, 04, 08 N=12	12	Stiff

Depth Fro	Depth To	Auger Len	Material M	Material Description
0.00	0.10	0.10	SO	TOPSOIL
0.10	2.50	2.40	CL	CI CLAY trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; w < PL, very stiff to hard.
2.50	3.00	0.50	CL	CI CLAY trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; w < PL, stiff.

Penetration Resistance N (blows/ft)	Density	Penetration Resistance N (blows/ft)	Consistency
0-4	Very loose	<2	Very soft
5-10	Loose	2-4	Soft
11-24	Medium	4-8	Medium
25-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very stiff
		>30	Hard

SPT blow count versus relative density of sand and consistency of clay [11]

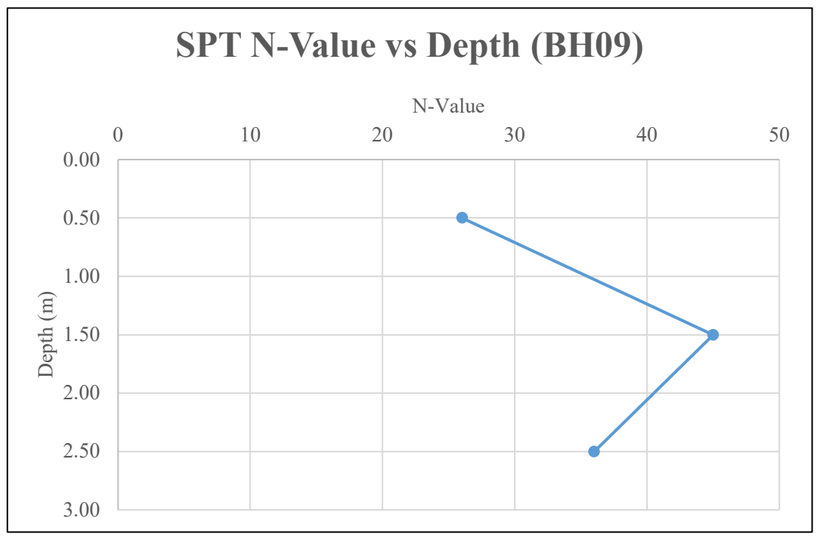


Depth (m)	To Depth	Depth ave.	SPT Results	N-Value	Density/Consistency
0.5	0.95	0.73	06, 12, 14 N=26	26	Very Stiff
1.5	1.95	1.73	13, 22, 23 N=45	45	Hard
2.5	2.95	2.73	03, 12, 24 N=36	36	Hard

Depth Fro	Depth To	Auger Len	Material N	Material Description
0.00	0.10	0.10	SO	TOPSOIL
0.10	3.00	2.90	CL	CI CLAY trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; w < PL, very stiff to hard.

Penetration Resistance N (blows/ft)	Density	Penetration Resistance N (blows/ft)	Consistency
0-4	Very loose	<2	Very soft
5-10	Loose	2-4	Soft
11-24	Medium	4-8	Medium
25-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very stiff
		>30	Hard

SPT blow count versus relative density of sand and consistency of clay [11]

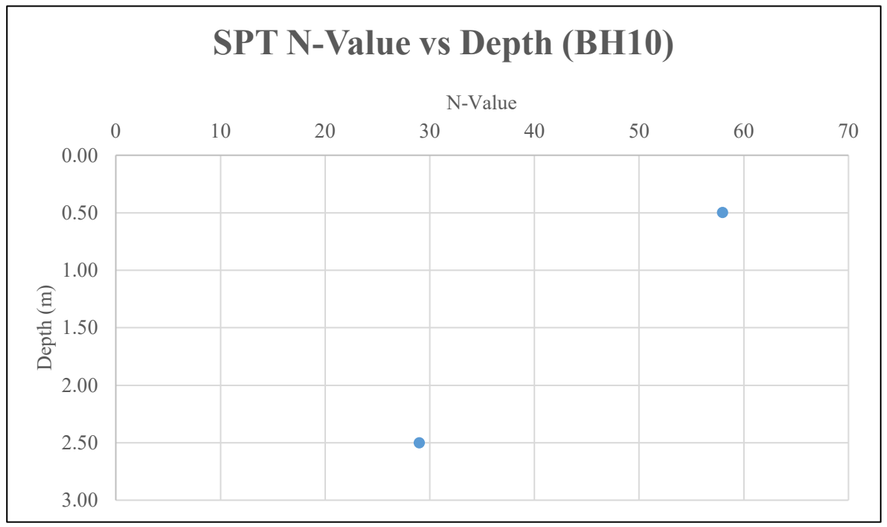


Depth (m)	To Depth	Depth ave.	SPT Results	N-Value	Density/Consistency
0.5	0.95	0.73	15, 28, 30 N=58	58	Hard
1.5	1.95	1.73	12, 30/95 N=30/95 mm		Hard
2.5	2.95	2.73	02, 08, 21 N=29	29	Very Stiff

Depth Fro	Depth To	Auger Len	Material I	Material Description
0.00	0.10	0.10	SO	TOPSOIL
0.10	3.00	2.90	CL	CI CLAY trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; w < PL, very stiff to hard.

Penetration Resistance N (blows/ft)	Density	Penetration Resistance N (blows/ft)	Consistency
0-4	Very loose	<2	Very soft
5-10	Loose	2-4	Soft
11-24	Medium	4-8	Medium
25-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very stiff
		>30	Hard

SPT blow count versus relative density of sand and consistency of clay [11]

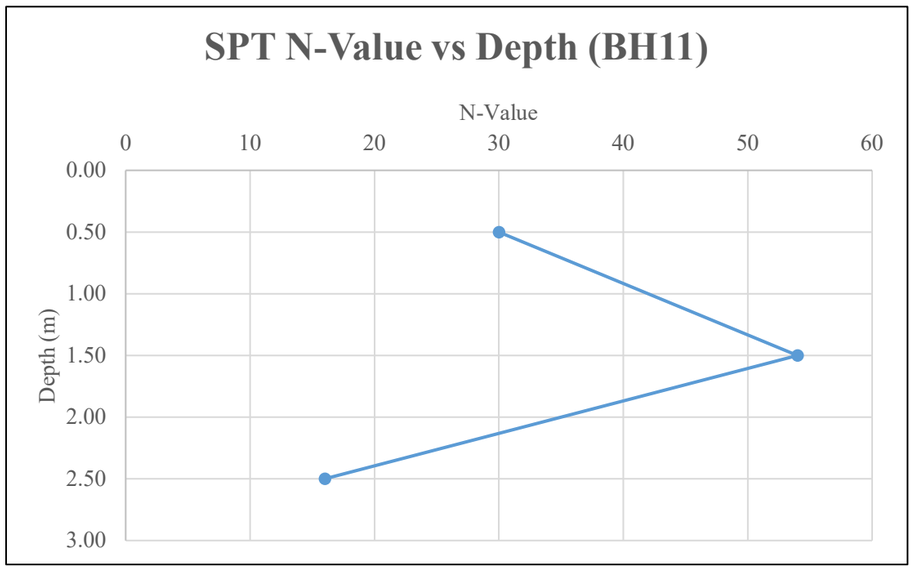


Depth (m)	To Depth	Depth ave.	SPT Results	N-Value	Density/Consistency
0.5	0.95	0.73	06, 13, 17 N=30	30	Very Stiff
1.5	1.95	1.73	04, 24, 30 N=54	54	Hard
2.5	2.95	2.73	02, 03, 13 N=16	16	Very Stiff

Depth Fro	Depth To (	Auger Len	Material N	Material Description
0.00	0.10	0.10	SO	TOPSOIL
0.10	2.50	2.40	CL	CI CLAY trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; w < PL, very stiff to hard.
2.50	3.00	0.50	CL	CI CLAY trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; w < PL, very stiff.

Penetration Resistance N (blows/ft)	Density	Penetration Resistance N (blows/ft)	Consistency
0-4	Very loose	<2	Very soft
5-10	Loose	2-4	Soft
11-24	Medium	4-8	Medium
25-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very stiff
		>30	Hard

SPT blow count versus relative density of sand and consistency of clay [11]

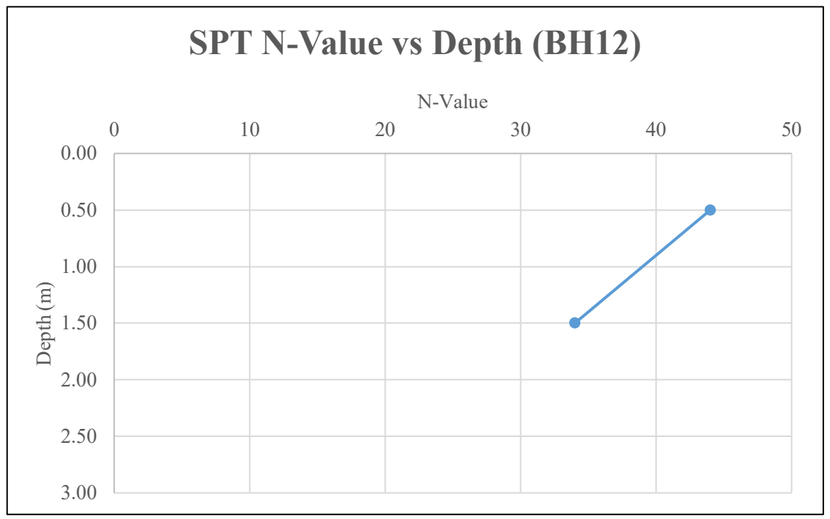


Depth (m)	To Depth	Depth ave.	SPT Results	N-Value	Density/Consistency	Refusal Depth
0.5	0.95	0.73	09, 23, 21 N=44	44	Hard	
1.5	1.95	1.73	08, 16, 18 N=34	34	Hard	
2.5	2.95	2.73	08, 15/40 N=15/40 mm		Hard	Refusal at 2.69 m

Depth Fro	Depth To (	Auger Len	Material N	Material Description
0.00	0.10	0.10	SO	TOPSOIL
0.10	2.00	1.90	CL	CI CLAY trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; w < PL, hard.
2.00	2.69	0.69	CL	CI CLAY trace Sand, medium plasticity, brown-yellow; sand 10%, fine, well graded, angular, brown; w < PL, hard.

Penetration Resistance N (blows/ft)	Density	Penetration Resistance N (blows/ft)	Consistency
0-4	Very loose	<2	Very soft
5-10	Loose	2-4	Soft
11-24	Medium	4-8	Medium
25-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very stiff
		>30	Hard

SPT blow count versus relative density of sand and consistency of clay [11]

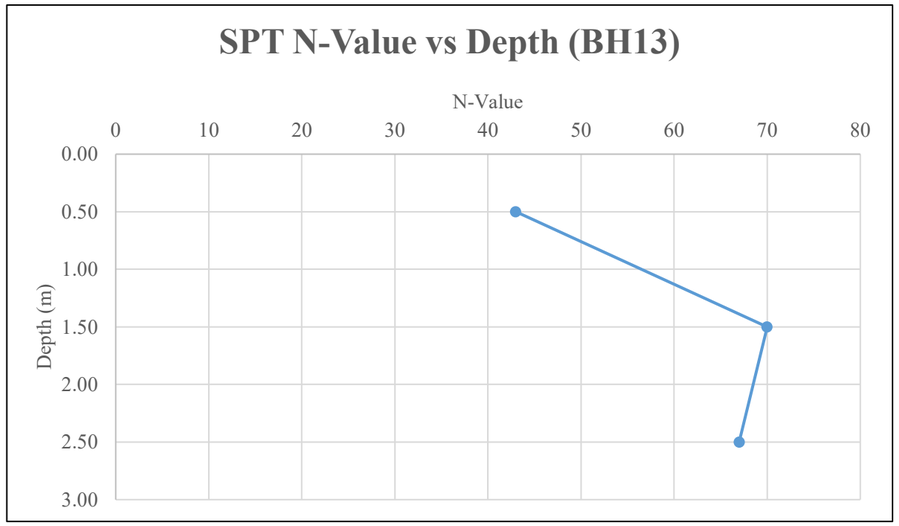


Depth (m)	To Depth	Depth ave.	SPT Results	N-Value	Density/Consistency
0.5	0.95	0.73	16, 22, 21 N=43	43	Hard
1.5	1.95	1.73	18, 34, 36 N=70	70	Hard
2.5	2.95	2.73	02, 23, 44 N=67	67	Hard

Depth Fro	Depth To	Auger Len	Material I	Material Description
0.00	0.10	0.10	SO	TOPSOIL
0.10	3.00	2.90	CL	CI CLAY trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; w < PL, hard.

Penetration Resistance N (blows/ft)	Density	Penetration Resistance N (blows/ft)	Consistency
0-4	Very loose	<2	Very soft
5-10	Loose	2-4	Soft
11-24	Medium	4-8	Medium
25-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very stiff
		>30	Hard

SPT blow count versus relative density of sand and consistency of clay [11]

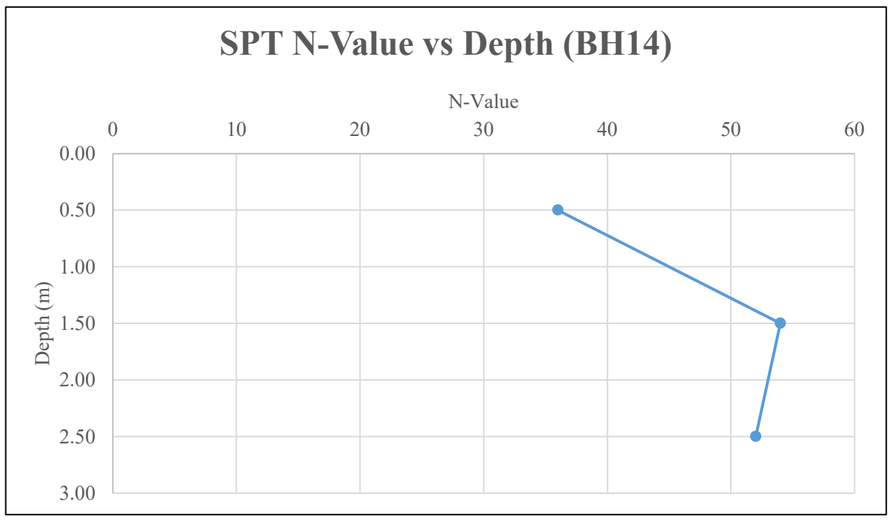


Depth (m)	To Depth	Depth ave.	SPT Results	N-Value	Density/Consistency
0.5	0.95	0.73	08, 16, 20 N=36	36	Hard
1.5	1.95	1.73	13, 25, 29 N=54	54	Hard
2.5	2.95	2.73	13, 25, 27 N=52	52	Hard

Depth Fro	Depth To (	Auger Len	Material N	Material Description
0.00	0.10	0.10	SO	TOPSOIL
0.10	3.00	2.90	CL	CI CLAY trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; w < PL, hard.

Penetration Resistance N (blows/ft)	Density	Penetration Resistance N (blows/ft)	Consistency
0-4	Very loose	<2	Very soft
5-10	Loose	2-4	Soft
11-24	Medium	4-8	Medium
25-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very stiff
		>30	Hard

SPT blow count versus relative density of sand and consistency of clay [11]

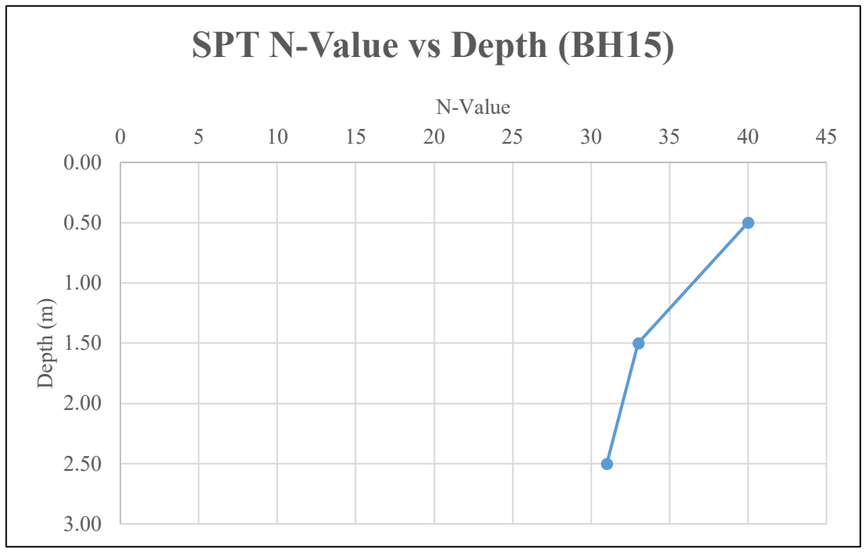


Depth (m)	To Depth	Depth ave.	SPT Results	N-Value	Density/Consistency
0.5	0.95	0.73	10, 18, 22 N=40	40	Hard
1.5	1.95	1.73	12, 16, 17 N=33	33	Hard
2.5	2.95	2.73	05, 10, 21 N=31	31	Hard

Depth Fro	Depth To (	Auger Len	Material N	Material Description
0.00	0.10	0.10	SO	TOPSOIL
0.10	3.00	2.90	CL	CI CLAY trace Sand, medium plasticity, red-brown; sand 10%, fine, well graded, angular, brown; w < PL, hard.

Penetration Resistance N (blows/ft)	Density	Penetration Resistance N (blows/ft)	Consistency
0-4	Very loose	<2	Very soft
5-10	Loose	2-4	Soft
11-24	Medium	4-8	Medium
25-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very stiff
		>30	Hard

SPT blow count versus relative density of sand and consistency of clay [11]



APPENDIX D. – SOIL ANALYTICAL RESULTS TABLES

Matrix: SOIL
Workgroup: EB2539329
Project name/number: BMS-P250000_VEL-CEN

Sample Type:	**REG**	**REG**	**REG**	**REG**	**REG**	**REG**	**REG**	**REG**	**REG**	**REG**	**REG**
ALS Sample Number:	EB2539329001	EB2539329002	EB2539329003	EB2539329005	EB2539329007	EB2539329008	EB2539329009	EB2539329011	EB2539329012	EB2539329014	EB2539329015
Sample Date:	06/11/2025	06/11/2025	05/11/2025	04/11/2025	05/11/2025	05/11/2025	05/11/2025	04/11/2025	04/11/2025	05/11/2025	05/11/2025
Client sample ID (1st):	BH01_GT09	BH02_GT09	BH03_GT01	BH05_GT02	BH07_GT01	BH08_GT06	BH09_GT01	BH11_GT02	BH12_GT02	BH14_GT07	BH15_GT01
Client sample ID (2nd):	2.3-2.5m	2.3-2.5m	0.3-0.5m	0.2-0.4m	0.3-0.5m	1.3-1.5m	0.3-0.5m	0.2-0.4m	0.2-0.4m	1.3-1.5m	0.3-0.5m
Depth Type:											
Depth (m):											
Site:	CENTURION	CENTURION	CENTURION	CENTURION	CENTURION	CENTURION	CENTURION	CENTURION	CENTURION	CENTURION	CENTURION
Purchase Order:											

Analyte grouping/Analyte	**CAS Number**	**NEPM - Table 1A(1) HIL & 1A(3) HSL Commercial/ Industrial D (Clay)**	**NEPM - Table 1B 5 & 6 EIL Commercial/ Industrial (fine soil)**	**NEPM - Table 1B 5 & 6 EIL Ecological Significance (Fine soil)**	**Unit**	**Limit of reporting**	BH01_GT09	BH02_GT09	BH03_GT01	BH05_GT02	BH07_GT01	BH08_GT06	BH09_GT01	BH11_GT02	BH12_GT02	BH14_GT07	BH15_GT01
EA002: pH 1:5 (Soils)																	
pH Value					pH Unit	0.1	**7.2**	**7.4**	**6.5**	**6.9**	**6.5**	**8.2**	**6.8**	**7.0**	**6.9**	**7.6**	**7.0**
EA010: Conductivity (1:5)																	
Electrical Conductivity @ 25°C					µS/cm	1	**30**	**38**	**19**	**10**	**79**	**138**	**18**	**13**	**13**	**32**	**36**
EA055: Moisture Content (Dried @ 105-110°C)																	
Moisture Content					%	1.0	**12.3**	**13.1**	**8.6**	**9.1**	**16.2**	**12.1**	**13.8**	**10.1**	**11.2**	**12.7**	**12.2**
EG005(ED093)T: Total Metals by ICP-AES																	
Arsenic	7440-38-2	3000	160	40	mg/kg	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Cadmium	7440-43-9	900			mg/kg	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	7440-47-3	3600 ♦			mg/kg	2	**137**	**147**	**170**	**153**	**125**	**167**	**144**	**174**	**161**	**150**	**160**
Copper	7440-50-8	240000			mg/kg	5	**17**	**23**	**23**	**22**	**15**	**30**	**23**	**25**	**20**	**25**	**27**
Lead	7439-92-1	1500			mg/kg	5	**5**	<5	<5	**7**	<5	**5**	<5	**6**	<5	<5	<5
Nickel	7440-02-0	6000			mg/kg	2	**34**	**62**	**63**	**46**	**41**	**87**	**71**	**44**	**42**	**49**	**56**
Zinc	7440-66-6	400000			mg/kg	5	**8**	**14**	**20**	**10**	**13**	**19**	**19**	**18**	**10**	**12**	**17**
EG035T: Total Recoverable Mercury by FIMS																	
Mercury	7439-97-6	730 ❖			mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)																	
Total Polychlorinated biphenyls		7			mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)																	
alpha-BHC	319-84-6				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC - (Lindane)	58-89-9				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	50			mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Chlordane (sum)					mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	530			mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	100			mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan (sum)	115-29-7	2000			mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3		640	3	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	2500			mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	3600			mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sum of Aldrin + Dieldrin	309-00-2/60-57-1	45			mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)																	
Dichlorvos	62-73-7				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4				mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0				mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2				mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0				mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons																	
Naphthalene	91-20-3	NL	370	10	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8				mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9				mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7				mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8				mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7				mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0				mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0				mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3				mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9				mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3				mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9				mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8				mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5				mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3				mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2				mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sum of polycyclic aromatic hydrocarbo		4000			mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ (zero)		40			mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ (half LOR)					mg/kg	0.5	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
Benzo(a)pyrene TEQ (LOR)					mg/kg	0.5	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons																	
C6 - C9 Fraction					mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C14 Fraction					mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15 - C28 Fraction					mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29 - C36 Fraction					mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C10 - C36 Fraction (sum)					mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions																	
C6 - C10 Fraction	C6_C10				mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	310♦	170	25	mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>C10 - C16 Fraction		NL	170	25	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
>C16 - C34 Fraction			2500		mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C34 - C40 Fraction			6600		mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)					mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
>C10 - C16 Fraction minus Naphthalene					mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
EP080: BTEXN																	
Benzene	71-43-2	4	95	10	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	NL	135	65	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**0.7**	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	NL	185	40	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3				mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6				mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes		NL	95	1.6	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sum of BTEX					mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	**0.7**	<0.2	<0.2	<0.2	<0.2	<0.2
Naphthalene	91-20-3	NL	370	10	mg/kg	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Chlorophenol-D4	93951-73-6				%	0.5	99.8	99.9	94.0	97.9	98.2	98.6	98.3	96.7	101	96.5	66.6
2.4.6-Tribromophenol	118-79-6				%	0.5	67.1	70.6	75.7	77.0	85.4	80.2	75.4	78.8	81.7	76.2	45.4
EP075(SIM)T: PAH Surrogates																	
2-Fluorobiphenyl	321-60-8				%	0.5	97.4	99.2	94.7	95.0	91.9	98.8	98.4	96.4	96.7	94.0	64.8
Anthracene-d10	1719-06-8				%	0.5	98.9	95.0	96.0	95.5	96.8	101	98.6	100	99.6	99.8	70.3
4-Terphenyl-d14	1718-51-0				%	0.5	121	118	101	105	104	111	108	106	115	110	75.2
EP080S: TPH(V)/BTEX Surrogates																	
1.2-Dichloroethane-D4	17060-07-0				%	0.2	143	66.1	148	148	147	70.9	142	154	137	146	143
Toluene-D8	2037-26-5				%	0.2	113	70.0	115	112	111	80.0	114	116	105	117	112
4-Bromofluorobenzene	460-00-4				%	0.2	95.5	88.7	97.3	94.3	91.9	102	95.8	92.5	85.6	99.6	89.1

Matrix:	SOIL				**Sample Type:**	REG	REG	REG	REG	REG	REG	REG	REG	REG	REG	REG
Workgroup:	EB2539329				**ALS Sample Number:**	EB2539329001	EB2539329002	EB2539329003	EB2539329005	EB2539329007	EB2539329008	EB2539329009	EB2539329011	EB2539329012	EB2539329014	EB2539329015
Project name/number:	BMS-P250000_VEL-CEN				**Sample Date:**	06/11/2025	06/11/2025	05/11/2025	04/11/2025	05/11/2025	05/11/2025	05/11/2025	04/11/2025	04/11/2025	05/11/2025	05/11/2025
					Client sample ID (1st):	BH01_GT09	BH02_GT09	BH03_GT01	BH05_GT02	BH07_GT01	BH08_GT06	BH09_GT01	BH11_GT02	BH12_GT02	BH14_GT07	BH15_GT01
					Client sample ID (2nd):	2.3-2.5m	2.3-2.5m	0.3-0.5m	0.2-0.4m	0.3-0.5m	1.3-1.5m	0.3-0.5m	0.2-0.4m	0.2-0.4m	1.3-1.5m	0.3-0.5m
					Depth Type:											
					Depth (m):											
					Site:	CENTURION	CENTURION	CENTURION	CENTURION	CENTURION	CENTURION	CENTURION	CENTURION	CENTURION	CENTURION	CENTURION
					Purchase Order:											
Analyte grouping/Analyte	**CAS Number**	**NEPM - Table 1A(1) HIL & 1A(3) HSL Commercial/ Industrial D (Clay)**	**NEPM - Table 1B 5 & 6 EIL Commercial/ Industrial (fine soil)**	**NEPM - Table 1B 5 & 6 EIL Ecological Significance (Fine soil)**	**Unit**	**Limit of reporting**										

♦ Chromium (VI)
❖ Murcury (ingorganic)
♦ F1 hydrocarbons 0<1m lowest threshold considered

APPENDIX E. - LABORATORY DOCUMENTS – SOIL ASSESSMENT

Mandatory Fields | **CHAIN OF CUSTODY** | Page 1 of 2

CLIENT CODE: Blackrock Mining Solutions | *PROJECT MANAGER: Ty Grantham | SAMPLER: Libin Gong

*CLIENT: Blackrock Mining Solutions | *PM MOBILE: 0437881075 | SAMPLER MOBILE: 0478571169

OFFICE: (Invoiced Office) Level 31, 10 Eagle St, Brisbane, QLD 4000 | ALS QUOTE # (Client PL if blank) | PURCHASE ORDER NO.:

PROJECT NO./PROJECT: | SITE: Centurion

*INVOICE TO: ~~BMS-P25000C-VEL-CEN~~ (client default if nil) ☐ CC invoice to PM

*EMAIL REPORTS TO: (default to PM if blank) t.grantham@blackrockmining.net; l.gong@blackrockmining.net

BIOSECURITY

Country of Origin: (if not Australia)

Environmental Division Brisbane

Work Order Reference EB2539329

Telephone : +61-7-3552-8695

*** STORAGE REQUIREMENTS** (Please check box) → Standard Storage time from receipt of samples: Waters - 3 weeks; Soils - 2 months

☑ Standard Storage ☐ Extended Storage

Specify Disposal Date:

Note: Extended storage incurs a fee and requires a signed agreement.

*** TURNAROUND** (Please check box) → (Not all tests can be expedited, contact Client Services for more information)

☑ 5+ days (no surcharge) ☐ 3 day (+15%) ☐ 2 day (+30%) ☐ 1 day (+50%)

***ANALYSIS REQUIRED**

(NB. ALS Quote No. and/or Analysis Suite Codes must be listed to attract suite-related price)

Where Metals are required, specify total (unfiltered bottle required) or Dissolved (field filtered bottle required).

Mark an X in the boxes below analysis to indicate the parameter listed above to be tested on that sample.

Comments:

ALS Use Only Lab ID	Sample ID	Depth	Date/Time	No. Bottles	MATRIX: Soil/Solid (S), Water (W), Sediments (SD), Dust (D), Product (P), Biota (B), Biosolid (BS)	Total Petroleum/Recoverable Hydrocarbons (TRH C6-C40)	Benzene, toluene, ethyl benzene, xylenes, naphthalene (BTEXN)	Polynuclear aromatic hydrocarbons (PAHs)	Organochlorine/organophosphate pesticides (OC/OP)	Polychlorinated biphenyls (PCBs)	Priority Metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn)	Physical parameter (e.g. pH, Fe)					Lab QC (additional bottles req.) Dup	Lab QC (additional bottles req.) MS	Additional Information (Comment on hazards - e.g., asbestos, known high contamination)
1	BH01_GT09	2.3-2.5m	6/11/25 07:20	1	S	X	X	X	X	X	X	X					☐	☐	
2	BH02_GT09	2.3-2.5m	6/11/25 08:30	1	S	X	X	X	X	X	X	X					☐	☐	
3	BH03_GT01	0.3-0.5m	5/11/25 13:10	1	S	X	X	X	X	X	X	X					☐	☐	
4	~~BH04_GT09~~	~~2.3-2.5m~~	6/11/25 09:50	1	S	X	X	X	X	X	X	X					☐	☐	
5	BH05_GT02	0.2-0.4m	4/11/25 13:40	1	S	X	X	X	X	X	X	X					☐	☐	
6	~~BH06_GT09~~	~~2.0-2.2m~~	5/11/25 16:25	1	S	X	X	X	X	X	X	X					☐	☐	
7	BH07_GT01	0.3-0.5m	5/11/25 12:15	1	S	X	X	X	X	X	X	X					☐	☐	
8	BH08_GT06	1.3-1.5m	5/11/25 15:00	1	S	X	X	X	X	X	X	X					☐	☐	
9	BH09_GT01	0.3-0.5m	5/11/25 11:10	1	S	X	X	X	X	X	X	X					☐	☐	
10	~~BH10_GT01~~	~~0.2-0.4m~~	4/11/25 14:40	1	S	X	X	X	X	X	X	X					☐	☐	

Receipt Detail (Lab Use ONLY): Chilling Method: | Ice: Frozen / Melted | Ice Bricks: Frozen / Thawed | None | Sample Temp at Receipt: °C °C °C | Security Seal Intact (circle): Yes / No / NA(None) | Carrier Details: ☐ Courier/Post ☐ Client | Con Note #

Packaging: (Circle) Hard Esky Foam Esky Box/Bag/Other | Count # # #

Relinquished by:	Signature:	Date/Time:	Received by:	Signature	Date/Time:
Relinquished by:	Signature:	Date/Time:	Received by:	Signature	Date/Time:

Mandatory Fields

CHAIN OF CUSTODY

Page 2 of 2

CoC #: (if applicable)

CLIENT CODE: Blackrock Mining Solutions | *PROJECT MANAGER: Ty Grantham | SAMPLER: Libin Gong

*CLIENT: Blackrock Mining Solutions | *PM MOBILE: 0437881075 | SAMPLER MOBILE: 0478571169

OFFICE: (Invoiced Office) Level 31, 10 Eagle St, Brisbane, QLD 4000 | ALS QUOTE # (Client PL if blank) | PURCHASE ORDER NO.:

PROJECT NO./PROJECT: BMS-P25000c - VEL-CEN | SITE: Centurion

*INVOICE TO: (Client default if nil) | ☐ CC Invoice to PM

*EMAIL REPORTS TO: (default to PM if blank) t.grantham@blackrockmining.net; L.gong@blackrockmining.net

BIOSECURITY

Country of Origin (if not Australia)

WO Sticker to go here. (ALS use only)

*** STORAGE REQUIREMENTS** (Please check box →) Standard Storage Standard Storage time from receipt of samples: Waters - 3 weeks, Soils - 2 months ☐ Extended Storage

Specify Disposal Date:

Note: Extended storage incurs a fee and requires a signed agreement.

*** TURNAROUND** (Please check box →) (Not all tests can be expedited, contact Client Services for more information)

☑ 5+ days (no surcharge) ☐ 3 day (+15%) ☐ 2 day (+30%) ☐ 1 day (+50%)

***ANALYSIS REQUIRED**

(NB. ALS Quote No. and/or Analysis Suite Codes must be listed to attract suite/listed price)

Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

Mark an X in the boxes below analysis to indicate the parameter listed above to be tested on that sample.

Comments:

ALS Use Only Lab ID	Sample ID	Depth	Date/Time	No. Bottles	MATRIX: Soil/Solid (S) Water (W) Sediment (SD) Dust (D) Biota (B) Biosolid (BS)	TRH C6-C40	BTEXN	PAHs	OC/OP Pesticides (Ultra trace)	PCBs	Heavy metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn)	Physical Parameters (pH, EC)					Lab QC (additional bottles req.) Dup	Lab QC (additional bottles req.) MS	Additional Information (Comment on hazards - e.g. asbestos, known high contamination)
11	BH11_GT02	0.2-0.4m	4/11/25 15:30	1	S	X	X	X	X	X	X	X					☐	☐	
12	BH12_GT02	0.2-0.4m	4/11/25 12:30	1	S	X	X	X	X	X	X	X					☐	☐	
~~13~~	~~BH13_GT02~~	~~1.3-1.5m~~	~~5/11/25 07:10~~	~~1~~	~~S~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~					☐	☐	
14	BH14_GT07	1.3-1.5m	5/11/25 08:20	1	S	X	X	X	X	X	X	X					☐	☐	
15	BH15_GT01	0.3-0.5m	5/11/25 09:25	1	S	X	X	X	X	X	X	X					☐	☐	
																	☐	☐	
																	☐	☐	
																	☐	☐	
																	☐	☐	
																	☐	☐	

Receipt Detail (Lab Use Only) Chilling Method: Ice / Frozen / Melted; Ice (Packs): Frozen / Thawed / None; Sample Temp at Receipt: °C °C °C; Security Seal Intact (circle): Yes / No / N/A(None); Carrier Details: ☐ Courier/Post ☐ Client; Con Note #; Packaging: (Circle) Hard Esky Foam Esky Box/Bag/Other; Count # # #

Relinquished by: Signature: Date/Time:

Relinquished by: Signature: Date/Time:

Received by: Signature: Date/Time:

Received by: Signature: Date/Time:

CERTIFICATE OF ANALYSIS

Work Order	: **EB2539329**	Page	: 1 of 18
Client	: **BLACK ROCK MINING**	Laboratory	: Environmental Division Brisbane
Contact	: T GRANTHAM	Contact	: Customer Services EB
Address	: LEVEL 31, 10 EAGLE STREET BRISBANE 4000	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: 0437881075	Telephone	: +61-7-3552-8685
Project	: BMS-P250000_VEL-CEN	Date Samples Received	: 07-Nov-2025 10:00
Order number	: ----	Date Analysis Commenced	: 10-Nov-2025
C-O-C number	: ----	Issue Date	: 26-Nov-2025 14:51
Sampler	: LIBIN GONG		
Site	: CENTURION		
Quote number	: EN/333		
No. of samples received	: 15		
No. of samples analysed	: 11		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Beatriz Llarinas	Senior Chemist	Brisbane Soil Preparation, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Soil Preparation, Stafford, QLD
Tatijana Markoska	Senior Chemist - Organics	Brisbane Organics, Stafford, QLD

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EG005T (Total Metals by ICP-AES): BH02_GT09 (EB2539329-002) shows poor matrix spike recovery due to sample heterogeneity. This has been confirmed by visual inspection.
- EP080 - Volatile TRH/BTEX: High surrogate recoveries have been deemed acceptable as all associated analyte results are less than LOR.
- EP080 - Volatile TRH/BTEX: Sample 'BH02_GT09' (EB2539329-002) shows poor matrix spike recovery due to matrix interference. Confirmed by re-extraction and re-analysis.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH01_GT09 2.3-2.5m	BH02_GT09 2.3-2.5m	BH03_GT01 0.3-0.5m	BH05_GT02 0.2-0.4m	BH07_GT01 0.3-0.5m
				Sampling date / time	06-Nov-2025 07:20	06-Nov-2025 08:30	05-Nov-2025 13:10	04-Nov-2025 13:40	05-Nov-2025 12:15
Compound	CAS Number	LOR	Unit		EB2539329-001	EB2539329-002	EB2539329-003	EB2539329-005	EB2539329-007
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		**7.2**	**7.4**	**6.5**	**6.9**	**6.5**
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		**30**	**38**	**19**	**10**	**79**
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		**12.3**	**13.1**	**8.6**	**9.1**	**16.2**
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		**137**	**147**	**170**	**153**	**125**
Copper	7440-50-8	5	mg/kg		**17**	**23**	**23**	**22**	**15**
Lead	7439-92-1	5	mg/kg		**5**	<5	<5	**7**	<5
Nickel	7440-02-0	2	mg/kg		**34**	**62**	**63**	**46**	**41**
Zinc	7440-66-6	5	mg/kg		**8**	**14**	**20**	**10**	**13**
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC - (Lindane)	58-89-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH01_GT09 2.3-2.5m	BH02_GT09 2.3-2.5m	BH03_GT01 0.3-0.5m	BH05_GT02 0.2-0.4m	BH07_GT01 0.3-0.5m
				Sampling date / time	06-Nov-2025 07:20	06-Nov-2025 08:30	05-Nov-2025 13:10	04-Nov-2025 13:40	05-Nov-2025 12:15
Compound	CAS Number	LOR	Unit		EB2539329-001	EB2539329-002	EB2539329-003	EB2539329-005	EB2539329-007
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
^ **Endosulfan (sum)**	115-29-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
^ **Sum of DDD + DDE + DDT**	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH01_GT09 2.3-2.5m	BH02_GT09 2.3-2.5m	BH03_GT01 0.3-0.5m	BH05_GT02 0.2-0.4m	BH07_GT01 0.3-0.5m
				Sampling date / time	06-Nov-2025 07:20	06-Nov-2025 08:30	05-Nov-2025 13:10	04-Nov-2025 13:40	05-Nov-2025 12:15
Compound	CAS Number	LOR	Unit		EB2539329-001	EB2539329-002	EB2539329-003	EB2539329-005	EB2539329-007
					Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued									
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH01_GT09 2.3-2.5m	BH02_GT09 2.3-2.5m	BH03_GT01 0.3-0.5m	BH05_GT02 0.2-0.4m	BH07_GT01 0.3-0.5m
				Sampling date / time	06-Nov-2025 07:20	06-Nov-2025 08:30	05-Nov-2025 13:10	04-Nov-2025 13:40	05-Nov-2025 12:15
Compound	CAS Number	LOR	Unit		EB2539329-001	EB2539329-002	EB2539329-003	EB2539329-005	EB2539329-007
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	<50	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH01_GT09 2.3-2.5m	BH02_GT09 2.3-2.5m	BH03_GT01 0.3-0.5m	BH05_GT02 0.2-0.4m	BH07_GT01 0.3-0.5m
				Sampling date / time	06-Nov-2025 07:20	06-Nov-2025 08:30	05-Nov-2025 13:10	04-Nov-2025 13:40	05-Nov-2025 12:15
Compound	CAS Number	LOR	Unit		EB2539329-001	EB2539329-002	EB2539329-003	EB2539329-005	EB2539329-007
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
^ **Total Xylenes**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**111**	**110**	**112**	**112**	**113**
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		**107**	**104**	**106**	**108**	**106**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		**84.3**	**83.9**	**93.5**	**104**	**95.5**
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**96.7**	**98.0**	**91.8**	**95.6**	**96.9**
2-Chlorophenol-D4	93951-73-6	0.5	%		**99.8**	**99.9**	**94.0**	**97.9**	**98.2**
2.4.6-Tribromophenol	118-79-6	0.5	%		**67.1**	**70.6**	**75.7**	**77.0**	**85.4**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**97.4**	**99.2**	**94.7**	**95.0**	**91.9**
Anthracene-d10	1719-06-8	0.5	%		**98.9**	**95.0**	**96.0**	**95.5**	**96.8**
4-Terphenyl-d14	1718-51-0	0.5	%		**121**	**118**	**101**	**105**	**104**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**143**	**66.1**	**148**	**148**	**147**
Toluene-D8	2037-26-5	0.2	%		**113**	**70.0**	**115**	**112**	**111**
4-Bromofluorobenzene	460-00-4	0.2	%		**95.5**	**88.7**	**97.3**	**94.3**	**91.9**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH08_GT06 1.3-1.5m	BH09_GT01 0.3-0.5m	BH11_GT02 0.2-0.4m	BH12_GT02 0.2-0.4m	BH14_GT07 1.3-1.5m
			Sampling date / time	05-Nov-2025 15:00	05-Nov-2025 11:10	04-Nov-2025 15:30	04-Nov-2025 12:30	05-Nov-2025 08:20
Compound	CAS Number	LOR	Unit	EB2539329-008	EB2539329-009	EB2539329-011	EB2539329-012	EB2539329-014
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**8.2**	**6.8**	**7.0**	**6.9**	**7.6**
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**138**	**18**	**13**	**13**	**32**
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**12.1**	**13.8**	**10.1**	**11.2**	**12.7**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**167**	**144**	**174**	**161**	**150**
Copper	7440-50-8	5	mg/kg	**30**	**23**	**25**	**20**	**25**
Lead	7439-92-1	5	mg/kg	**5**	<5	**6**	<5	<5
Nickel	7440-02-0	2	mg/kg	**87**	**71**	**44**	**42**	**49**
Zinc	7440-66-6	5	mg/kg	**19**	**19**	**18**	**10**	**12**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC - (Lindane)	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH08_GT06 1.3-1.5m	BH09_GT01 0.3-0.5m	BH11_GT02 0.2-0.4m	BH12_GT02 0.2-0.4m	BH14_GT07 1.3-1.5m
				Sampling date / time	05-Nov-2025 15:00	05-Nov-2025 11:10	04-Nov-2025 15:30	04-Nov-2025 12:30	05-Nov-2025 08:20
Compound	CAS Number	LOR	Unit		EB2539329-008	EB2539329-009	EB2539329-011	EB2539329-012	EB2539329-014
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
^ **Endosulfan (sum)**	115-29-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
^ **Sum of DDD + DDE + DDT**	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH08_GT06 1.3-1.5m	BH09_GT01 0.3-0.5m	BH11_GT02 0.2-0.4m	BH12_GT02 0.2-0.4m	BH14_GT07 1.3-1.5m
				Sampling date / time	05-Nov-2025 15:00	05-Nov-2025 11:10	04-Nov-2025 15:30	04-Nov-2025 12:30	05-Nov-2025 08:20
Compound	CAS Number	LOR	Unit		EB2539329-008	EB2539329-009	EB2539329-011	EB2539329-012	EB2539329-014
					Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued									
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH08_GT06 1.3-1.5m	BH09_GT01 0.3-0.5m	BH11_GT02 0.2-0.4m	BH12_GT02 0.2-0.4m	BH14_GT07 1.3-1.5m
				Sampling date / time	05-Nov-2025 15:00	05-Nov-2025 11:10	04-Nov-2025 15:30	04-Nov-2025 12:30	05-Nov-2025 08:20
Compound	CAS Number	LOR	Unit		EB2539329-008	EB2539329-009	EB2539329-011	EB2539329-012	EB2539329-014
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		**0.7**	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		**0.7**	<0.2	<0.2	<0.2	<0.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH08_GT06 1.3-1.5m	BH09_GT01 0.3-0.5m	BH11_GT02 0.2-0.4m	BH12_GT02 0.2-0.4m	BH14_GT07 1.3-1.5m
				Sampling date / time	05-Nov-2025 15:00	05-Nov-2025 11:10	04-Nov-2025 15:30	04-Nov-2025 12:30	05-Nov-2025 08:20
Compound	CAS Number	LOR	Unit		EB2539329-008	EB2539329-009	EB2539329-011	EB2539329-012	EB2539329-014
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
^ **Total Xylenes**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**117**	**117**	**114**	**117**	**114**
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		**110**	**109**	**110**	**109**	**108**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		**98.5**	**99.7**	**106**	**103**	**98.9**
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**96.9**	**96.7**	**94.7**	**98.9**	**97.2**
2-Chlorophenol-D4	93951-73-6	0.5	%		**98.6**	**98.3**	**96.7**	**101**	**96.5**
2.4.6-Tribromophenol	118-79-6	0.5	%		**80.2**	**75.4**	**78.8**	**81.7**	**76.2**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**98.8**	**98.4**	**96.4**	**96.7**	**94.0**
Anthracene-d10	1719-06-8	0.5	%		**101**	**98.6**	**100**	**99.6**	**99.8**
4-Terphenyl-d14	1718-51-0	0.5	%		**111**	**108**	**106**	**115**	**110**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**70.9**	**142**	**154**	**137**	**146**
Toluene-D8	2037-26-5	0.2	%		**80.0**	**114**	**116**	**105**	**117**
4-Bromofluorobenzene	460-00-4	0.2	%		**102**	**95.8**	**92.5**	**85.6**	**99.6**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH15_GT01 0.3-0.5m	----	----	----	----
			Sampling date / time	05-Nov-2025 09:25	----	----	----	----
Compound	CAS Number	LOR	Unit	EB2539329-015	--------	--------	--------	--------
				Result	----	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**7.0**	----	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**36**	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**12.2**	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	**160**	----	----	----	----
Copper	7440-50-8	5	mg/kg	**27**	----	----	----	----
Lead	7439-92-1	5	mg/kg	<5	----	----	----	----
Nickel	7440-02-0	2	mg/kg	**56**	----	----	----	----
Zinc	7440-66-6	5	mg/kg	**17**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	----	----	----	----
gamma-BHC - (Lindane)	58-89-9	0.05	mg/kg	<0.05	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	----	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH15_GT01 0.3-0.5m	----	----	----	----
				Sampling date / time	05-Nov-2025 09:25	----	----	----	----
Compound	CAS Number	LOR	Unit		EB2539329-015	--------	--------	--------	--------
					Result	----	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg		<0.05	----	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	----	----	----	----
Endrin	72-20-8	0.05	mg/kg		<0.05	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	----	----	----	----
^ **Endosulfan (sum)**	115-29-7	0.05	mg/kg		<0.05	----	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	----	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	----	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	----	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	----	----	----	----
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.05	mg/kg		<0.05	----	----	----	----
^ **Sum of DDD + DDE + DDT**	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	----	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	----	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	----	----	----	----
Dimethoate	60-51-5	0.05	mg/kg		<0.05	----	----	----	----
Diazinon	333-41-5	0.05	mg/kg		<0.05	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	----	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	----	----	----	----
Malathion	121-75-5	0.05	mg/kg		<0.05	----	----	----	----
Fenthion	55-38-9	0.05	mg/kg		<0.05	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH15_GT01 0.3-0.5m	----	----	----	----
				Sampling date / time	05-Nov-2025 09:25	----	----	----	----
Compound	CAS Number	LOR	Unit		EB2539329-015	--------	--------	--------	--------
					Result	----	----	----	----
EP068B: Organophosphorus Pesticides (OP) - Continued									
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	----	----	----	----
Parathion	56-38-2	0.2	mg/kg		<0.2	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	----	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	----	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	----	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	----	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	----	----	----	----
Ethion	563-12-2	0.05	mg/kg		<0.05	----	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	----	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH15_GT01 0.3-0.5m	----	----	----	----
				Sampling date / time	05-Nov-2025 09:25	----	----	----	----
Compound	CAS Number	LOR	Unit		EB2539329-015	--------	--------	--------	--------
					Result	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	----	----	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg		<0.5	----	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg		<0.5	----	----	----	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg		**0.6**	----	----	----	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg		**1.2**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	----	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH15_GT01 0.3-0.5m	----	----	----	----
				Sampling date / time	05-Nov-2025 09:25	----	----	----	----
Compound	CAS Number	LOR	Unit		EB2539329-015	--------	--------	--------	--------
					Result	----	----	----	----
EP080: BTEXN - Continued									
^ **Total Xylenes**	----	0.5	mg/kg		<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	----	----	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**69.5**	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		**67.5**	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		**58.2**	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**67.0**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**66.6**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		**45.4**	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**64.8**	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%		**70.3**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		**75.2**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**143**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%		**112**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		**89.1**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	16	134
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	10	138
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	23	134
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	35	154
2-Chlorophenol-D4	93951-73-6	42	153
2.4.6-Tribromophenol	118-79-6	26	157
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	34	156
Anthracene-d10	1719-06-8	37	153
4-Terphenyl-d14	1718-51-0	42	172
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	53	134
Toluene-D8	2037-26-5	60	131
4-Bromofluorobenzene	460-00-4	59	127

QUALITY CONTROL REPORT

Work Order	: **EB2539329**	Page	: 1 of 12
Client	: **BLACK ROCK MINING**	Laboratory	: Environmental Division Brisbane
Contact	: T GRANTHAM	Contact	: Customer Services EB
Address	: LEVEL 31, 10 EAGLE STREET BRISBANE 4000	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: 0437881075	Telephone	: +61-7-3552-8685
Project	: BMS-P250000_VEL-CEN	Date Samples Received	: 07-Nov-2025
Order number	: ----	Date Analysis Commenced	: 10-Nov-2025
C-O-C number	: ----	Issue Date	: 26-Nov-2025
Sampler	: LIBIN GONG		
Site	: CENTURION		
Quote number	: EN/333		
No. of samples received	: 15		
No. of samples analysed	: 11		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Beatriz Llarinas	Senior Chemist	Brisbane Soil Preparation, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Soil Preparation, Stafford, QLD
Tatijana Markoska	Senior Chemist - Organics	Brisbane Organics, Stafford, QLD

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC
* = The final LOR has been raised due to dilution or other sample specific cause; adjusted LOR is shown in brackets. The duplicate ranges for Acceptable RPD% are applied to the final LOR where applicable.

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 6993170)									
EB2539329-001	BH01_GT09 2.3-2.5m	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	137	116	16.4	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	34	39	12.6	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	17	19	13.8	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	5	5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	8	9	12.3	No Limit
EB2539329-015	BH15_GT01 0.3-0.5m	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	160	159	0.9	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	56	55	0.0	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	27	27	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	17	17	0.0	No Limit
EA002: pH 1:5 (Soils) (QC Lot: 6992666)									
EB2539329-001	BH01_GT09 2.3-2.5m	EA002: pH Value	----	0.1	pH Unit	7.2	7.2	0.0	0% - 20%
EB2539128-004	Anonymous	EA002: pH Value	----	0.1	pH Unit	6.7	6.7	0.0	0% - 20%
EA002: pH 1:5 (Soils) (QC Lot: 6992673)									
EB2539329-015	BH15_GT01 0.3-0.5m	EA002: pH Value	----	0.1	pH Unit	7.0	6.9	1.7	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 6992665)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA010: Conductivity (1:5) (QC Lot: 6992665) - continued									
EB2539329-001	BH01_GT09 2.3-2.5m	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	30	33	9.4	0% - 20%
EB2539128-004	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	67	60	11.2	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 6992672)									
EB2539329-015	BH15_GT01 0.3-0.5m	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	36	30	17.0	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 6992368)									
EB2537784-001	Anonymous	EA055: Moisture Content	----	0.1 (1.0)*	%	48.0	49.5	3.1	0% - 20%
EB2539208-008	Anonymous	EA055: Moisture Content	----	0.1 (1.0)*	%	15.9	15.5	2.7	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 6992369)									
EB2539329-009	BH09_GT01 0.3-0.5m	EA055: Moisture Content	----	0.1 (1.0)*	%	13.8	15.4	10.5	0% - 50%
EB2539374-089	Anonymous	EA055: Moisture Content	----	0.1 (1.0)*	%	9.4	8.9	5.5	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 6993172)									
EB2539329-001	BH01_GT09 2.3-2.5m	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EB2539329-015	BH15_GT01 0.3-0.5m	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 6992532)									
EB2539329-001	BH01_GT09 2.3-2.5m	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EB2539329-015	BH15_GT01 0.3-0.5m	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 6992529)									
EB2539329-001	BH01_GT09 2.3-2.5m	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC - (Lindane)	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP068A: Organochlorine Pesticides (OC) (QC Lot: 6992529) - continued									
EB2539329-001	BH01_GT09 2.3-2.5m	EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EB2539329-015	BH15_GT01 0.3-0.5m	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC - (Lindane)	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 6992529)									
EB2539329-001	BH01_GT09 2.3-2.5m	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 6992529) - continued									
EB2539329-001	BH01_GT09 2.3-2.5m	EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EB2539329-015	BH15_GT01 0.3-0.5m	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 6992530)									
EB2539329-001	BH01_GT09 2.3-2.5m	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 6992530) - continued									
EB2539329-001	BH01_GT09 2.3-2.5m	EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EB2539329-015	BH15_GT01 0.3-0.5m	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 6992426)									
EB2539329-001	BH01_GT09 2.3-2.5m	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EB2539329-015	BH15_GT01 0.3-0.5m	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 6992531)									
EB2539329-001	BH01_GT09 2.3-2.5m	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 6992531) - continued									
EB2539329-001	BH01_GT09 2.3-2.5m	EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EB2539329-015	BH15_GT01 0.3-0.5m	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 6992426)									
EB2539329-001	BH01_GT09 2.3-2.5m	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EB2539329-015	BH15_GT01 0.3-0.5m	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 6992531)									
EB2539329-001	BH01_GT09 2.3-2.5m	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EB2539329-015	BH15_GT01 0.3-0.5m	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080: BTEXN (QC Lot: 6992426)									
EB2539329-001	BH01_GT09 2.3-2.5m	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
EB2539329-015	BH15_GT01 0.3-0.5m	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 6993170)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	30.5 mg/kg	108	84.0	123
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
EG005T: Chromium	7440-47-3	2	mg/kg	<2	27.3 mg/kg	111	83.0	125
EG005T: Copper	7440-50-8	5	mg/kg	<5	112 mg/kg	107	86.0	122
EG005T: Lead	7439-92-1	5	mg/kg	<5	84.2 mg/kg	103	84.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	28.7 mg/kg	107	81.5	118
EG005T: Zinc	7440-66-6	5	mg/kg	<5	176 mg/kg	104	80.0	120
EA002: pH 1:5 (Soils) (QCLot: 6992666)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.0	102
				----	7 pH Unit	100	98.0	102
EA002: pH 1:5 (Soils) (QCLot: 6992673)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.0	102
				----	7 pH Unit	100	98.0	102
EA010: Conductivity (1:5) (QCLot: 6992665)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	97.8	95.0	105
EA010: Conductivity (1:5) (QCLot: 6992672)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	98.8	95.0	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 6993172)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.1 mg/kg	108	70.0	125
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 6992532)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	102	71.6	155
EP068A: Organochlorine Pesticides (OC) (QCLot: 6992529)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	86.2	72.8	127
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	88.4	71.0	127
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	83.7	67.5	126
EP068: gamma-BHC - (Lindane)	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	89.2	72.7	127
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	86.7	70.6	122
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	93.1	64.8	127
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	85.8	72.4	122
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	85.3	67.4	125

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 6992529) - continued								
EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	85.6	65.6	124
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	99.4	70.4	122
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	86.7	65.6	125
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	84.6	69.1	124
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	83.2	72.4	125
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	85.9	63.2	127
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	87.1	69.7	120
EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	98.3	61.2	124
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	89.5	55.5	125
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	77.9	57.1	117
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	103	51.9	125
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	77.1	46.5	122
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	83.9	34.0	130
EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----
EP068B: Organophosphorus Pesticides (OP) (QCLot: 6992529)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	87.3	55.8	126
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	95.5	45.9	136
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	77.8	20.0	147
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	82.7	44.1	125
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	82.5	70.3	125
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	86.9	63.2	124
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	84.1	44.2	129
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	83.7	52.3	133
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	84.6	62.9	126
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	83.4	69.2	123
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	77.5	37.6	138
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	87.2	59.6	131
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	79.5	46.4	144
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	84.0	56.8	128
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	59.7	24.4	135

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike	Spike Recovery (%)	Acceptable Limits (%)
				Result	Concentration	LCS	Low	High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 6992529) - continued								
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	94.4	55.9	123
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	83.0	45.0	138
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	89.1	41.6	141
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	63.2	20.0	145
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 6992530)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	1.5 mg/kg	95.1	72.6	133
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	1.5 mg/kg	100.0	63.2	144
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	1.5 mg/kg	97.4	66.0	132
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	1.5 mg/kg	90.6	76.2	134
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	1.5 mg/kg	98.7	71.8	137
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	1.5 mg/kg	99.7	77.1	143
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	1.5 mg/kg	99.0	74.1	140
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	1.5 mg/kg	99.2	72.0	139
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	1.5 mg/kg	96.5	58.0	145
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	1.5 mg/kg	94.4	63.0	147
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	1.5 mg/kg	96.5	70.5	142
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	1.5 mg/kg	92.6	75.5	138
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	1.5 mg/kg	95.9	68.5	140
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	1.5 mg/kg	97.1	58.4	143
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	1.5 mg/kg	97.5	52.1	149
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	1.5 mg/kg	97.3	64.6	140
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6992426)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	18 mg/kg	86.8	64.2	107
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6992531)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	334 mg/kg	105	63.3	125
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	432 mg/kg	100	56.1	122
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6992426)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	22.5 mg/kg	86.4	63.5	105
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6992531)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	446 mg/kg	107	61.2	132
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	299 mg/kg	95.6	52.6	130
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	LCS: Spike Recovery (%)	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP080: BTEXN (QCLot: 6992426)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	86.4	68.0	107
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	92.5	69.0	108
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	93.3	68.0	109
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	99.2	70.0	114
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	100	74.0	116
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	90.8	74.0	109

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 6993170)							
EB2539329-002	BH02_GT09 2.3-2.5m	EG005T: Arsenic	7440-38-2	50 mg/kg	# 32.6	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	89.1	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	# 64.3	70.0	130
		EG005T: Copper	7440-50-8	250 mg/kg	92.7	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	88.9	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	78.2	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	87.1	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 6993172)							
EB2539329-002	BH02_GT09 2.3-2.5m	EG035T: Mercury	7439-97-6	0.5 mg/kg	100	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 6992532)							
EB2539329-002	BH02_GT09 2.3-2.5m	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	91.8	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 6992529)							
EB2539329-001	BH01_GT09 2.3-2.5m	EP068: gamma-BHC - (Lindane)	58-89-9	0.5 mg/kg	89.7	70.0	136
		EP068: Heptachlor	76-44-8	0.5 mg/kg	93.3	65.0	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	86.0	70.0	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	86.2	67.0	129
		EP068: Endrin	72-20-8	0.5 mg/kg	86.6	60.0	137
		EP068: 4.4`-DDT	50-29-3	0.5 mg/kg	103	51.9	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 6992529)							
EB2539329-001	BH01_GT09 2.3-2.5m	EP068: Diazinon	333-41-5	0.5 mg/kg	81.8	70.0	131
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	86.7	63.2	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP068B: Organophosphorus Pesticides (OP) (QCLot: 6992529) - continued							
EB2539329-001	BH01_GT09 2.3-2.5m	EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	88.7	59.6	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	84.9	56.8	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	88.6	55.9	134
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 6992530)							
EB2538977-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	1.5 mg/kg	95.8	66.0	132
		EP075(SIM): Pyrene	129-00-0	1.5 mg/kg	95.5	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6992426)							
EB2539329-002	BH02_GT09 2.3-2.5m	EP080: C6 - C9 Fraction	----	8 mg/kg	# 58.7	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 6992531)							
EB2538977-001	Anonymous	EP071: C10 - C14 Fraction	----	334 mg/kg	98.4	70.0	130
		EP071: C15 - C28 Fraction	----	432 mg/kg	93.2	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6992426)							
EB2539329-002	BH02_GT09 2.3-2.5m	EP080: C6 - C10 Fraction	C6_C10	8 mg/kg	# 58.2	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 6992531)							
EB2538977-001	Anonymous	EP071: >C10 - C16 Fraction	----	446 mg/kg	100	70.0	130
		EP071: >C16 - C34 Fraction	----	299 mg/kg	88.9	70.0	130
EP080: BTEXN (QCLot: 6992426)							
EB2539329-002	BH02_GT09 2.3-2.5m	EP080: Benzene	71-43-2	2 mg/kg	70.9	70.0	130
		EP080: Toluene	108-88-3	2 mg/kg	73.8	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB2539329**	Page	: 1 of 10
Client	: **BLACK ROCK MINING**	Laboratory	: Environmental Division Brisbane
Contact	: T GRANTHAM	Telephone	: +61-7-3552-8685
Project	: BMS-P250000_VEL-CEN	Date Samples Received	: 07-Nov-2025
Site	: CENTURION	Issue Date	: 26-Nov-2025
Sampler	: LIBIN GONG	No. of samples received	: 15
Order number	: ----	No. of samples analysed	: 11

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG005(ED093)T: Total Metals by ICP-AES	EB2539329--002	BH02_GT09 2.3-2.5m	**Arsenic**	7440-38-2	32.6 %	70.0-130%	**Recovery less than lower data quality objective**
EG005(ED093)T: Total Metals by ICP-AES	EB2539329--002	BH02_GT09 2.3-2.5m	**Chromium**	7440-47-3	64.3 %	70.0-130%	**Recovery less than lower data quality objective**
EP080/071: Total Petroleum Hydrocarbons	EB2539329--002	BH02_GT09 2.3-2.5m	**C6 - C9 Fraction**	----	58.7 %	70.0-130%	**Recovery less than lower data quality objective**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	EB2539329--002	BH02_GT09 2.3-2.5m	**C6 - C10 Fraction**	C6_C10	58.2 %	70.0-130%	**Recovery less than lower data quality objective**

Regular Sample Surrogates

Sub-Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP080S: TPH(V)/BTEX Surrogates	EB2539329-001	BH01_GT09 2.3-2.5m	**1.2-Dichloroethane-D4**	17060-07-0	143 %	52.7-134 %	**Recovery greater than upper data quality objective**
EP080S: TPH(V)/BTEX Surrogates	EB2539329-003	BH03_GT01 0.3-0.5m	**1.2-Dichloroethane-D4**	17060-07-0	148 %	52.7-134 %	**Recovery greater than upper data quality objective**
EP080S: TPH(V)/BTEX Surrogates	EB2539329-005	BH05_GT02 0.2-0.4m	**1.2-Dichloroethane-D4**	17060-07-0	148 %	52.7-134 %	**Recovery greater than upper data quality objective**
EP080S: TPH(V)/BTEX Surrogates	EB2539329-007	BH07_GT01 0.3-0.5m	**1.2-Dichloroethane-D4**	17060-07-0	147 %	52.7-134 %	**Recovery greater than upper data quality objective**
EP080S: TPH(V)/BTEX Surrogates	EB2539329-009	BH09_GT01 0.3-0.5m	**1.2-Dichloroethane-D4**	17060-07-0	142 %	52.7-134 %	**Recovery greater than upper data quality objective**
EP080S: TPH(V)/BTEX Surrogates	EB2539329-011	BH11_GT02 0.2-0.4m	**1.2-Dichloroethane-D4**	17060-07-0	154 %	52.7-134 %	**Recovery greater than upper data quality objective**
EP080S: TPH(V)/BTEX Surrogates	EB2539329-012	BH12_GT02 0.2-0.4m	**1.2-Dichloroethane-D4**	17060-07-0	137 %	52.7-134 %	**Recovery greater than upper data quality objective**
EP080S: TPH(V)/BTEX Surrogates	EB2539329-014	BH14_GT07 1.3-1.5m	**1.2-Dichloroethane-D4**	17060-07-0	146 %	52.7-134 %	**Recovery greater than upper data quality objective**
EP080S: TPH(V)/BTEX Surrogates	EB2539329-015	BH15_GT01 0.3-0.5m	**1.2-Dichloroethane-D4**	17060-07-0	143 %	52.7-134 %	**Recovery greater than upper data quality objective**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
BH05_GT02 - 0.2-0.4m, BH11_GT02 - 0.2-0.4m, BH12_GT02 - 0.2-0.4m	**04-Nov-2025**	**11-Nov-2025**	11-Nov-2025	✓	**11-Nov-2025**	11-Nov-2025	✓
Soil Glass Jar - Unpreserved (EA002)							
BH03_GT01 - 0.3-0.5m, BH07_GT01 - 0.3-0.5m, BH08_GT06 - 1.3-1.5m, BH09_GT01 - 0.3-0.5m, BH14_GT07 - 1.3-1.5m, BH15_GT01 - 0.3-0.5m	**05-Nov-2025**	**11-Nov-2025**	12-Nov-2025	✓	**11-Nov-2025**	11-Nov-2025	✓
Soil Glass Jar - Unpreserved (EA002)							
BH01_GT09 - 2.3-2.5m, BH02_GT09 - 2.3-2.5m	**06-Nov-2025**	**11-Nov-2025**	13-Nov-2025	✓	**11-Nov-2025**	11-Nov-2025	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
BH05_GT02 - 0.2-0.4m, BH11_GT02 - 0.2-0.4m, BH12_GT02 - 0.2-0.4m	**04-Nov-2025**	**11-Nov-2025**	11-Nov-2025	✓	**11-Nov-2025**	09-Dec-2025	✓
Soil Glass Jar - Unpreserved (EA010)							
BH03_GT01 - 0.3-0.5m, BH07_GT01 - 0.3-0.5m, BH08_GT06 - 1.3-1.5m, BH09_GT01 - 0.3-0.5m, BH14_GT07 - 1.3-1.5m, BH15_GT01 - 0.3-0.5m	**05-Nov-2025**	**11-Nov-2025**	12-Nov-2025	✓	**11-Nov-2025**	09-Dec-2025	✓
Soil Glass Jar - Unpreserved (EA010)							
BH01_GT09 - 2.3-2.5m, BH02_GT09 - 2.3-2.5m	**06-Nov-2025**	**11-Nov-2025**	13-Nov-2025	✓	**11-Nov-2025**	09-Dec-2025	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
BH05_GT02 - 0.2-0.4m, BH11_GT02 - 0.2-0.4m, BH12_GT02 - 0.2-0.4m	**04-Nov-2025**	**----**	----	----	**10-Nov-2025**	18-Nov-2025	✓
Soil Glass Jar - Unpreserved (EA055)							
BH03_GT01 - 0.3-0.5m, BH07_GT01 - 0.3-0.5m, BH08_GT06 - 1.3-1.5m, BH09_GT01 - 0.3-0.5m, BH14_GT07 - 1.3-1.5m, BH15_GT01 - 0.3-0.5m	**05-Nov-2025**	**----**	----	----	**10-Nov-2025**	19-Nov-2025	✓
Soil Glass Jar - Unpreserved (EA055)							
BH01_GT09 - 2.3-2.5m, BH02_GT09 - 2.3-2.5m	**06-Nov-2025**	**----**	----	----	**10-Nov-2025**	20-Nov-2025	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
BH05_GT02 - 0.2-0.4m, BH11_GT02 - 0.2-0.4m, BH12_GT02 - 0.2-0.4m	**04-Nov-2025**	**11-Nov-2025**	03-May-2026	✓	**11-Nov-2025**	03-May-2026	✓
Soil Glass Jar - Unpreserved (EG005T)							
BH03_GT01 - 0.3-0.5m, BH07_GT01 - 0.3-0.5m, BH08_GT06 - 1.3-1.5m, BH09_GT01 - 0.3-0.5m, BH14_GT07 - 1.3-1.5m, BH15_GT01 - 0.3-0.5m	**05-Nov-2025**	**11-Nov-2025**	04-May-2026	✓	**11-Nov-2025**	04-May-2026	✓
Soil Glass Jar - Unpreserved (EG005T)							
BH01_GT09 - 2.3-2.5m, BH02_GT09 - 2.3-2.5m	**06-Nov-2025**	**11-Nov-2025**	05-May-2026	✓	**11-Nov-2025**	05-May-2026	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) BH05_GT02 - 0.2-0.4m, BH11_GT02 - 0.2-0.4m, BH12_GT02 - 0.2-0.4m	**04-Nov-2025**	**11-Nov-2025**	02-Dec-2025	✓	**12-Nov-2025**	02-Dec-2025	✓
Soil Glass Jar - Unpreserved (EG035T) BH03_GT01 - 0.3-0.5m, BH07_GT01 - 0.3-0.5m, BH08_GT06 - 1.3-1.5m, BH09_GT01 - 0.3-0.5m, BH14_GT07 - 1.3-1.5m, BH15_GT01 - 0.3-0.5m	**05-Nov-2025**	**11-Nov-2025**	03-Dec-2025	✓	**12-Nov-2025**	03-Dec-2025	✓
Soil Glass Jar - Unpreserved (EG035T) BH01_GT09 - 2.3-2.5m, BH02_GT09 - 2.3-2.5m	**06-Nov-2025**	**11-Nov-2025**	04-Dec-2025	✓	**12-Nov-2025**	04-Dec-2025	✓
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066) BH05_GT02 - 0.2-0.4m, BH11_GT02 - 0.2-0.4m, BH12_GT02 - 0.2-0.4m	**04-Nov-2025**	**11-Nov-2025**	18-Nov-2025	✓	**13-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP066) BH03_GT01 - 0.3-0.5m, BH07_GT01 - 0.3-0.5m, BH08_GT06 - 1.3-1.5m, BH09_GT01 - 0.3-0.5m, BH14_GT07 - 1.3-1.5m, BH15_GT01 - 0.3-0.5m	**05-Nov-2025**	**11-Nov-2025**	19-Nov-2025	✓	**13-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP066) BH01_GT09 - 2.3-2.5m, BH02_GT09 - 2.3-2.5m	**06-Nov-2025**	**11-Nov-2025**	20-Nov-2025	✓	**13-Nov-2025**	21-Dec-2025	✓
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068) BH12_GT02 - 0.2-0.4m	**04-Nov-2025**	**11-Nov-2025**	18-Nov-2025	✓	**12-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP068) BH05_GT02 - 0.2-0.4m, BH11_GT02 - 0.2-0.4m	**04-Nov-2025**	**11-Nov-2025**	18-Nov-2025	✓	**13-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP068) BH14_GT07 - 1.3-1.5m, BH15_GT01 - 0.3-0.5m	**05-Nov-2025**	**11-Nov-2025**	19-Nov-2025	✓	**12-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP068) BH03_GT01 - 0.3-0.5m, BH07_GT01 - 0.3-0.5m, BH08_GT06 - 1.3-1.5m, BH09_GT01 - 0.3-0.5m	**05-Nov-2025**	**11-Nov-2025**	19-Nov-2025	✓	**13-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP068) BH01_GT09 - 2.3-2.5m	**06-Nov-2025**	**11-Nov-2025**	20-Nov-2025	✓	**12-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP068) BH02_GT09 - 2.3-2.5m	**06-Nov-2025**	**11-Nov-2025**	20-Nov-2025	✓	**13-Nov-2025**	21-Dec-2025	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved (EP068) BH12_GT02 - 0.2-0.4m	**04-Nov-2025**	**11-Nov-2025**	18-Nov-2025	✓	**12-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP068) BH05_GT02 - 0.2-0.4m, BH11_GT02 - 0.2-0.4m	**04-Nov-2025**	**11-Nov-2025**	18-Nov-2025	✓	**13-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP068) BH14_GT07 - 1.3-1.5m, BH15_GT01 - 0.3-0.5m	**05-Nov-2025**	**11-Nov-2025**	19-Nov-2025	✓	**12-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP068) BH03_GT01 - 0.3-0.5m, BH07_GT01 - 0.3-0.5m, BH08_GT06 - 1.3-1.5m, BH09_GT01 - 0.3-0.5m	**05-Nov-2025**	**11-Nov-2025**	19-Nov-2025	✓	**13-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP068) BH01_GT09 - 2.3-2.5m	**06-Nov-2025**	**11-Nov-2025**	20-Nov-2025	✓	**12-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP068) BH02_GT09 - 2.3-2.5m	**06-Nov-2025**	**11-Nov-2025**	20-Nov-2025	✓	**13-Nov-2025**	21-Dec-2025	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) BH05_GT02 - 0.2-0.4m, BH11_GT02 - 0.2-0.4m, BH12_GT02 - 0.2-0.4m	**04-Nov-2025**	**11-Nov-2025**	18-Nov-2025	✓	**13-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH03_GT01 - 0.3-0.5m, BH07_GT01 - 0.3-0.5m, BH08_GT06 - 1.3-1.5m, BH09_GT01 - 0.3-0.5m, BH14_GT07 - 1.3-1.5m, BH15_GT01 - 0.3-0.5m	**05-Nov-2025**	**11-Nov-2025**	19-Nov-2025	✓	**13-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH01_GT09 - 2.3-2.5m, BH02_GT09 - 2.3-2.5m	**06-Nov-2025**	**11-Nov-2025**	20-Nov-2025	✓	**13-Nov-2025**	21-Dec-2025	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) BH05_GT02 - 0.2-0.4m, BH11_GT02 - 0.2-0.4m, BH12_GT02 - 0.2-0.4m	**04-Nov-2025**	**10-Nov-2025**	18-Nov-2025	✓	**12-Nov-2025**	18-Nov-2025	✓
Soil Glass Jar - Unpreserved (EP071) BH05_GT02 - 0.2-0.4m, BH11_GT02 - 0.2-0.4m, BH12_GT02 - 0.2-0.4m	**04-Nov-2025**	**11-Nov-2025**	18-Nov-2025	✓	**12-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP080) BH03_GT01 - 0.3-0.5m, BH07_GT01 - 0.3-0.5m, BH08_GT06 - 1.3-1.5m, BH09_GT01 - 0.3-0.5m, BH14_GT07 - 1.3-1.5m, BH15_GT01 - 0.3-0.5m	**05-Nov-2025**	**10-Nov-2025**	19-Nov-2025	✓	**12-Nov-2025**	19-Nov-2025	✓
Soil Glass Jar - Unpreserved (EP071) BH03_GT01 - 0.3-0.5m, BH07_GT01 - 0.3-0.5m, BH08_GT06 - 1.3-1.5m, BH09_GT01 - 0.3-0.5m	**05-Nov-2025**	**11-Nov-2025**	19-Nov-2025	✓	**12-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP071) BH14_GT07 - 1.3-1.5m, BH15_GT01 - 0.3-0.5m	**05-Nov-2025**	**11-Nov-2025**	19-Nov-2025	✓	**13-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP080) BH01_GT09 - 2.3-2.5m, BH02_GT09 - 2.3-2.5m	**06-Nov-2025**	**10-Nov-2025**	20-Nov-2025	✓	**12-Nov-2025**	20-Nov-2025	✓
Soil Glass Jar - Unpreserved (EP071) BH01_GT09 - 2.3-2.5m, BH02_GT09 - 2.3-2.5m	**06-Nov-2025**	**11-Nov-2025**	20-Nov-2025	✓	**12-Nov-2025**	21-Dec-2025	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) BH05_GT02 - 0.2-0.4m, BH11_GT02 - 0.2-0.4m, BH12_GT02 - 0.2-0.4m	**04-Nov-2025**	**10-Nov-2025**	18-Nov-2025	✓	**12-Nov-2025**	18-Nov-2025	✓
Soil Glass Jar - Unpreserved (EP071) BH05_GT02 - 0.2-0.4m, BH11_GT02 - 0.2-0.4m, BH12_GT02 - 0.2-0.4m	**04-Nov-2025**	**11-Nov-2025**	18-Nov-2025	✓	**12-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP080) BH03_GT01 - 0.3-0.5m, BH07_GT01 - 0.3-0.5m, BH08_GT06 - 1.3-1.5m, BH09_GT01 - 0.3-0.5m, BH14_GT07 - 1.3-1.5m, BH15_GT01 - 0.3-0.5m	**05-Nov-2025**	**10-Nov-2025**	19-Nov-2025	✓	**12-Nov-2025**	19-Nov-2025	✓
Soil Glass Jar - Unpreserved (EP071) BH03_GT01 - 0.3-0.5m, BH07_GT01 - 0.3-0.5m, BH08_GT06 - 1.3-1.5m, BH09_GT01 - 0.3-0.5m	**05-Nov-2025**	**11-Nov-2025**	19-Nov-2025	✓	**12-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP071) BH14_GT07 - 1.3-1.5m, BH15_GT01 - 0.3-0.5m	**05-Nov-2025**	**11-Nov-2025**	19-Nov-2025	✓	**13-Nov-2025**	21-Dec-2025	✓
Soil Glass Jar - Unpreserved (EP080) BH01_GT09 - 2.3-2.5m, BH02_GT09 - 2.3-2.5m	**06-Nov-2025**	**10-Nov-2025**	20-Nov-2025	✓	**12-Nov-2025**	20-Nov-2025	✓
Soil Glass Jar - Unpreserved (EP071) BH01_GT09 - 2.3-2.5m, BH02_GT09 - 2.3-2.5m	**06-Nov-2025**	**11-Nov-2025**	20-Nov-2025	✓	**12-Nov-2025**	21-Dec-2025	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) BH05_GT02 - 0.2-0.4m, BH11_GT02 - 0.2-0.4m, BH12_GT02 - 0.2-0.4m	**04-Nov-2025**	**10-Nov-2025**	18-Nov-2025	✓	**12-Nov-2025**	18-Nov-2025	✓
Soil Glass Jar - Unpreserved (EP080) BH03_GT01 - 0.3-0.5m, BH07_GT01 - 0.3-0.5m, BH08_GT06 - 1.3-1.5m, BH09_GT01 - 0.3-0.5m, BH14_GT07 - 1.3-1.5m, BH15_GT01 - 0.3-0.5m	**05-Nov-2025**	**10-Nov-2025**	19-Nov-2025	✓	**12-Nov-2025**	19-Nov-2025	✓
Soil Glass Jar - Unpreserved (EP080) BH01_GT09 - 2.3-2.5m, BH02_GT09 - 2.3-2.5m	**06-Nov-2025**	**10-Nov-2025**	20-Nov-2025	✓	**12-Nov-2025**	20-Nov-2025	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	3	27	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	3	27	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	4	27	**14.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
TRH Volatiles/BTEX	EP080	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3).
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.

Preparation Methods	Method	Matrix	Method Descriptions
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

APPENDIX F. - EPBC ACT PROTECTED MATTERS REPORT

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 09-Jan-2026

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	21
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	13
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	8
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin	Endangered	Community likely to occur within area	In feature area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community likely to occur within area	In feature area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Gallinago hardwickii			
Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area	In feature area
Geophaps scripta scripta			
Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat known to occur within area	In feature area
Neochmia ruficauda ruficauda			
Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area	In feature area
Poephila cincta cincta			
Southern Black-throated Finch [64447]	Endangered	Species or species habitat may occur within area	In feature area
Rostratula australis			
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area	In feature area
MAMMAL			
Dasyurus hallucatus			
Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat may occur within area	In feature area
Petauroides minor			
Greater Glider (northern), Greater Glider (north-eastern Queensland) [92008]	Vulnerable	Species or species habitat may occur within area	In feature area
Petauroides volans			
Greater Glider (southern and central) [254]	Endangered	Species or species habitat likely to occur within area	In feature area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)			
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat may occur within area	In feature area
PLANT			
Dichanthium queenslandicum			
King Blue-grass [5481]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Eucalyptus raveretiana Black Ironbox [16344]	Vulnerable	Species or species habitat may occur within area	In feature area
Polianthion minutiflorum [82772]	Vulnerable	Species or species habitat may occur within area	In feature area
REPTILE			
Denisonia maculata Ornamental Snake [1193]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area	In feature area
Elseya albagula Southern Snapping Turtle, White-throated Snapping Turtle [81648]	Critically Endangered	Species or species habitat may occur within area	In feature area
Lerista allanae Allan's Lerista, Retro Slider [1378]	Endangered	Species or species habitat may occur within area	In buffer area only
Rheodytes leukops Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle, White-eyed River Diver [1761]	Endangered	Species or species habitat may occur within area	In feature area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat may occur within area overfly marine area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area

Extra Information

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Queensland Pacific Metals (QPM) Energy Project, high-pressure gas pipeline and gas compression facility	2022/09329		Post-Approval	In feature area
Controlled action				
Bowen Gas Project	2012/6377	Controlled Action	Post-Approval	In feature area
Eaglefield Expansion Project - new open-cut coal mine pit	2009/4682	Controlled Action	Completed	In feature area
Establishment of Galilee Coal Mine and Associated Infrastructure	2009/4737	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
Construction of Burdekin Pipeline	2005/2209	Not Controlled Action	Completed	In feature area
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Rail link in central Qld	2005/2170	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
BHP Mitsui Coal???s Wards Well Exploration Program, QLD	2011/5820	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data is available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on the contents of this report.

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions when time permits.

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded breeding sites; and
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

APPENDIX G. – MSES REPORT / WILDNET RECORDS

Queensland Government

Department of the Environment, Tourism, Science and Innovation

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest

Longitude: 147.97197 Latitude: -21.62725 with 2 kilometre radius

Environmental Reports - General Information

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

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 2020). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

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

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

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

Disclaimer

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

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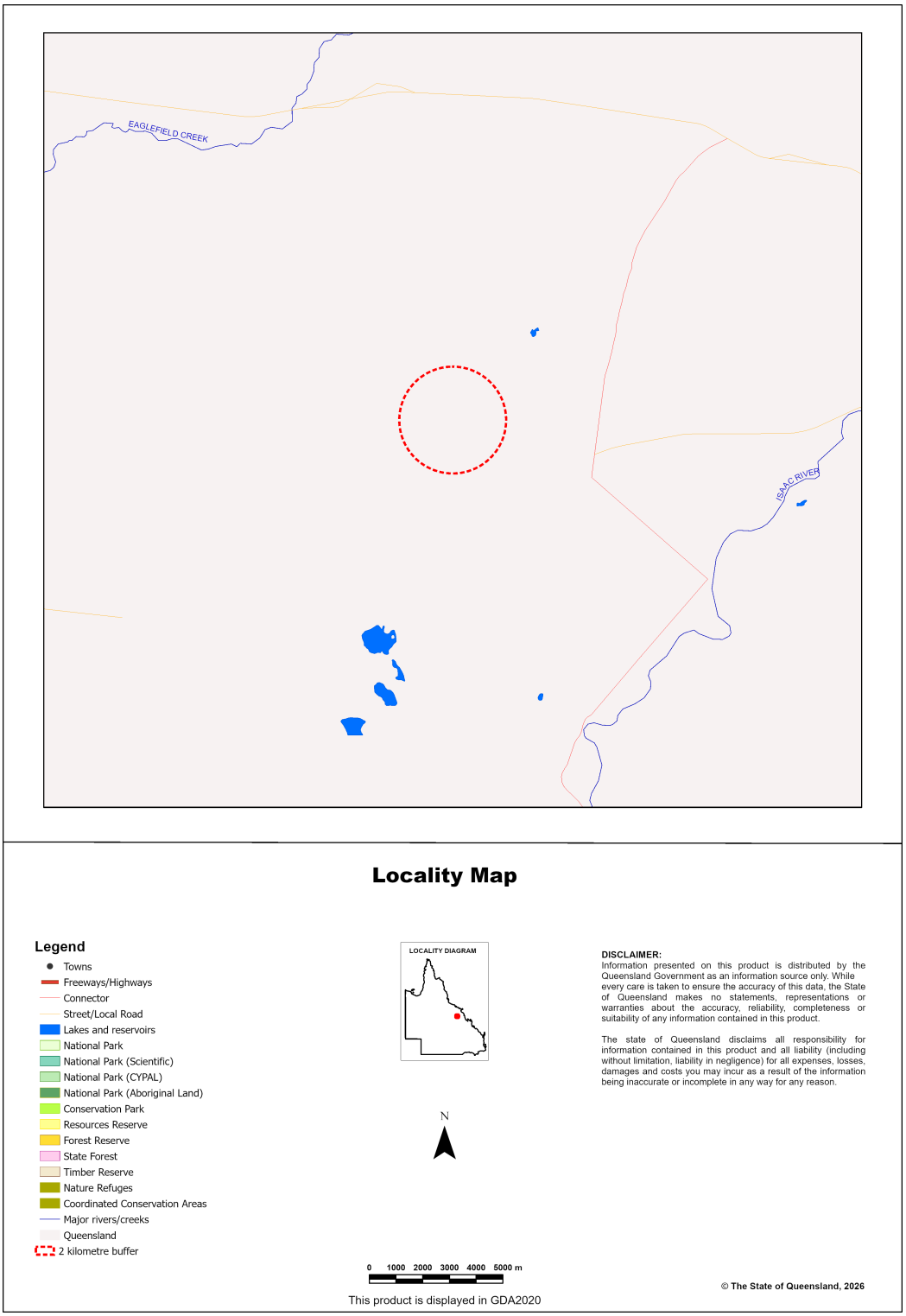
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Assessment Area Details

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

Table 1: Summary table, details for AOI: Longitude: 147.97197 Latitude: -21.62725 with 2 kilometre radius, with area 1256.64 ha

Local Government(s)	Catchment(s)	Bioregion(s)	Subregion(s)
Isaac Regional	Fitzroy	Brigalow Belt	Northern Bowen Basin
	Burdekin		



Matters of State Environmental Significance (MSES)

MSES Categories

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

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

The MSES mapping product is a guide to assist implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations.

The SPP defines matters of state environmental significance as:

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

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

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

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

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

  - Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems;
  - Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;
  - Category R areas on the regulated vegetation management map;
  - Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse and drainage feature map;
  - Regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map;

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

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

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

MSES Values Present

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

Table 2: Summary of MSES present within the AOI

1a Protected Areas- estates	0 ha	0.0%
1b Protected Areas- nature refuges	0 ha	0.0%
1c Protected Areas- special wildlife reserves	0 ha	0.0%
2 State Marine Parks- highly protected zones	0 ha	0.0%
3 Fish habitat areas (A and B areas)	0 ha	0.0%
4 Strategic Environmental Areas (SEA)	0 ha	0.0%
5 High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values	0 ha	0.0%
6a High Ecological Value (HEV) wetlands	0 ha	
6b High Ecological Value (HEV) waterways	0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	415.05 ha	33.0%
7b Special least concern animals	58.87 ha	4.7%
7c i Koala habitat area - core (SEQ)	0 ha	0.0%
7c ii Koala habitat area - locally refined (SEQ)	0 ha	0.0%
7d Sea turtle nesting areas	0 km	Not applicable
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	250.85 ha	20.0%
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	177.09 ha	14.1%
8c Regulated Vegetation - Category R (GBR riverine regrowth)	0.18 ha	0.0%
8d Regulated Vegetation - Essential habitat	459.72 ha	36.6%
8e Regulated Vegetation - intersecting a watercourse	1.2 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	0 ha	0.0%
9a Legally secured offset areas- offset register areas	0 ha	0.0%
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0 ha	0.0%

Additional Information with Respect to MSES Values Present

MSES - State Conservation Areas

1a. Protected Areas - estates

(No results)

1b. Protected Areas - nature refuges

(No results)

1c. Protected Areas - special wildlife reserves

(No results)

2. State Marine Parks - highly protected zones

(No results)

3. Fish habitat areas (A and B areas)

(No results)

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

MSES - Wetlands and Waterways

4. Strategic Environmental Areas (SEA)

(No results)

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

(no results)

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

(no results)

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

(no results)

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

MSES - Species

7a. Threatened (endangered or vulnerable) wildlife

Values are present

7b. Special least concern animals

Values are present

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

Not applicable

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

Not applicable

7d. Wildlife habitat (sea turtle nesting areas)

Not applicable

Threatened (endangered or vulnerable) wildlife habitat suitability models

Species	Common name	NCA status	Presence
Boronia keysii	Keys boronia	V	None
Calyptorhynchus lathami	Glossy black cockatoo	V	None
Casuarius casuarius johnsonii	Sthn population cassowary	E	None
Crinia tinnula	Wallum froglet	V	None
Denisonia maculata	Ornamental snake	V	Core
Euastacus bindal	Mount Elliot crayfish	CR	None
Euastacus binzayedi		CR	None
Euastacus eungella		E	None
Euastacus hystricosus		E	None
Euastacus jagara	Jagara hairy crayfish	CR	None
Euastacus maidae		CR	None
Euastacus monteithorum		E	None
Euastacus robertsi		E	None
Taudactylus pleione	Kroombit tinkerfrog	E	None
Litoria freycineti	Wallum rocketfrog	V	None
Litoria olongburensis	Wallum sedgefrog	V	None
Macadamia integrifolia		V	None
Melaleuca irbyana	swamp tea-tree	E	None
Macadamia ternifolia		V	None
Macadamia tetraphylla	bopple nut	V	None
Petrogale penicillata	brush-tailed rock-wallaby	V	None
Petrogale coenensis	Cape York rock-wallaby	E	None
Petrogale purpureicollis	purple-necked rock-wallaby	V	None
Petrogale sharmani	Sharmans rock-wallaby	V	None
Petrogale xanthopus celeris	yellow-footed rock-wallaby (Qld subspecies)	V	None
Petaurus gracilis	Mahogany Glider	E	None
Petrogale persephone	Proserpine rock-wallaby	E	None
Phascolarctos cinereus	Koala - outside SEQ*	E	None
Pezoporus wallicus wallicus	Eastern ground parrot	V	None
Xeromys myoides	Water Mouse	V	None

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

Threatened (endangered or vulnerable) wildlife species records

Scientific name	Common name	NCA status	EPBC status	Migratory status
Geophaps scripta scripta	squatter pigeon (southern subspecies)	V	V	None

Special least concern animal species records

Scientific name	Common name	Migratory status
Tachyglossus aculeatus	short-beaked echidna	None

Shorebird habitat (critically endangered/endangered/vulnerable)

Not applicable

Shorebird habitat (special least concern)

Not applicable

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

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

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

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

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

MSES - Regulated Vegetation

For further information relating to regional ecosystems in general, go to:

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

For a more detailed description of a particular regional ecosystem, access the regional ecosystem search page at:

https://environment.ehp.qld.gov.au/regional-ecosystems/

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

Regional ecosystem	Vegetation management polygon	Vegetation management status
11.4.9/11.4.8/11.5.3	E-dom	rem_end
11.8.11/11.8.5	O-dom	rem_oc
11.8.13	E-dom	rem_end

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

Regional ecosystem	Vegetation management polygon	Vegetation management status
11.4.9/11.4.8/11.5.3	E-dom	hvr_end
11.8.11/11.8.5	O-dom	hvr_oc
11.8.13	E-dom	hvr_end

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

Regulated vegetation map category	Map number
R	8454

8d. Regulated Vegetation - Essential habitat

Values are present

8e. Regulated Vegetation - intersecting a watercourse**

A vegetation management watercourse is mapped as present

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

Not applicable

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

MSES - Offsets

9a. Legally secured offset areas - offset register areas

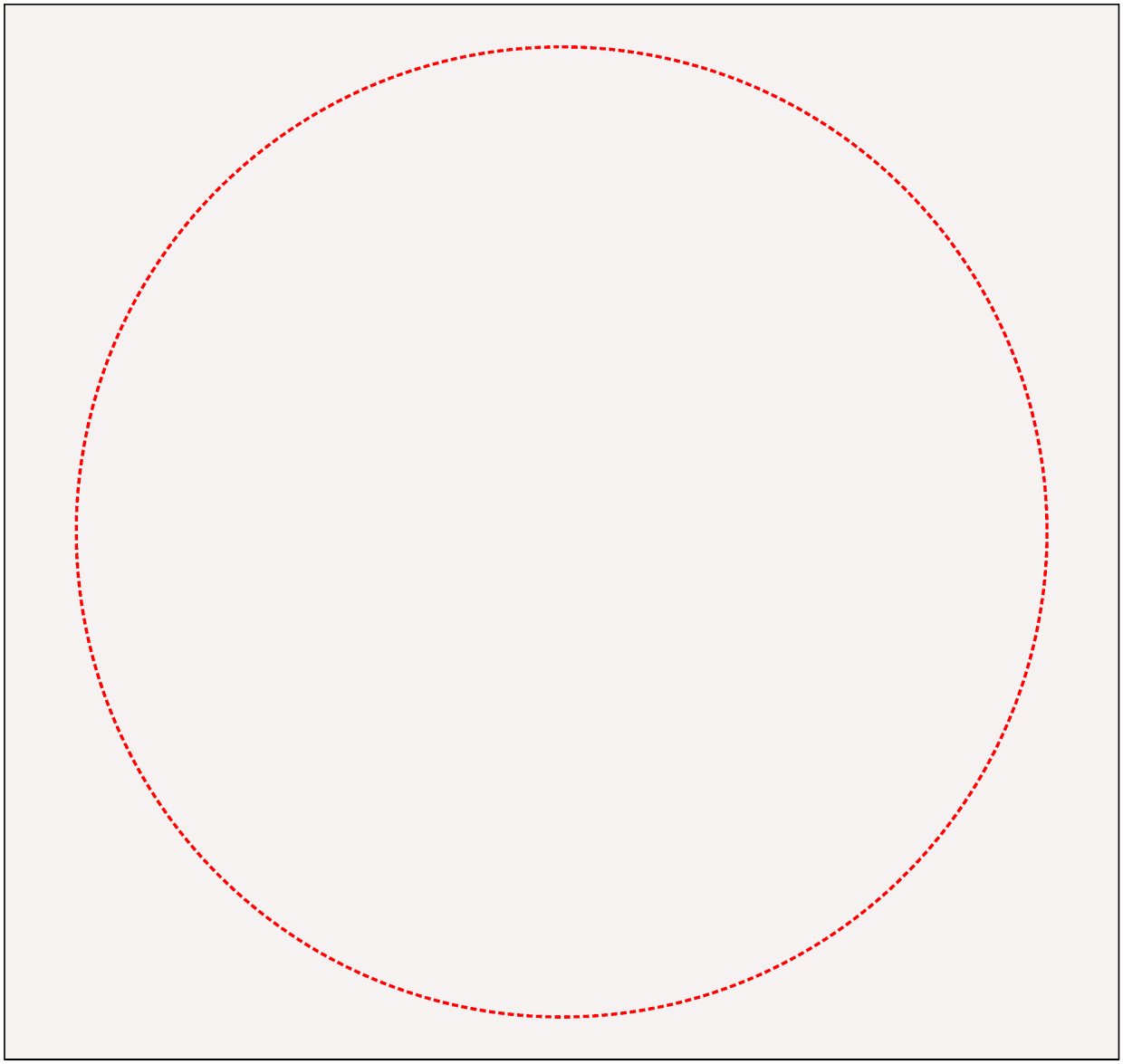
(No results)

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

(No results)

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

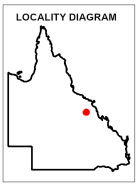
Map 1 - MSES - State Conservation Areas



MSES - State Conservation Areas

- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Protected area (estates, nature refuges, special wildlife reserves)
- Declared fish habitat area (A and B areas)
- Marine park (highly protected)
- 2 kilometre buffer

LOCALITY DIAGRAM



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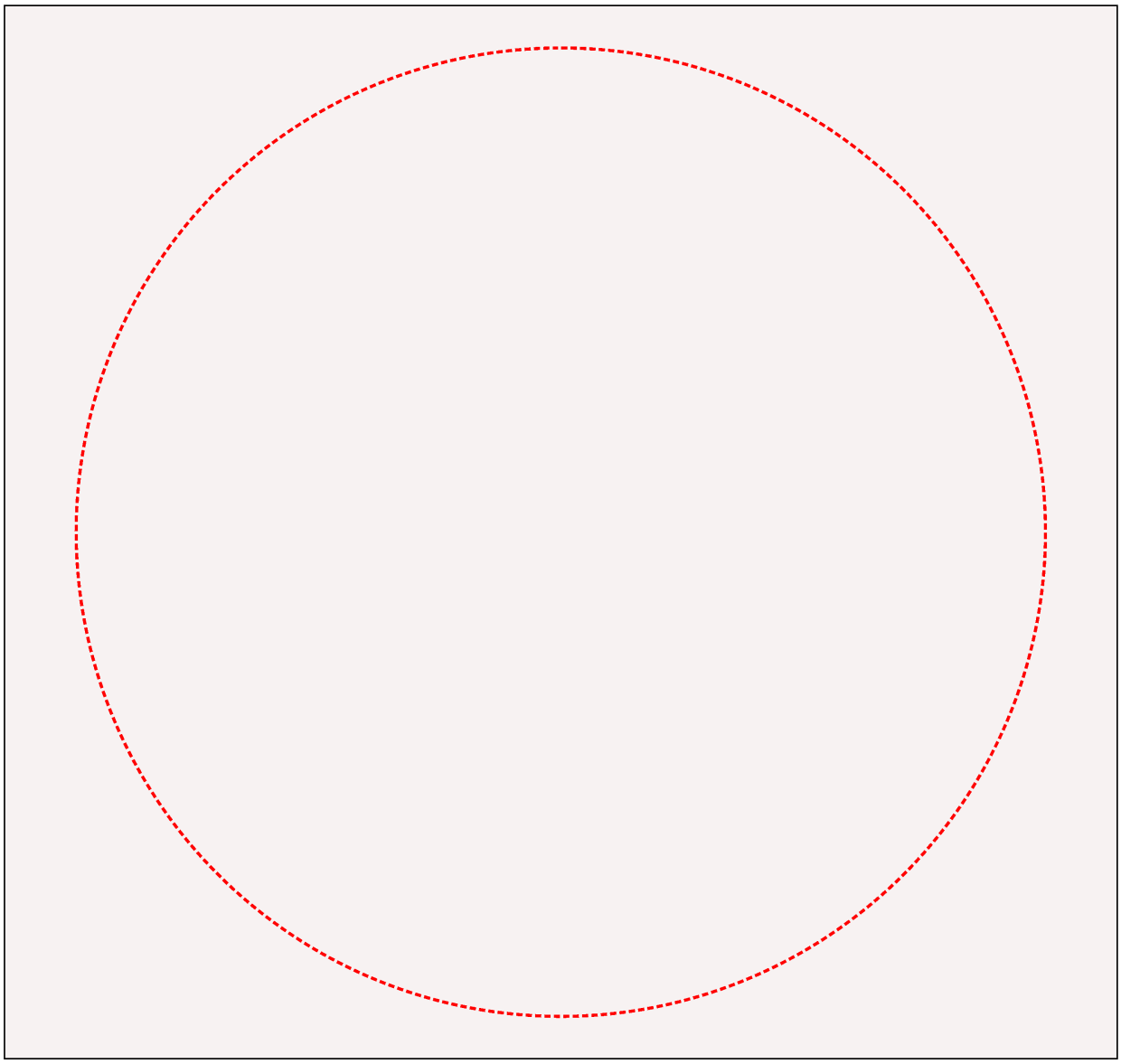
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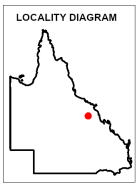
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Map 2 - MSES - Wetlands and Waterways



MSES - Wetlands and Waterways

- ▲ Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Declared high ecological value waters (watercourse)
- Strategic environmental area (designated precinct)
- Declared high ecological value waters (wetland)
- High ecological significance wetlands
- 2 kilometre buffer



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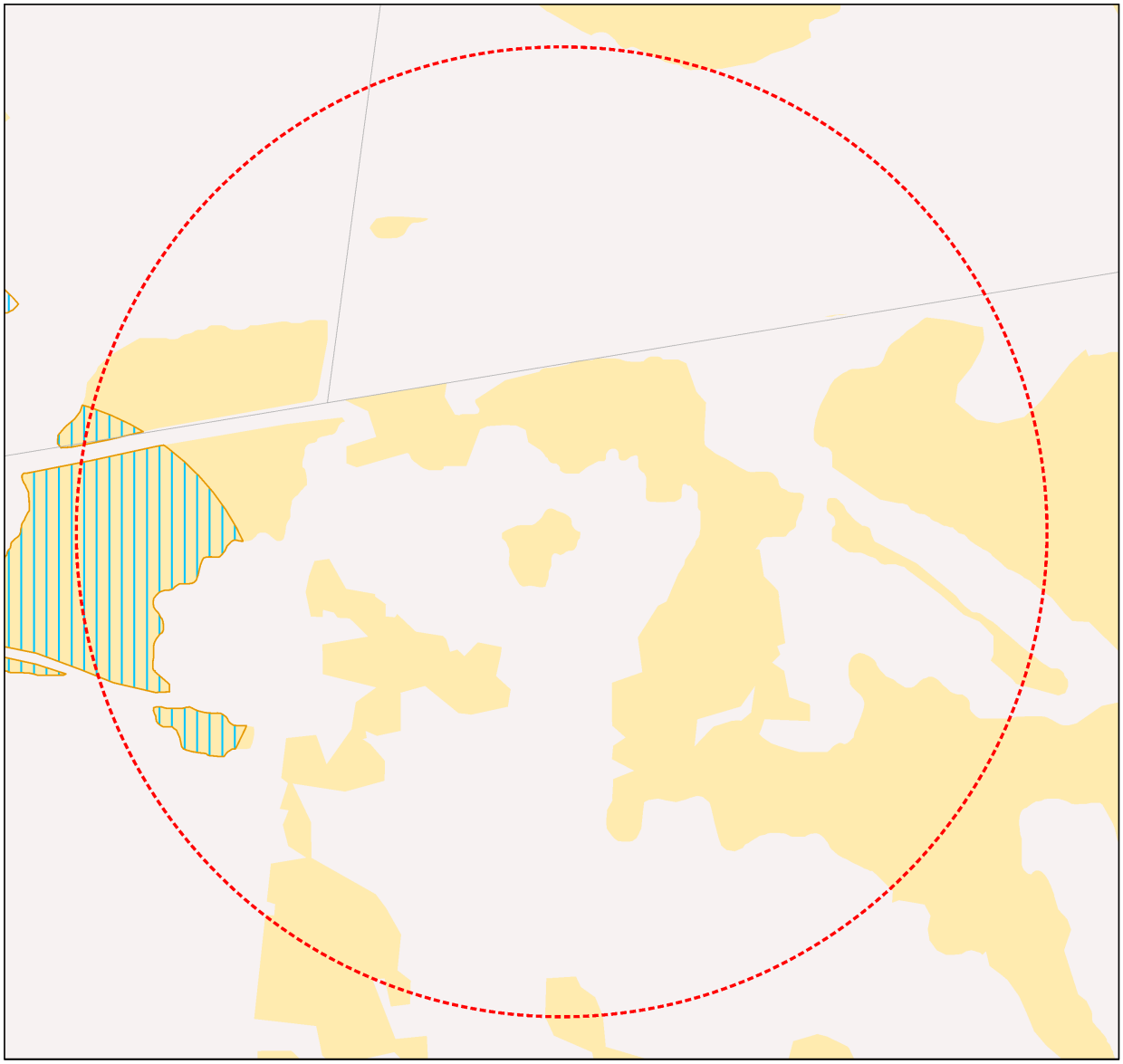
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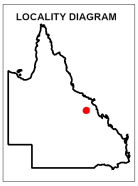
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Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals



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

- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Wildlife habitat (special least concern)
- Wildlife habitat (endangered or vulnerable)
- 2 kilometre buffer



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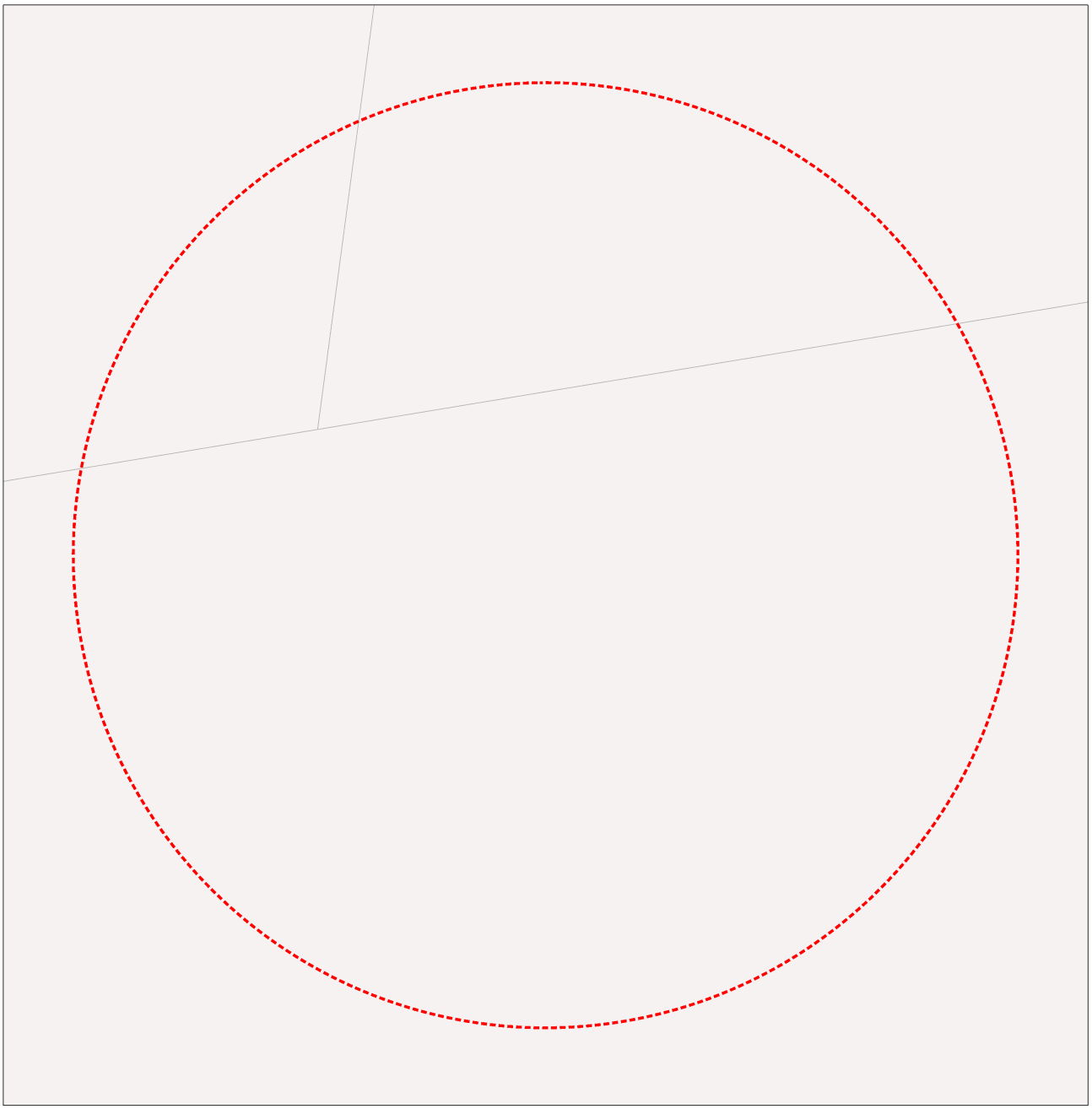
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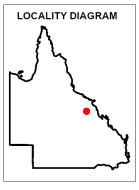
Map 3b - MSES - Species - Koala habitat area (SEQ)



MSES - Species
Koala habitat area (SEQ)

- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Koala habitat area (core)
- Koala habitat area (locally refined)
- 2 kilometre buffer

LOCALITY DIAGRAM



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The represented layers for SEQ 'koala habitat area-core' and 'koala habitat area- locally refined' in MSES are sourced directly from the regulatory mapping under the Nature Conservation (Koala) Conservation Plan 2017. Whilst every effort is made to ensure the information remains current, there may be delays between updating versions. Please refer to the original mapping for the most recent version. See https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping

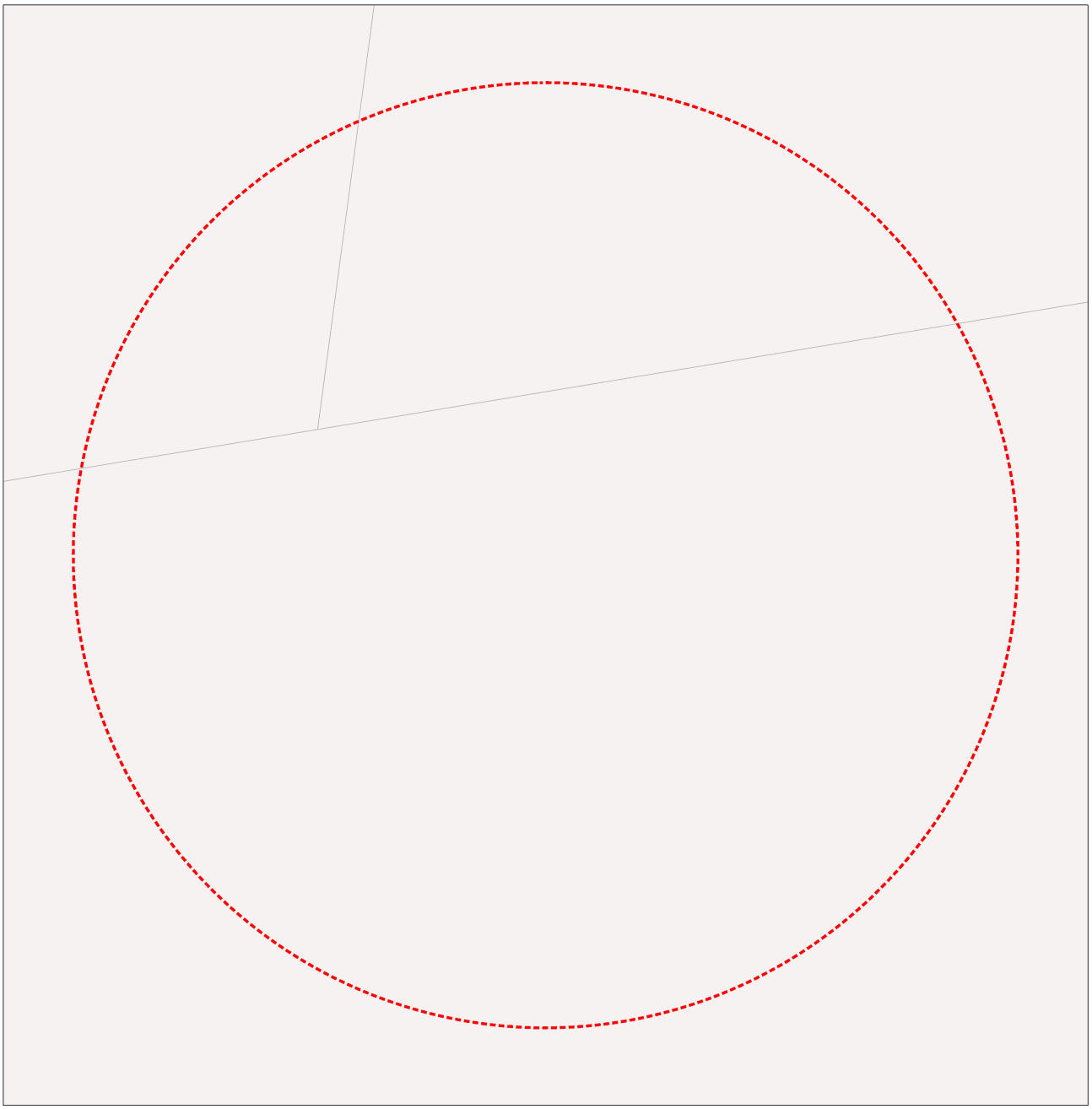
The koala habitat mapping within South East Queensland uses regional ecosystem linework compiled at a scale varying from 1:25,000 to 1:100,000. Linework should be used as a guide only. The positional accuracy of regional ecosystem data mapped at a scale of 1:100,000 is +/- 100 metres.

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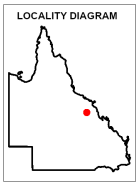
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Map 3c - MSES - Species - Wildlife habitat (sea turtle nesting areas)



MSES - Wildlife habitat (sea turtle nesting areas)

- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Wildlife habitat (sea turtle nesting areas)
- 2 kilometre buffer



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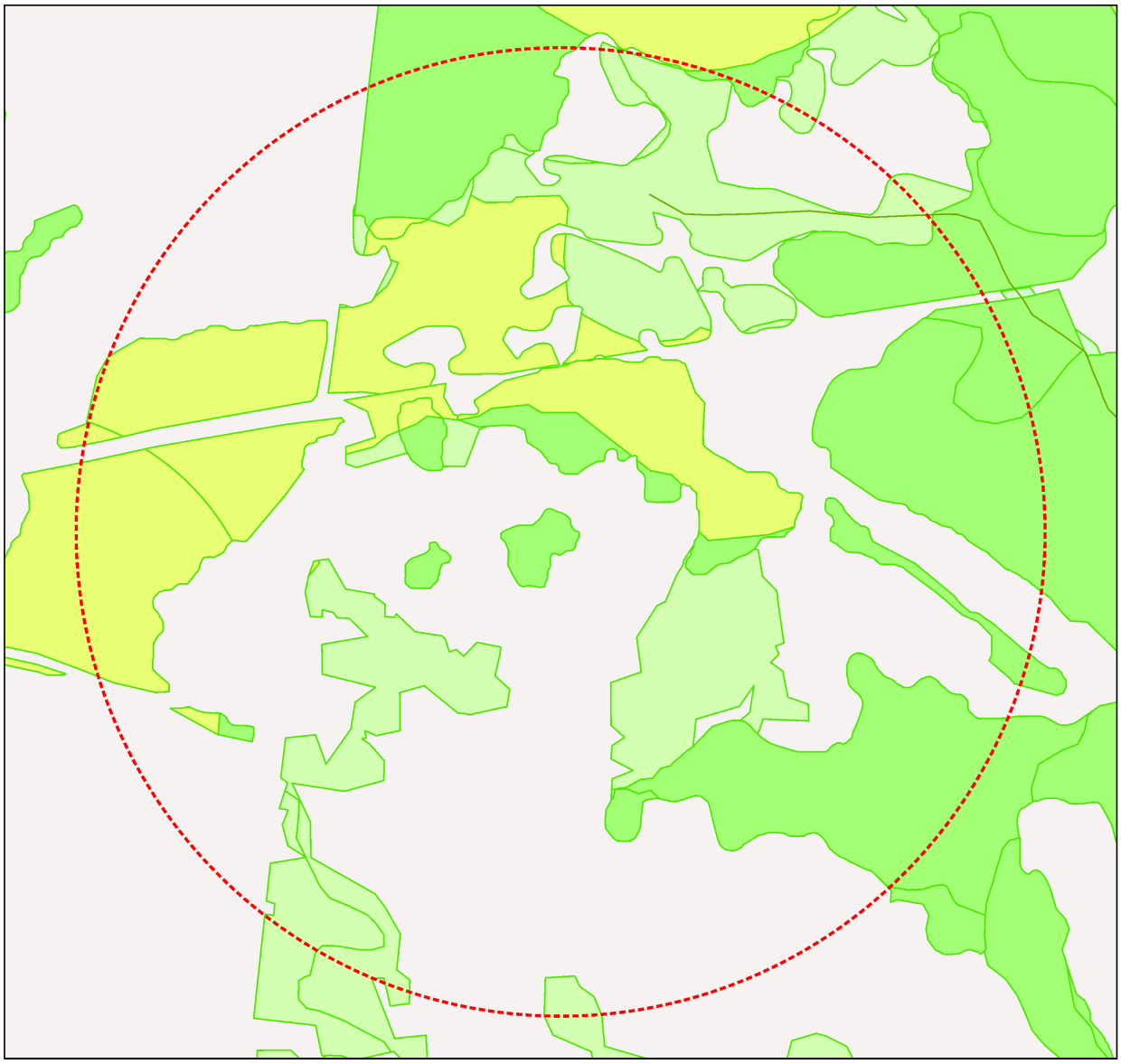
MSES mapping of sea turtle nesting areas identifies beaches where the recorded number of turtle nests are over 1% of the turtle species or genetic stock. The linework is also deliberately extended along nearby rocky coastlines and headlands to recognise that significant numbers of nesting adults and hatchlings can become disoriented by light pollution from development on rocky coastlines and headlands while navigating offshore from nesting beaches.

0 230 460 690 920 1,150 m

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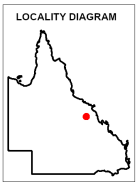
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Map 4 - MSES - Regulated Vegetation



MSES - Regulated Vegetation

- ▲ Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Regulated vegetation (intersecting a watercourse)
- Regulated vegetation (100m from wetland)
- Regulated vegetation (category B - endangered or of concern)
- Regulated vegetation (category C - endangered or of concern)
- Regulated vegetation (category R - GBR riverine)
- Regulated vegetation (essential habitat)
- 2 kilometre buffer



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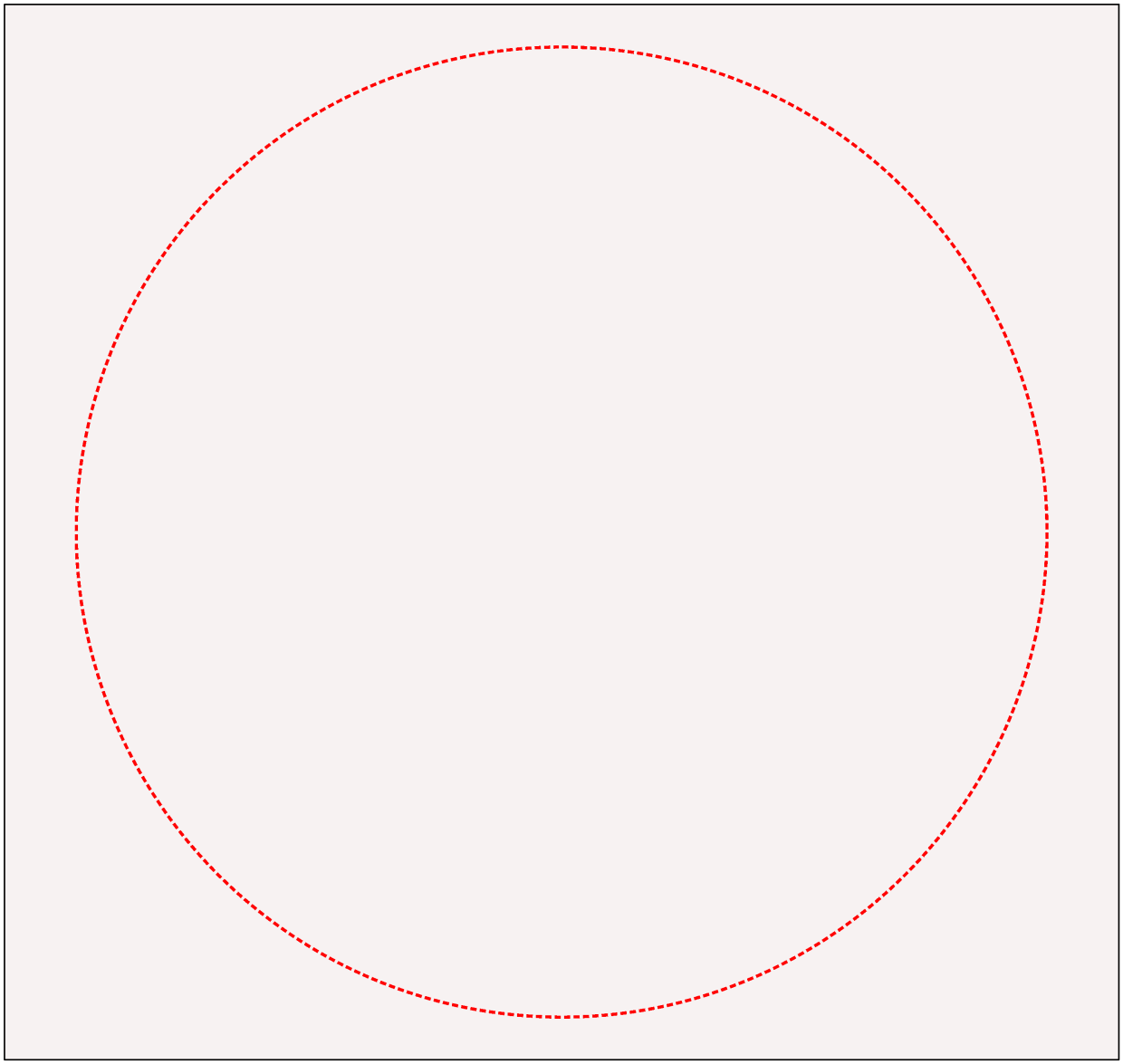
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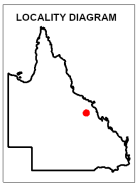
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Map 5 - MSES - Offset Areas



MSES - Offsets

- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Legally secured offset area (offset register)
- Legally secured offset area (vegetation offsets)
- 2 kilometre buffer



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Appendices

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

MSES mapping is a regional-scale representation of the definition for MSES under the State Planning Policy (SPP). Its primary purpose is to support implementation of the SPP biodiversity policy.

MSES mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations.

MSES mapping does not determine whether state or local development assessment is required. For state assessment triggers refer to the Development Assessment Mapping System (DAMS). For local assessment triggers, refer to the relevant local planning scheme.

The Queensland Government's "Method for mapping - matters of state environmental significance can be downloaded from:

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

Appendix 2 - Source Data

The datasets listed below are available on request from:

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

- Matters of State environmental significance

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

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

MSES layers	**current QSpatial data (http://qspatial.information.qld.gov.au)**
Protected Areas-Estates, Nature Refuges, Special Wildlife Reserves	- Protected areas of Queensland - Nature Refuges - Queensland - Special Wildlife Reserves- Queensland
Marine Park-Highly Protected Zones	Moreton Bay marine park zoning 2008
Fish Habitat Areas	Queensland fish habitat areas
Strategic Environmental Areas-designated	Regional Planning Interests Act - Strategic Environmental Areas
HES wetlands	Map of Queensland Wetland Environmental Values
Wetlands in HEV waters	HEV waters: - EPP Water intent for waters Source Wetlands: - Queensland Wetland Mapping (Current version 5) Source Watercourses: - Vegetation management watercourse and drainage feature map (1:100000 and 1:250000)
Wildlife habitat (threatened and special least concern)	-WildNet database species records - habitat suitability models (various) - SEQ koala habitat areas under the Koala Conservation Plan 2019
VMA regulated regional ecosystems	Vegetation management regional ecosystem and remnant map
VMA Essential Habitat	Vegetation management - essential habitat map
VMA Wetlands	Vegetation management wetlands map
Legally secured offsets	Vegetation Management Act property maps of assessable vegetation. For offset register data-contact DETSI
Regulated Vegetation Map	Vegetation management - regulated vegetation management map

Appendix 3 - Acronyms and Abbreviations

AOI	- Area of Interest
DETSI	- Department of the Environment, Tourism, Science and Innovation
EP Act	- Environmental Protection Act 1994
EPP	- Environmental Protection Policy
GDA2020	- Geocentric Datum of Australia 2020
GEM	- General Environmental Matters
GIS	- Geographic Information System
MSES	- Matters of State Environmental Significance
NCA	- Nature Conservation Act 1992
RE	- Regional Ecosystem
SPP	- State Planning Policy
VMA	- Vegetation Management Act 1999

Queensland Government

Department of the Environment, Tourism, Science and Innovation

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest

Lot: 412 Plan: SP352711

Environmental Reports - General Information

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

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 2020). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

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

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

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

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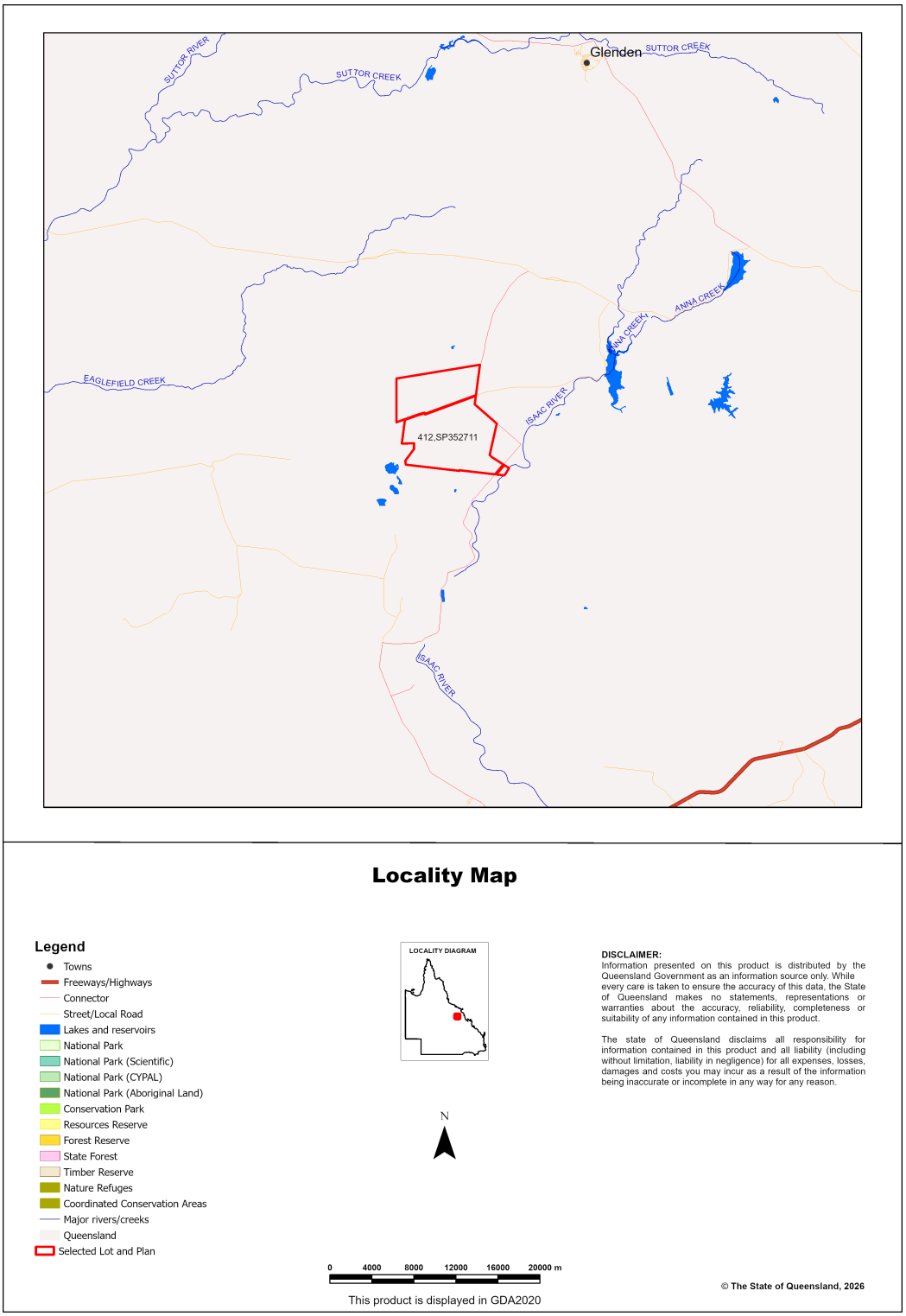
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Assessment Area Details

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

Table 1: Summary table, details for AOI: Lot: 412 Plan: SP352711, with area 7047.48 ha

Local Government(s)	Catchment(s)	Bioregion(s)	Subregion(s)
Isaac Regional	Fitzroy	Brigalow Belt	Northern Bowen Basin
	Burdekin		



Matters of State Environmental Significance (MSES)

MSES Categories

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

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

The MSES mapping product is a guide to assist implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations.

The SPP defines matters of state environmental significance as:

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

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

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

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

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

  - Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems;
  - Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;
  - Category R areas on the regulated vegetation management map;
  - Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse and drainage feature map;
  - Regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map;

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

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

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

MSES Values Present

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

Table 2: Summary of MSES present within the AOI

1a Protected Areas- estates	0 ha	0.0%
1b Protected Areas- nature refuges	0 ha	0.0%
1c Protected Areas- special wildlife reserves	0 ha	0.0%
2 State Marine Parks- highly protected zones	0 ha	0.0%
3 Fish habitat areas (A and B areas)	0 ha	0.0%
4 Strategic Environmental Areas (SEA)	0 ha	0.0%
5 High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values	0 ha	0.0%
6a High Ecological Value (HEV) wetlands	0 ha	
6b High Ecological Value (HEV) waterways	0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	2468.74 ha	35.0%
7b Special least concern animals	65.4 ha	0.9%
7c i Koala habitat area - core (SEQ)	0 ha	0.0%
7c ii Koala habitat area - locally refined (SEQ)	0 ha	0.0%
7d Sea turtle nesting areas	0 km	Not applicable
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	2175.72 ha	30.9%
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	295.14 ha	4.2%
8c Regulated Vegetation - Category R (GBR riverine regrowth)	83.19 ha	1.2%
8d Regulated Vegetation - Essential habitat	2541.52 ha	36.1%
8e Regulated Vegetation - intersecting a watercourse	21.1 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	0 ha	0.0%
9a Legally secured offset areas- offset register areas	0 ha	0.0%
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0 ha	0.0%

Additional Information with Respect to MSES Values Present

MSES - State Conservation Areas

1a. Protected Areas - estates

(No results)

1b. Protected Areas - nature refuges

(No results)

1c. Protected Areas - special wildlife reserves

(No results)

2. State Marine Parks - highly protected zones

(No results)

3. Fish habitat areas (A and B areas)

(No results)

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

MSES - Wetlands and Waterways

4. Strategic Environmental Areas (SEA)

(No results)

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

(no results)

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

(no results)

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

(no results)

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

MSES - Species

7a. Threatened (endangered or vulnerable) wildlife

Values are present

7b. Special least concern animals

Values are present

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

Not applicable

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

Not applicable

7d. Wildlife habitat (sea turtle nesting areas)

Not applicable

Threatened (endangered or vulnerable) wildlife habitat suitability models

Species	Common name	NCA status	Presence
Boronia keysii	Keys boronia	V	None
Calyptorhynchus lathami	Glossy black cockatoo	V	None
Casuarius casuarius johnsonii	Sthn population cassowary	E	None
Crinia tinnula	Wallum froglet	V	None
Denisonia maculata	Ornamental snake	V	Core
Euastacus bindal	Mount Elliot crayfish	CR	None
Euastacus binzayedi		CR	None
Euastacus eungella		E	None
Euastacus hystricosus		E	None
Euastacus jagara	Jagara hairy crayfish	CR	None
Euastacus maidae		CR	None
Euastacus monteithorum		E	None
Euastacus robertsi		E	None
Taudactylus pleione	Kroombit tinkerfrog	E	None
Litoria freycineti	Wallum rocketfrog	V	None
Litoria olongburensis	Wallum sedgefrog	V	None
Macadamia integrifolia		V	None
Melaleuca irbyana	swamp tea-tree	E	None
Macadamia ternifolia		V	None
Macadamia tetraphylla	bopple nut	V	None
Petrogale penicillata	brush-tailed rock-wallaby	V	None
Petrogale coenensis	Cape York rock-wallaby	E	None
Petrogale purpureicollis	purple-necked rock-wallaby	V	None
Petrogale sharmani	Sharmans rock-wallaby	V	None
Petrogale xanthopus celeris	yellow-footed rock-wallaby (Qld subspecies)	V	None
Petaurus gracilis	Mahogany Glider	E	None
Petrogale persephone	Proserpine rock-wallaby	E	None
Phascolarctos cinereus	Koala - outside SEQ*	E	None
Pezoporus wallicus wallicus	Eastern ground parrot	V	None
Xeromys myoides	Water Mouse	V	None

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

Threatened (endangered or vulnerable) wildlife species records

Scientific name	Common name	NCA status	EPBC status	Migratory status
Geophaps scripta scripta	squatter pigeon (southern subspecies)	V	V	None
Dichanthium queenslandicum		V	E	None

Special least concern animal species records

Scientific name	Common name	Migratory status
Tachyglossus aculeatus	short-beaked echidna	None

Shorebird habitat (critically endangered/endangered/vulnerable)

Not applicable

Shorebird habitat (special least concern)

Not applicable

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

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

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

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

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

MSES - Regulated Vegetation

For further information relating to regional ecosystems in general, go to:

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

For a more detailed description of a particular regional ecosystem, access the regional ecosystem search page at:

https://environment.ehp.qld.gov.au/regional-ecosystems/

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

Regional ecosystem	Vegetation management polygon	Vegetation management status
11.3.1	E-dom	rem_end
11.3.2	O-dom	rem_oc
11.3.4	O-dom	rem_oc
11.4.8/11.8.15	E-dom	rem_end
11.4.9	E-dom	rem_end
11.4.9/11.4.8	E-dom	rem_end
11.4.9/11.4.8/11.5.3	E-dom	rem_end
11.8.11	O-dom	rem_oc
11.8.11/11.8.5	O-dom	rem_oc
11.8.13	E-dom	rem_end
11.8.15	E-dom	rem_end
11.9.1	E-dom	rem_end

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

Regional ecosystem	Vegetation management polygon	Vegetation management status
11.4.9/11.4.8/11.5.3	E-dom	hvr_end
11.8.11/11.8.5	O-dom	hvr_oc
11.8.13	E-dom	hvr_end
11.9.1	E-dom	hvr_end

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

Regulated vegetation map category	Map number
R	8454
R	8554

8d. Regulated Vegetation - Essential habitat

Values are present

8e. Regulated Vegetation - intersecting a watercourse**

A vegetation management watercourse is mapped as present

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

Not applicable

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

MSES - Offsets

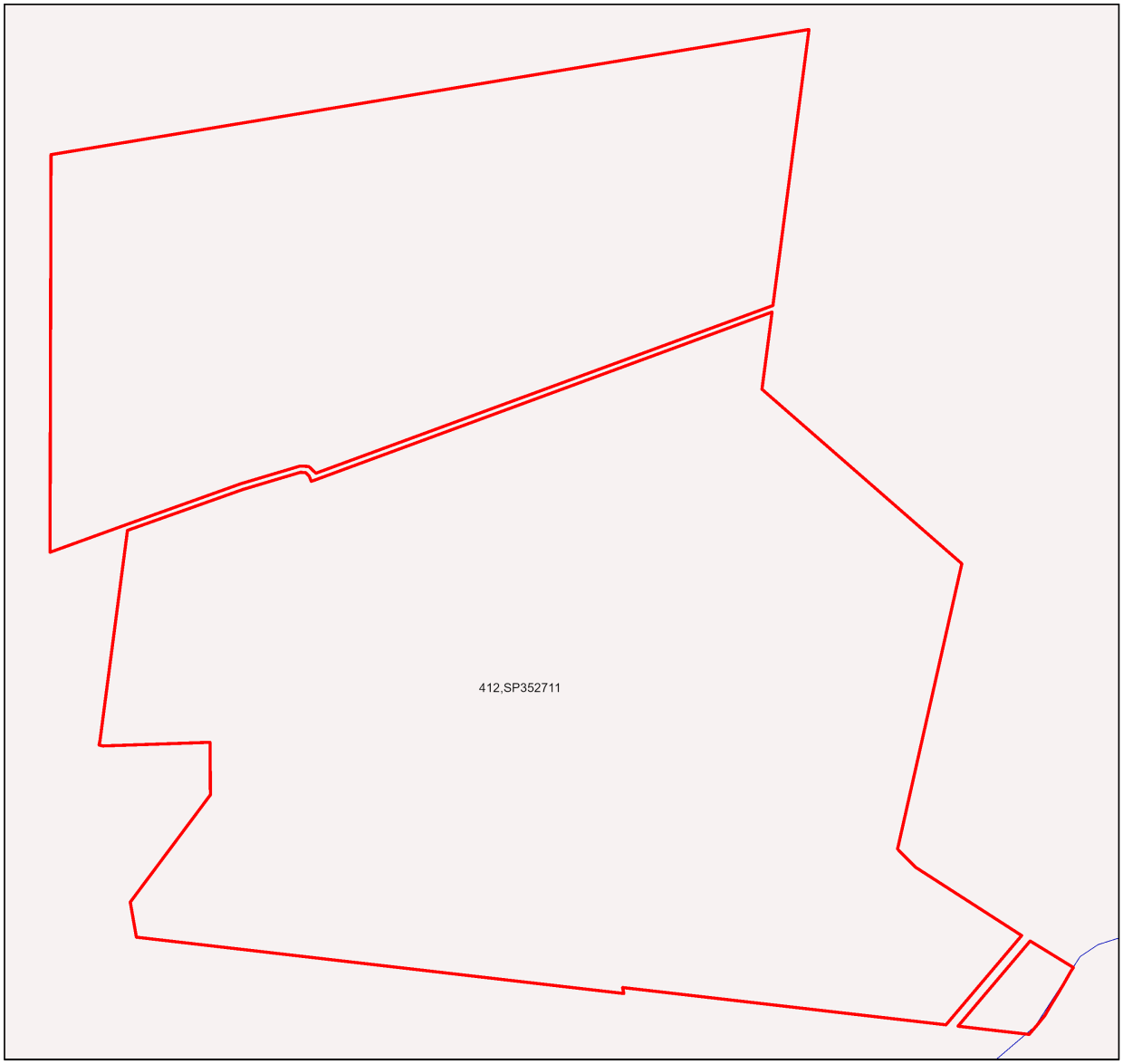
9a. Legally secured offset areas - offset register areas

(No results)

9b. Legally secured offset areas - vegetation offsets through a Property Map of Assessable Vegetation
(No results)

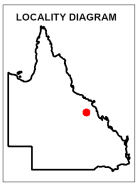
Refer to **Map 5 - MSES - Offset Areas** for an overview of the relevant MSES.

Map 1 - MSES - State Conservation Areas



MSES - State Conservation Areas

- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Protected area (estates, nature refuges, special wildlife reserves)
- Declared fish habitat area (A and B areas)
- Marine park (highly protected)
- Selected Lot and Plan



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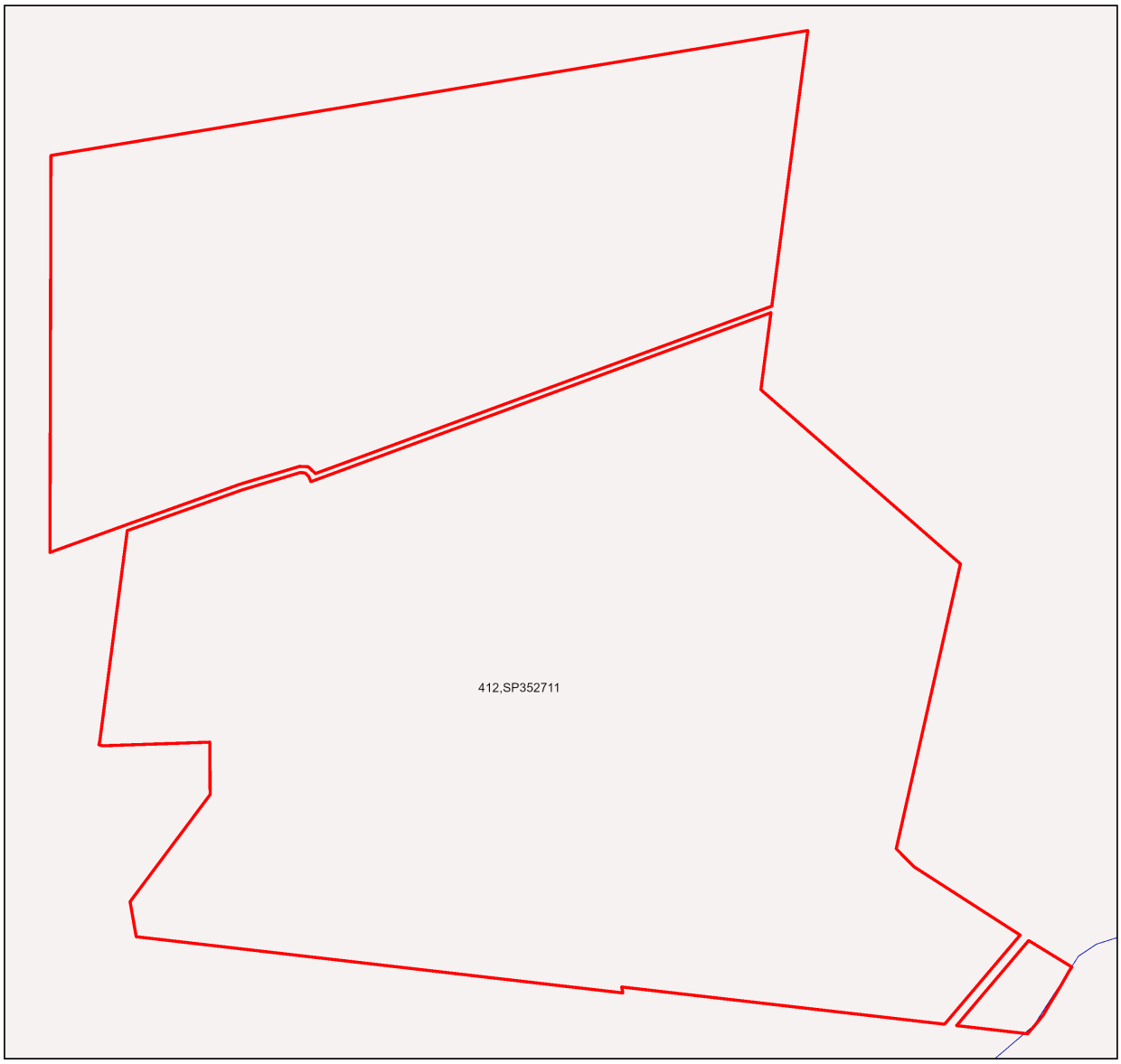
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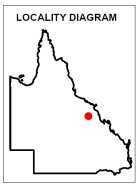
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Map 2 - MSES - Wetlands and Waterways



MSES - Wetlands and Waterways

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



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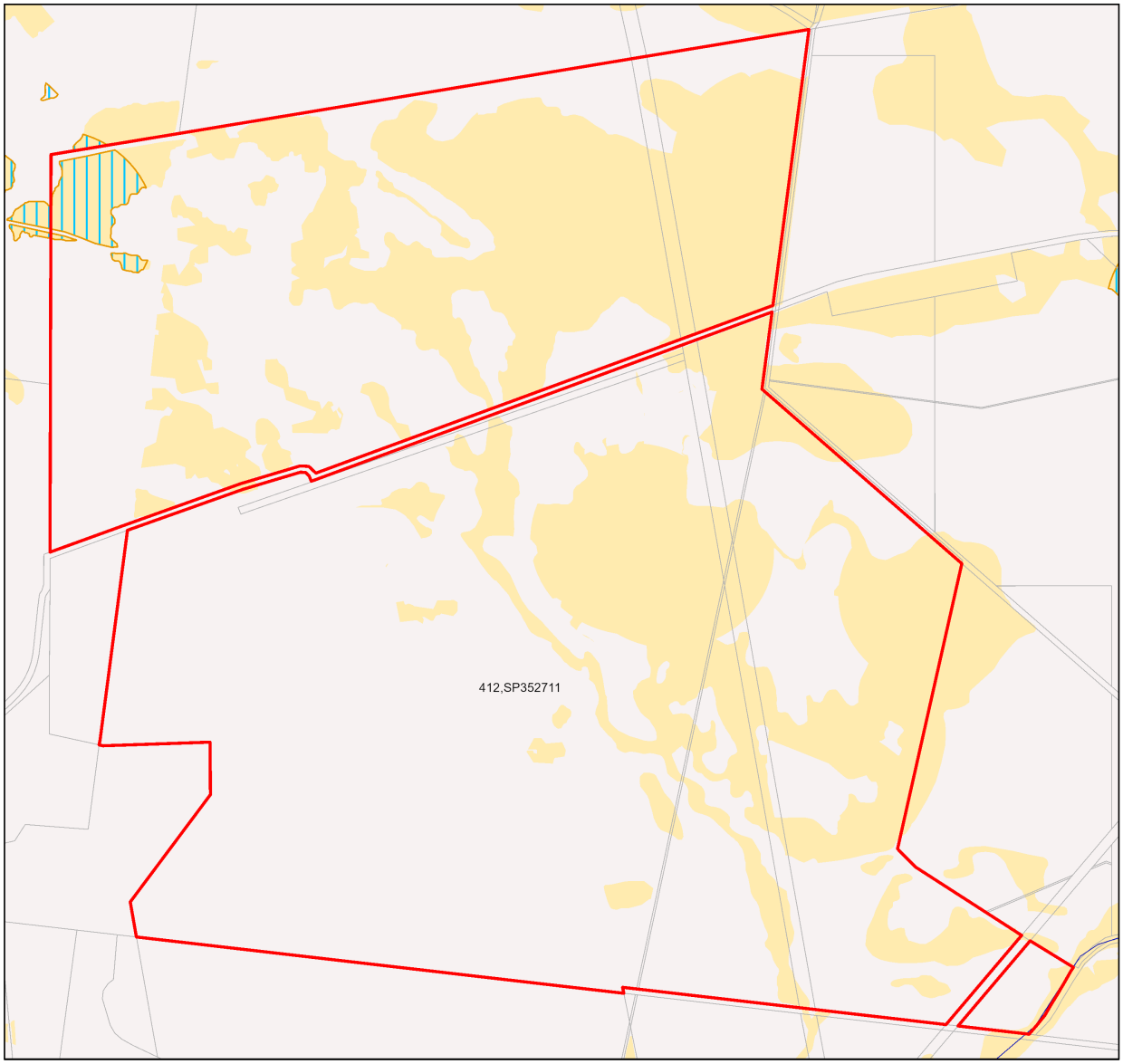
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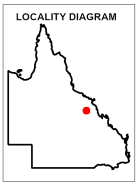
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Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals



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

- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Wildlife habitat (special least concern)
- Wildlife habitat (endangered or vulnerable)
- Selected Lot and Plan



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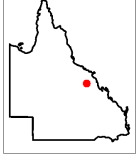
Map 3b - MSES - Species - Koala habitat area (SEQ)



MSES - Species
Koala habitat area (SEQ)

- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Koala habitat area (core)
- Koala habitat area (locally refined)
- Selected Lot and Plan

LOCALITY DIAGRAM



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The represented layers for SEQ 'koala habitat area-core' and 'koala habitat area- locally refined' in MSES are sourced directly from the regulatory mapping under the Nature Conservation (Koala) Conservation Plan 2017. Whilst every effort is made to ensure the information remains current, there may be delays between updating versions. Please refer to the original mapping for the most recent version. See https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping

The koala habitat mapping within South East Queensland uses regional ecosystem linework compiled at a scale varying from 1:25,000 to 1:100,000. Linework should be used as a guide only. The positional accuracy of regional ecosystem data mapped at a scale of 1:100,000 is +/- 100 metres.

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0 580 1,160 1,740 2,320 2,900 m

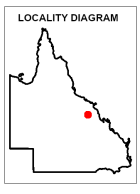
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Map 3c - MSES - Species - Wildlife habitat (sea turtle nesting areas)



MSES - Wildlife habitat (sea turtle nesting areas)

- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Wildlife habitat (sea turtle nesting areas)
- Selected Lot and Plan



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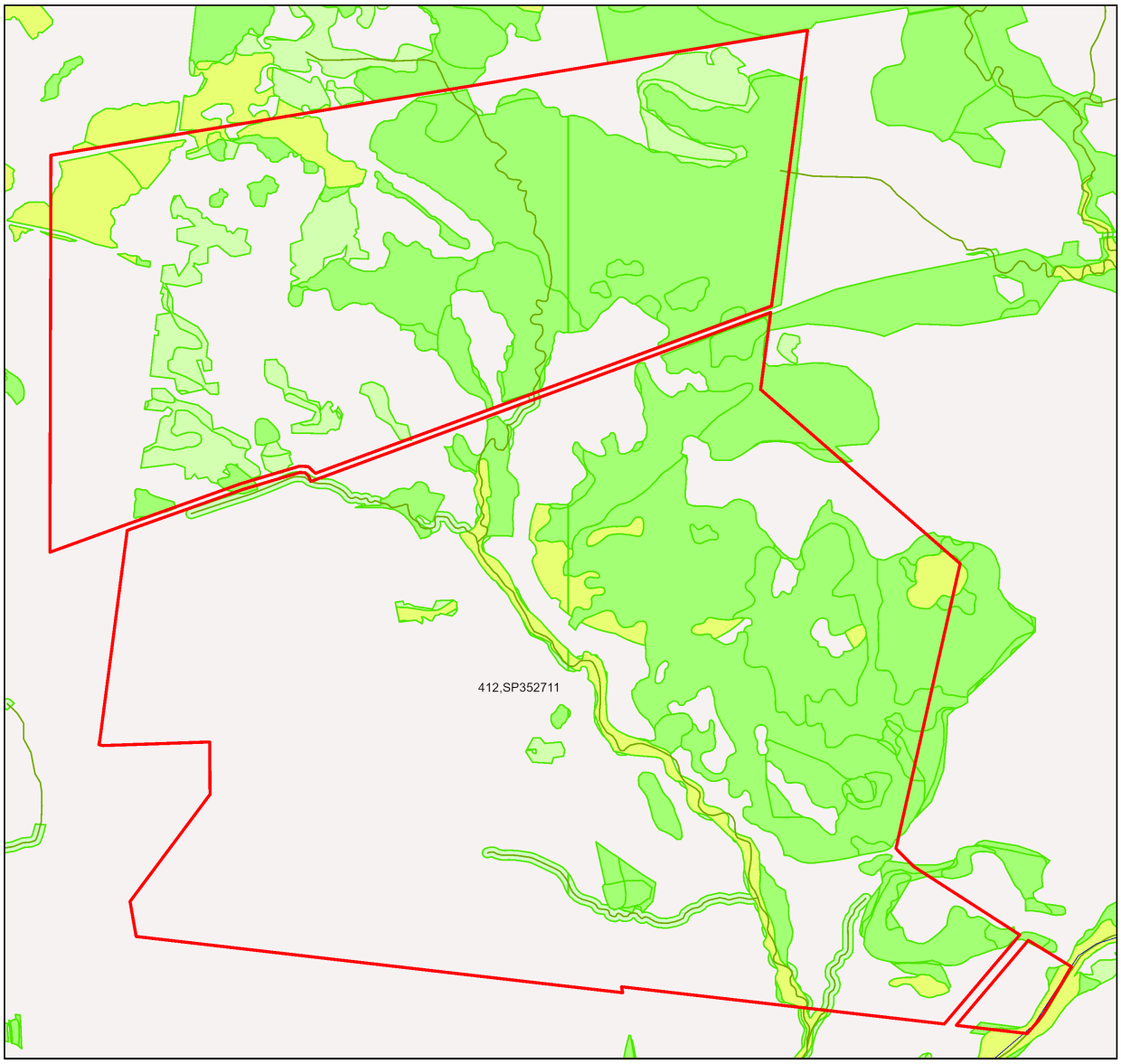
MSES mapping of sea turtle nesting areas identifies beaches where the recorded number of turtle nests are over 1% of the turtle species or genetic stock. The linework is also deliberately extended along nearby rocky coastlines and headlands to recognise that significant numbers of nesting adults and hatchlings can become disoriented by light pollution from development on rocky coastlines and headlands while navigating offshore from nesting beaches.

0 580 1,160 1,740 2,320 2,900 m

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Map 4 - MSES - Regulated Vegetation



MSES - Regulated Vegetation

- ▲ Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Regulated vegetation (intersecting a watercourse)
- Regulated vegetation (100m from wetland)
- Regulated vegetation (category B - endangered or of concern)
- Regulated vegetation (category C - endangered or of concern)
- Regulated vegetation (category R - GBR riverine)
- Regulated vegetation (essential habitat)
- Selected Lot and Plan

LOCALITY DIAGRAM



N

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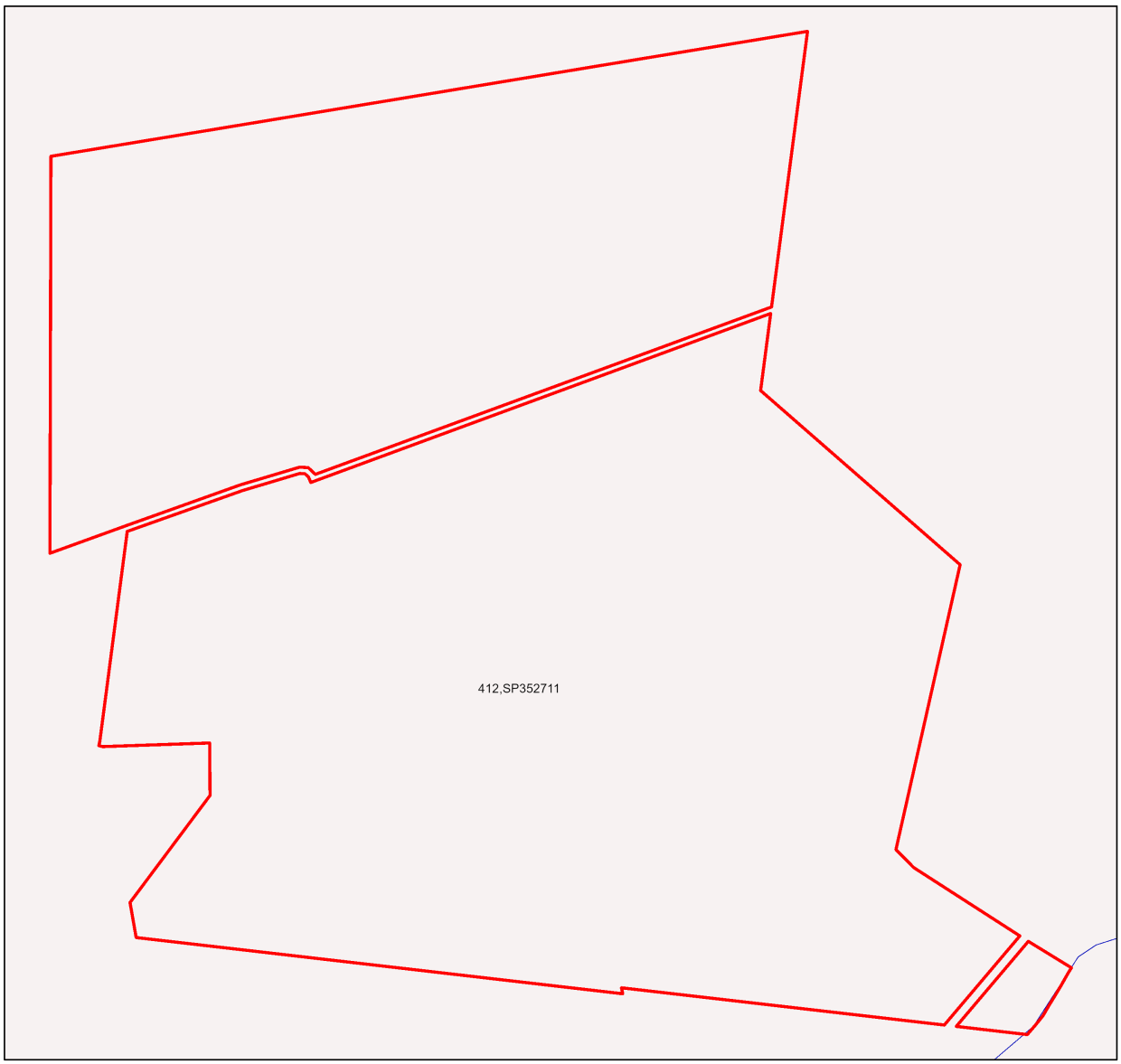
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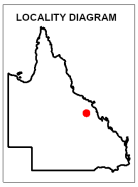
Map 5 - MSES - Offset Areas



MSES - Offsets

- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Legally secured offset area (offset register)
- Legally secured offset area (vegetation offsets)
- Selected Lot and Plan

LOCALITY DIAGRAM



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Appendices

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

MSES mapping is a regional-scale representation of the definition for MSES under the State Planning Policy (SPP). Its primary purpose is to support implementation of the SPP biodiversity policy.

MSES mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations.

MSES mapping does not determine whether state or local development assessment is required. For state assessment triggers refer to the Development Assessment Mapping System (DAMS). For local assessment triggers, refer to the relevant local planning scheme.

The Queensland Government's "Method for mapping - matters of state environmental significance can be downloaded from:

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

Appendix 2 - Source Data

The datasets listed below are available on request from:

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

- Matters of State environmental significance

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

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

MSES layers	**current QSpatial data (http://qspatial.information.qld.gov.au)**
Protected Areas-Estates, Nature Refuges, Special Wildlife Reserves	- Protected areas of Queensland - Nature Refuges - Queensland - Special Wildlife Reserves- Queensland
Marine Park-Highly Protected Zones	Moreton Bay marine park zoning 2008
Fish Habitat Areas	Queensland fish habitat areas
Strategic Environmental Areas-designated	Regional Planning Interests Act - Strategic Environmental Areas
HES wetlands	Map of Queensland Wetland Environmental Values
Wetlands in HEV waters	HEV waters: - EPP Water intent for waters Source Wetlands: - Queensland Wetland Mapping (Current version 5) Source Watercourses: - Vegetation management watercourse and drainage feature map (1:100000 and 1:250000)
Wildlife habitat (threatened and special least concern)	-WildNet database species records - habitat suitability models (various) - SEQ koala habitat areas under the Koala Conservation Plan 2019
VMA regulated regional ecosystems	Vegetation management regional ecosystem and remnant map
VMA Essential Habitat	Vegetation management - essential habitat map
VMA Wetlands	Vegetation management wetlands map
Legally secured offsets	Vegetation Management Act property maps of assessable vegetation. For offset register data-contact DETSI
Regulated Vegetation Map	Vegetation management - regulated vegetation management map

Appendix 3 - Acronyms and Abbreviations

AOI	- Area of Interest
DETSI	- Department of the Environment, Tourism, Science and Innovation
EP Act	- Environmental Protection Act 1994
EPP	- Environmental Protection Policy
GDA2020	- Geocentric Datum of Australia 2020
GEM	- General Environmental Matters
GIS	- Geographic Information System
MSES	- Matters of State Environmental Significance
NCA	- Nature Conservation Act 1992
RE	- Regional Ecosystem
SPP	- State Planning Policy
VMA	- Vegetation Management Act 1999

WildNet Records
Conservation Significant Species List

For the selected area of interest Lot: 412 Plan: SP352711
Current as at 09/01/2026 WildNetCSSpeciesList

Summary Information

The following table provides an overview of the area of interest: Lot: 412 Plan: SP352711

Table 1. Area of interest details

Size (ha)	
7,047.48	
Local Government(s)	
Isaac Regional	
Catchment(s)	
Fitzroy	
Burdekin	
Bioregion(s)	**Subregion(s)**
Brigalow Belt	Northern Bowen Basin

Protected Area(s)

No estates or reserves are located within the area of interest.

World Heritage Area(s)

No World Heritage Areas are located within the area of interest.

Ramsar Area(s)

No Ramsar Areas are located within the area of interest.

Introduction

This WildNet report is derived from a spatial layer that is generated from the WildNet database, managed by the Department of the Environment, Tourism, Science and Innovation. The layer, which is generated weekly, contains a subset of WildNet wildlife records that are not classed as erroneous or duplicate, that have a location precision equal to or less than 10000 metres and do not have a count of zero. It does not include aspatial data such as some baseline species lists created for some protected areas.

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

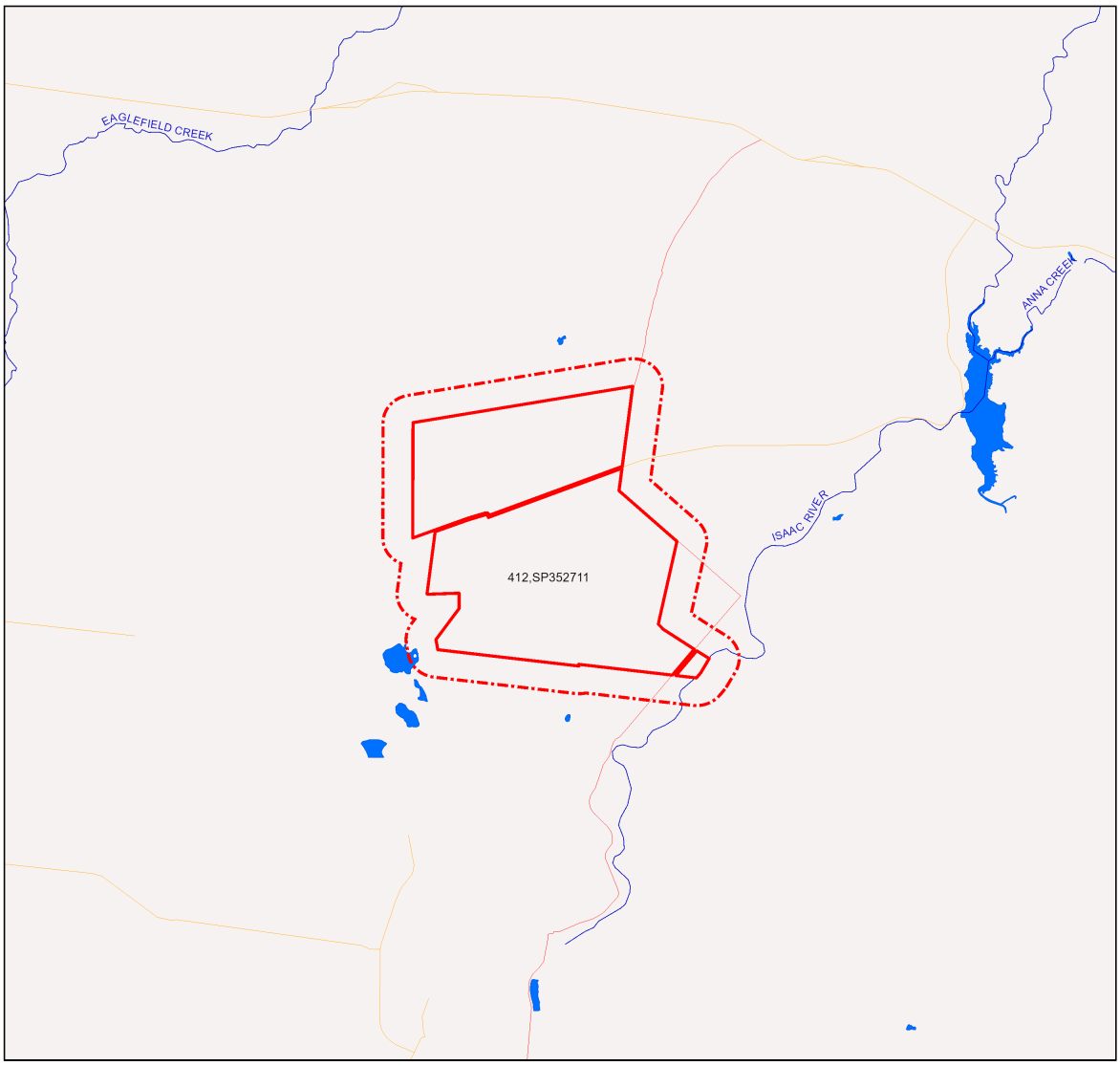
The WildNet Application may provide additional information on species occurence within your area of interest.

Conservation significant species are species listed:

- as threatened or near threatened under the *Nature Conservation Act 1992*;
- as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* or
- migratory species protected under the following international agreements:
    - Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
    - China-Australia Migratory Bird Agreement
    - Japan-Australia Migratory Bird Agreement
    - Republic of Korea-Australia Migratory Bird Agreement

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

Map 1. Locality Map

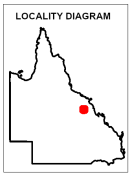


Locality Map

Legend

- Towns
- Freeways/Highways
- Connector
- Street/Local Road
- Lakes and reservoirs
- National Park
- National Park (Scientific)
- National Park (CYPAL)
- National Park (Aboriginal Land)
- Conservation Park
- Resources Reserve
- Forest Reserve
- State Forest
- Timber Reserve
- Nature Refuges
- Coordinated Conservation Areas
- Major rivers/creeks
- Queensland
- Selected Lot and Plan
- 1 kilometre buffer

LOCALITY DIAGRAM



N

0 2000 4000 6000 8000 10000 m

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Table 2. Conservation significant species recorded within the area of interest and its one kilometre buffer

Taxon Id	Kingdom	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
1971	Animalia	Aves	Apodidae	*Hirundapus caudacutus*	white-throated needletail	V	V	0	1	8/12/2021
11064	Plantae	Equisetopsida	Poaceae	*Dichanthium queenslandicum*		V	E	8	8	23/12/2022

Taxon Id: Unique identifier of the taxon from the WildNet database.
NCA: Queensland conservation status of the taxon under the *Nature Conservation Act 1992* (Least Concern (C), Critically Endangered (CR), Endangered (E), Extinct (EX), Near Threatened (NT), Extinct in the Wild (PE), Special Least Concern (SL), and Vulnerable (V)).
EPBC: Australian conservation status of the taxon under the *Environment Protection and Biodiversity Conservation Act 1999* (Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Vulnerable (V), and Extinct in the Wild (XW)).
Specimens: The number of specimen-backed records of the taxon.
Records: The total number of records of the taxon.
Last record: Date of most recent record of the taxon.

Links and Support

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

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

Please direct queries about this report to the WildNet Team WildNet@detsi.qld.gov.au.

Other useful sites for accessing Queensland biodiversity data include:

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

Disclaimer

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APPENDIX H. – BASIS OF DESIGN

PROJECT BASIS OF DESIGN

FOR

Clean Energy Fuels Australia
Mid-West LNG Plant 48 TPD
Relocation & Upgrade
Moranbah, QLD
Peabody Coal Seam Gas

PROJECT - 24098

3/5/2025

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1 PROJECT OVERVIEW

1.1 Introduction

The purpose of this document is to provide a Basis of Design (BOD) for Clean Energy Fuels Australia (CEFA) for the relocation of the 48TPD LNG plant from Mt. Magnet to Peabody location**.** This document pertains to the 48 tons per day plant only.

1.2 Project Summary

CEFA proposes to install a natural gas liquefaction facility ("LNG Plant") to process 3300 to 4150 nm^3/hr for the liquefaction plant. The LNG Plant will utilize a Single Mixed Refrigerant Cycle to liquefy the gas downstream of the mole sieve dehydration system. LNG will be marketed as part of a virtual pipeline to various industrial end applications such as remote power generation, marine bunkering, and mobile equipment.

1.3 Abbreviations

The following abbreviations may be used in this document:

Table 1-1: Abbreviations

Abbreviation	Definition
API	American Petroleum Institute
BOD	Basis of Design
BOG	Boil-off gas
BTX	Benzene, Toluene, Xylene
BCA	Building Code of Australia
EFG	End flash gas
CEFA	Clean Energy Fuels Australia
GT	Gas turbine
HHV	Higher heating value
HP	High pressure
LNG	Liquefied natural gas
LP	Low pressure
TP	Tie Point
kW	Kilowatts
Mscf	Thousand standard cubic feet
MMscf	Million standard cubic feet
MR	Mixed refrigerant
MDEA	Methyl diethanolamine
MCR	Mix Compressed Refrigerant
ppm(v)	Parts per million (volume)
SMR	Single mixed refrigerant
TBA	To be assigned
TBC	To be considered
TPD	Tons per day

2 DESIGN SCOPE AND REQUIREMENTS

2.1 LNG Plant Processes

The scope of this BOD includes the basis for design for the following processes:

- Pre-treatment (48 TPD design).
    - CO_2 Removal (Amine Module). This module is designed to remove up to 2.5% CO_2 for brief excursions, and 2% CO_2 nominally.
    - Mole Sieve Dehydration Module
- Liquefaction and compression (48 TPD Design)
    - MR Compression and Refrigeration Module
    - LNG Liquefaction Module
- MR Make Up Module (48 TPD design)
- Flare System (250 TPD)
- LNG storage tanks provided by CEFA
- LNG Truck loading provided by CEFA
- Power supply provided by CEFA
- Relevant utilities (location of utilities to be confirmed) provided by CEFA

Main interface connections in the project will be as illustrated in the figure below:

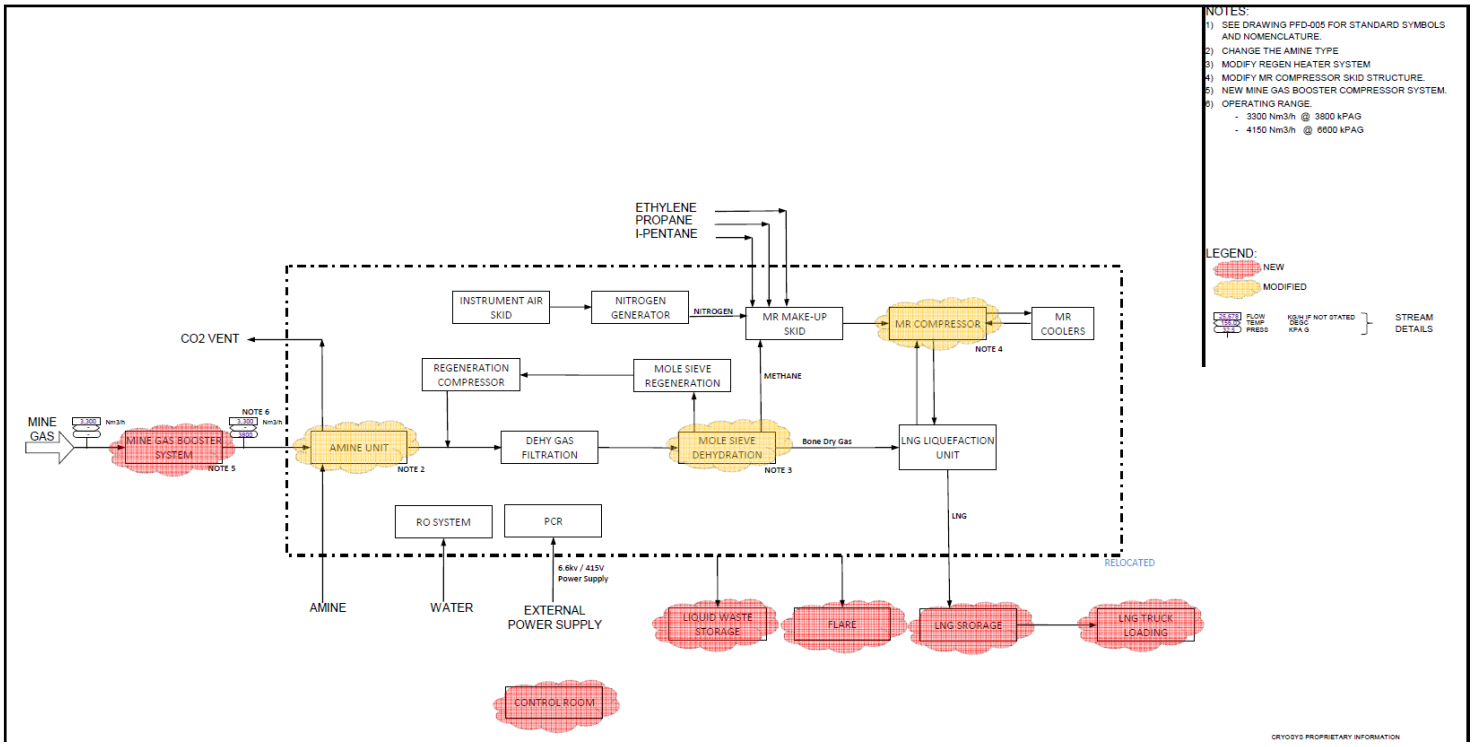


Figure 2-1: Overall block flow diagram of the LNG Plant

2.2 Design Life

The LNG Plant shall be designed for a service life of 25 years.

2.3 Capability and Turn-down Ratio

The process systems shall be designed such that the LNG Plant capability corresponds to expected annual average operating time of approximately 8,059 hours (i.e. 92% annual run time).

The LNG Plant shall have a designed capacity turn-down ratio of approximately 50% of full rate of LNG production.

2.4 LNG Production Capacity

The LNG Plant shall produce LNG at a design capacity of 48 TPD (minimum).

2.5 Design Units of Measurement and Language

All documents shall be written in English language.

All documentation should be in units as shown below.

Table 2-1: Units of measure established for the Project

Magnitude	SI (metric) Units
Temperature	°C
Pressure	kPa
Mass	kg
Actual Flow Rate	m^3/h
Gas Volumetric Flow	Nm^3/h
Time	s or h
Length	m
Mass Flow Rate	kg/h or TPD
Velocity	m/s
Volume	m^3
Density	kg/m^3
Energy	J
Work	kW
Duty	J/h
Heat Transfer Coeff.	$J/h\text{-}m^2\text{-}°C$
Specific Heat	J/kg -°C
Thermal Conductivity	W/m-°C
Viscosity	cP
Surface Tension	dyne/cm
Power	kW
Liquid Volumetric Flow	m^3/h

2.6 Process Safeguarding Philosophy Including Over Pressure Protection

Pressure Safety Valves (**PSVs**) shall not be spared, typically 1x100% unless required by code. Block and test for each PSV shall be provided. Automated depressurization is not required and therefore should not be provided. Any required blowdown shall be routed either to certified pressure vessels for re-capture, to local vents, to the fuel gas system or to the flare.

2.7 Design Margin Philosophy

A design margin of 10% shall be employed throughout the process design. LNG Plant Supplier to detail actual design margin on all key elements of the LNG Plant.

2.8 Interface Philosophy

All electrical terminations are to be brought to a single junction box or control cabinet at the skid edge. All process connections (where practical) to be located at skid edge. Where appropriate, a single drain interface at skid edge.

2.9 Civil and Structural Design

- **Modular Construction**

The connections between LNG Plant modules should be, where possible, quick connecting connections and allow for unlimited disassembly and reconnection. Welded connections between modules requiring site assembly shall be avoided. Disassembly of the modules should be possible without cutting of steel or welds. Flexible connections to alleviate pipe stresses should be provided at skid connections.

The modules shall be of steel construction, self-supporting and all LNG Plant equipment shall be housed within the envelope of the steel frames. Lifting lugs, shipping tie downs, module to module connections, and module tie-down points where required shall be incorporated into the frame design.

The modules shall be designed for installation on concrete, steel pier, or stabilized dirt foundations. The fully assembled LNG Plant shall be designed for adequate structural integrity without the need for external bracing, guy wires or site fabricated steelwork. The LNG Plant design should seek to minimize the requirement for poured concrete.

The pipework and electrical cable trays shall be integrated in the modules as much as possible. All connections between modules for site installation and commissioning shall be easily accessible without removal of structural or equipment components. Where possible, interconnections between modules for pipework and electrical shall be at a height such that they can be accessed without the need for ladders or scaffolding. Modules and free-standing equipment shall be kept within dimensions and weights that will facilitate cost effective transport. Transport weight and dimension limits for routes from the LNG Plant Supplier factory to Site shall be considered along with transport weight and dimension limits across Australia, to allow for relocation anywhere in Australia.

The access to equipment for commissioning, operation and maintenance shall be from within the skid modules. Filters, valves, instruments and any other equipment requiring maintenance during the life of the LNG Plant shall have adequate access around it and adequate structure above it, to allow for lifting and removal from the modules, without the need for disassembling the modules or removing structural components or equipment.

- **Geotechnical Site Data**

At present, there is no geotechnical data available for the selected location of the LNG Plant Site. CEFA will engage a local contractor to conduct the required site surveys, geotechnical analysis and flood risk assessments prior to the LNG Plant Supplier having to finalize its structural design.

- **Structural Design**

Structural design shall be in accordance with AS 1170 and documents referenced therein based on:

- design working life of 25 years
- importance level of 2
- annual probability of exceedance (P) of 1/250

- **Permanent, Imposed, and Other Actions**

Permanent loads, imposed loads and other actions shall be calculated in accordance with AS 1170.1 and AS 1657 for platforms, walkways and ladders. These loads shall be increased when considered necessary.

Access and maintenance platform live loading shall be 5.0 kPa, or larger when considered necessary. Stairway live loading shall be 4.0 kPa.

The effects of other actions such as dynamic loads from rotating or reciprocating equipment or thermal expansion of structures, piping and equipment shall be considered where appropriate.

- **Earthquake Actions**

Earthquake actions shall be calculated in accordance with AS 1170.4.

- **Wind Actions**

Wind actions shall be calculated in accordance with AS 1170.2 with the region-specific rating for the LNG Plant.

- **Structural Concrete**

Structural concrete shall be pre-cast concrete blocks wherever possible. The design (but not the supply) of structural foundations are inside the scope of supply for Cryosys. Also, Cryosys and their vendors will supply foundation requirements for each skid as well as skid details for each skid, including (but not limited to):

- Dimensions
- Hold-down bolt locations
- Structural (static and dynamic)
- Center of gravity
- Overall weight
- Lifting plan

- **Structural Steelwork**

Structural steelwork shall be designed in accordance with AS 4100 and AS 1554 and documents referenced therein. All structural steelwork, material strengths, connection details, bolting details, welding details, base plate grouting and corrosion protection shall be in accordance with the project specification for steelwork and, where possible, the project standard drawings.

- **Control Rooms**

Buildings including electrical and instrument switch rooms shall comply with relevant Australian Standards, the Building Code of Australia (**BCA**) and building regulations viz. BCA Class 5. Transportable style buildings are preferred.

2.10 Mechanical Design

All mechanical equipment supplied for the LNG Plant shall be designed to operate in the environment as stated in Section 4.

- **Seismic Loads**

All equipment shall be designed for the Seismic Conditions relevant for the LNG Plant Site as identified in Section 4.

- **Wind Loads**

All equipment shall be designed for the Wind Conditions relevant for the LNG Plant Site as identified in Section 4.

- **Noise**

The noise shall be no greater than 85 dB(A) at the Site boundary fence. Overall noise levels at the Site boundary shall be provided during detailed design.
Designated areas will be created where:
• it is likely that the 95 per cent upper confidence limit of an eight-hour mean exceeds 85 dB(A);
or
• impulse noise exceeds 140 dB(C).
These designated areas shall be identified and mapped, signposted or otherwise clearly communicated to personnel working in the area. Signposting, where necessary, must use appropriate wording or symbols on signs to identify the
hazard.

- **Reliability Data**

All sub-component equipment vendors shall provide reliability data for their equipment and/or major components as part of the scope of supply to Cryosys.
This data shall include (but not be limited to):
• Mean Time To Failure (**MTTF**)
• Mean Time To Repair (**MTTR**), with due consideration of project location
• Equipment performance profile
• Recommended maintenance intervals

- **Painting and Insulation**

Any vessels that are not insulated shall be painted to protect them from the environment. The coating systems shall be fit-for-purpose to meet the environmental data provided in Section 4.

- **Spare Parts**

The LNG Plant shall be provided with all commissioning spares. Cryosys and its vendors shall provide a priced list of operating spares for the first two (2) years of operation and a suggestion as to the quantity recommended for on-Site storage based on the previous experience.

Cryosys shall supply a critical spares list whereby each part which would lead to 24-hours loss of production will be identified. The tenderer shall consider the isolated nature of the equipment in remote Western Australia when preparing the critical spares list. The tenderer shall clearly identify where duty/standby equipment is recommended, for example, instances in which a single equipment failure would result in an LNG Plant shutdown.

- **Metallurgy**

A list of the proposed materials of construction and manufacture shall be provided to CEFA. Where items are sourced from third parties, the proposed materials shall be nominated in the equipment data sheets

for review and approval. Metallurgy for all systems must be fit-for-purpose with particular attention to the material selection for high pressure systems.

- **Rotating Equipment**

Generally, American Petroleum Institute (**API**) compliance is desired for rotating equipment, but the supply of equipment not compliant with API will be considered by Purchaser if it is deemed more cost effective, fit-for-purpose and good engineering practice. All rotating equipment shall also comply with AS 4024 for machine safety.

- **Packaged Equipment**

The maximum skid dimensions and weight shall be such to minimize transportation and lifting issues. Transport weight and dimension limits for routes from Cryosys factories to Site shall be considered along with transport weight and dimension limits across Australia, to allow for relocation anywhere in Australia.

- **Pressure Vessels and Static Equipment**

The pressure vessel design and fabrication for standard package equipment shall be supplied against ASME VIII / AS 1210. All pressure vessels will require local design verification and registration.

- **Pressure Vessel Internals**

The pressure vessel internals shall be fully designed, fabricated, inspected and tested in accordance with good engineering practice.

- **Plate and Frame Heat Exchangers**

If the LNG Plant proposed by the Supplier incorporates plate and frame heat exchangers, then such installation shall provide for 2 x 100% capacity units to provide adequate redundancy to allow for regular maintenance.

- **Air Cooled Heat Exchangers**

If the LNG Plant proposed by the Supplier incorporates air cooled heat exchangers, then such installation shall provide for 1 x 100% capacity unit with preference for multiple fan bays.

- **Shell and Tube Heat Exchangers**

If the LNG Plant proposed by the Supplier incorporates shell and tube heat exchangers, then such installation shall provide for 1 x 100% capacity units.

- **Piping and Valving**

Piping and valves shall be designed to ASME B31.3.

- **Pipe Stress Analysis**

Pipe stress analysis shall be performed as required by ASME B31.3.

- **Isolation Philosophy**

Single isolation valves are adequate for equipment isolation and provision for drains shall be included for equipment maintenance and vent valves required for commissioning and normal operation.

2.11 Instrumentation and Electrical Design

This section covers the minimum requirements for the electrical and instrumentation systems, equipment and materials for installation for the process. The governing regulations, design codes and design standards referenced below shall be taken to mean the latest edition of applicable documents published by that organization except where noted.

The electrical and instrumentation system shall be designed to withstand the weather conditions noted for the Site location detailed in Section 4. Electrical connections requiring site installation shall be minimized. All electrical, instrument and control wiring shall be provided with each skid.

- **Design Codes and Standards**

The design and installation shall comply with the relevant Standards, Codes of Practice and Statutory requirements including but not limited to those listed in Section 3.

- **Hazardous Area Classification**

Hazardous area classification for the plant shall be carried out in accordance with AS/NZS 60079.10. This classification is expected to be Zones IIA and IIB.

- **Certifying Authority**

Any equipment installed in a hazardous area shall be suitably explosion protection (**Ex**) rated for the zone, gas group and temperature class of the atmosphere in which it is installed. All Ex rated equipment shall be certified by an approved testing station in accordance with AS/NZS 60079 series of standards and shall be provided with an IEC Certificate of Conformity (**COC**). Certification from other authorities (e.g. ATEX) is not permitted as a substitute.

- **Hazardous Area – Explosion Protection Methods**

Accepted methods of explosion protection are:

- Zone 0, 1 & 2 Ex 'ia' Intrinsically Safe (with galvanic isolation barriers preferred)
- Zone 1 & 2
  - Ex 'd' Flameproof
  - Ex 'e' Increased Safety
  - Ex 'm' Encapsulation
- Zone 2 Ex 'n' Non-sparking

Equipment located in designated non-hazardous areas does not require certification.

- **Ingress Protection**

Electrical equipment, including cable entries and blanking plugs, shall carry a minimum Ingress Protection (**IP**) rating listed below, as specified in AS 60529:

• Electrical equipment installed in outdoor locations (IP 65)

• Instrument air compressor motor (IP 55)

With an electrical enclosure open, all live parts shall be shrouded to provide IP2X protection as a minimum.

- **System Voltage, Frequency, and Tolerance**

The electrical system voltages and frequency shall comply with AS 60038 – 2012 which is as follows:
• Power supply: 415 V AC, 3-phase, 4-wires (+ earth) 50 Hz, neutral solidly earthed (MEN)
• UPS power: 240 V AC, 1-phase, 2-wires, 50 Hz
• Lighting: 240 V AC 1-phase, 2-wires, 50 Hz
• Instrumentation and control: 24 V DC
Electrical equipment shall be designed for AC voltage system variations in the range of ± 10% and AC frequency variations in the range ± 2.5%. Total harmonic distortion shall be less than 5%.

- **Electrical Design Requirements**

In accordance with AS 60947 set of standards, electrical panels, enclosures and equipment shall be appropriately guarded, labelled, and made inaccessible (except for emergency shut off mechanisms) to unauthorized personnel. Areas containing such equipment are 'controlled areas'.

Main Power Supply

The Moranbah facility is located in a remote location with no access to grid power supply. The Moranbah facility and LNG Plant shall be supplied with power from a gas generation set (**Gen-Set**) that will use tail gas and make-up gas from gas feedstock. Cryosys will be responsible for the necessary electrical interfaces between the Gen-Set and the Suppliers switch room including but not limited to all necessary power and control feeds to the LNG Plant and general area lighting and power.

Distribution Boards and Panels

A main distribution board on each LNG Plant shall contain electrical protection devices for incoming and outgoing feeder circuits, as well as the control system electrical components required for the LNG Plant. If the LNG Plant includes any trim heater control panels then such panels shall contain electrical protection devices for outgoing heater circuits as well as the control system electrical components required for the heater, including heater circuit contactors. The main distribution board and heater control panel(s) shall provide adequate explosion protection for the hazardous area in which they are installed.
Other aspects which shall be considered include:
• the boards shall be steel construction
• cable entry (incoming and outgoing) shall be top or bottom entry as required to facilitate space limitation.
• short circuit capacity of all panels and protection devices shall be rated above 25kA design fault level or be suitably protected by an upstream device (per AS 3000)
• minimum 10% additional spare space

Uninterruptible Power Supply

A battery backed UPS system shall be provided for the basic process control (**PCS**) and communications systems during a total supply power failure. The UPS unit shall be sized to supply 240 V AC at 100% rated load at 0.8 power factor in the event of failure of the power supply.
The battery reserve capacity for the control system shall be capable of supplying the required loads, taking into consideration the expected load profiles, for a period of at least one (1) hour. For fire and gas detection the battery reserve capacity shall be capable of supplying the required load for at least twelve (12) hours. The battery shall be sealed lead acid type and have a rated life of minimum 15 years.

○ DC System

Rectification to 24 V DC shall be done as required within the main distribution board, remote I/O panels, and in the heater control panel.

○ Normal Lighting

LED lighting incorporated into the LNG Plant shall be utilized to provide general area illumination. Illumination outside the LNG Plant is outside the scope of this project. The lighting design shall permit safe access to all areas of the LNG Plant. Lighting shall be controlled automatically via a photoelectric (**PE**) cell and luminaries shall be fitted with built-in ballast units.

○ Emergency Lighting

All emergency luminaries shall be fitted with individual battery packs, capable of providing a back-up time of not less than two (2) hours.

○ Cable Construction and Cable Installation

Cable shall be in accordance with the guidelines of AS/NZS 3000. Low voltage cables shall be circular, copper conductor, 0.6/1.0 kV grade, X-90 cross-linked polyethylene insulated, galvanized steel wire armored and polyvinyl chloride (PVC) sheathed i.e. Cu XLPE/SWA/PVC.
Small power cables (i.e. ≤16mm2) may be thermoplastic (PVC) V-75/V-90 insulated i.e. Cu PVC/SWA/PVC.
All instrumentation cabling (24 V DC) located in hazardous areas, shall be armored, overall screened, twisted pair type cable.
For cable conductor core colors shall be:

- Red, White, Blue for phase conductors
- Black for neutral conductors
- Green/Yellow for earth conductors
- Red and Black for DC cables
- White and Black for twisted pair instrumentation cables
- Consistent coloring for panel wiring

LV cables shall be installed, continuous from terminal to terminal, mainly on perforated cable trays, incorporated into the skids. Cables shall be nominally spaced by the outside cable diameter to avoid cable de-rating. Short cable runs from electrical panels to equipment terminals may be bunched in free-air.

○ Cable Sizing

Cable sizing shall be completed in accordance with the guidelines of AS/NZS 3008.1.1 and AS/NZS 3000. Cables shall be sized for current-carrying capacity, to withstand voltage drop (maximum 5%) and to meet short circuit performance. The minimum size for power feeder circuits shall be 2.5 mm^2. The main distribution board incoming breaker shall be provided with fast acting zero sequence protection and therefore earth loop impedance will not be a factor for consideration. Control and other small wiring shall be carried out with multi-stranded copper conductors with a minimum size of 0.5 mm^2 for multi pair cable and 1.5 mm^2 for single pair cable or panel wiring.

○ Earthing and Bonding

The power supply electrical system earthing shall be a multiple earth neutral (**MEN**) system as described in AS/NZ 3000, Section 5. Protective earthing and equipotential (**EP**) bonding within the skids shall be provided in accordance with the requirements of AS/NZS 3000 and AS/NZS 60079 (particularly part 14).

Two skid earth EP bonding bosses shall be provided on each skid (position on skid to be determined). An EP bonding conductor, connected to the electrical supply earth termination system, shall comprise 120mm^2 copper, PVC insulated cable, connected at either earthing boss using plated brass compression lugs and phosphor bronze M10 hex head set screws with locking nuts. Protective earth bars in electrical panels shall be connected to the panel frame at both ends of the bar.
Instrument earth connection shall be provided in panels as required for the instrumentation system.
Additional intrinsically safe (**IS**) earth shall be provided as per the requirements of AS/NZS 3000 and AS/NZS 60079 applicable to the IS system implemented. All protective earth and instrument earth bars shall be clearly labelled. Where IS earths are used, they shall be isolated and clearly labelled. Static protection earthing shall be provided, where required, in accordance with the requirements of AS/NZ 1020. All metallic vessels, piping and steelwork, etc. requiring equipotential bonding shall be connected to the electrical earthing system. Adequate electrical continuity shall be provided for static dissipation to the EP bonding system for the LNG Tankers and hoses.

○ Lightning Protection

Equipment providers should advise if any equipment requires lightning protection.
Where lightning is considered a substantial risk, a lightning risk assessment shall be carried out in accordance with the requirements of AS/NZS 1768.
A Lightning Protection System (**LPS**) shall be installed as required, dependent on the outcome of the lightning risk assessment.

• Instrument Design Requirements

○ General Requirements for Instrumentation

Field instruments shall be suitable for the service in which they are installed and for use in the environmental conditions and hazardous area in which they are located. Instrumentation shall be fit for-purpose and, where possible, to LNG Plant Supplier standard. All instrumentation shall meet statutory requirements. Transmitters shall be specified in lieu of switches wherever practical. All instrumentation shall be provided with adequate support and adequate clearance to permit routine maintenance, inspection and removal. Instrument installations with impulse lines shall include the provision of block and bleed valves. An air filter and regulator shall be provided for each instrument requiring an air supply for its operation. The wetted parts of all instrumentation components shall be of type 316 stainless steel as a minimum. All instruments included for a shutdown service shall be provided complete with verified probability of failure on demand (**PFD**) information suitable for use if required for SIL verification procedures. All instrumentation installed outdoors shall be protected from the effects of direct sunlight by use of local sunshades unless they are already suitably protected from direct sunlight.

○ Electrical Requirements for Instrumentation

Conventional input and output (**I/O**) signal levels shall be used. Analog instruments shall utilize loop power, 4-20mA signals. Digital signals shall be +24V DC. Electrical panels containing instrumentation and control terminations shall include a protective earth and an instrument earth. In circumstances where IS devices are used preference shall be for isolated, intrinsically safe systems and an intrinsically safe earth shall be provided only as required.

• Field Instrumentation

○ Level Instruments

Level transmitters shall be of the differential pressure type.

- **Pressure Gauges**

Pressure gauges shall be of the Bourdon tube type.

- **Pressure Switches**

Pressure transmitters shall be used in preference to pressure switches.

- **Pressure and Differential Pressure Transmitters**

Pressure and differential pressure transmitters shall be electronic, capacitance type and shall be capable of withstanding full line pressure on either side. Transmitters shall be provided with an integral indicator. Indicators shall be a digital type and shall display the process variable in engineering units.

- **Temperature Instruments**

All temperature measuring devices in process lines shall be furnished complete with a thermowell. Thermowells shall be of 316 stainless steel as a minimum. Resistance thermometers (**RTD**) or thermocouples (**TCs**) may be used. The use of temperature switches is not permitted. RTDs and TCs shall be connected to associated I/O modules via a temperature transmitter. Temperature transmitters shall preferably, be mounted directly on the RTD or TC head. Where transmitter indicators are used, they shall be a digital type and shall display the process variable in engineering units.

- **Coriolis and other Flowmeters**

A Coriolis flowmeter is the required method of metering natural gas to the LNG Site, this will be supplied by CEFA. This meter shall be adequate for fiscal natural gas metering and provide gas mass flow, total and temperature outputs. Internal metering is required to LNG Plant and Island Power as well as natural gas product discharged from the LNG Plant which will be provided by the Cryosys. A Coriolis flowmeter is not required for aforementioned metering. The use of differential pressure gauge and orifice plate is an acceptable alternative.

- **Valves**

- **Control Valves**

Control valves shall generally be globe type with single or double seated trim. Control valves shall be provided as complete assemblies, with I/P converter/positioner and pneumatic actuator.
Control valve sizing calculations shall be in accordance with IEC 60534-2-1. Noise reducing trims shall be used to ensure that control valve noise levels do not exceed 85 dB(A) at 1 meter from the valve during normal operation or exceed 110 dB(A) at 1 meter from the valve during abnormal operation.

- **Shutdown Valves**

Shutdown valves shall be fail-closed actuated ball type operated by de-energization of electrically activated solenoid valves. Shutdown valves shall incorporate position switches, of appropriate Ex rating (Ex ‘ia’ preferred), for open and closed status indication as required. All shutdown safety valves shall be certified as fire safe and anti-static. Shutdown valve assemblies complete with valve, actuator and solenoid shall be supplied.

- **Relief Valves**

All relief valves shall be certified to either AS 1210 or ASME VIII. Relief valve sizing shall be in accordance with AS 1271 or API RP 520. Particular attention shall be given to the maximum possible backpressure of the vent header arising from the opening of any relief valve into the vent system. Where the set pressure of a relief valve will be significantly affected by developed backpressure, a balanced bellow or pilot-operated relief valve shall be specified.

- **Tubing and Fittings**

All instrumentation tubing shall, as a minimum, be ASTM A269 TP 316L stainless steel.
All instrumentation tube fittings shall be of the double ferrule 316 stainless steel compression type.

- **Combustible Gas Detectors**

Hydrocarbon gas detectors (suitable for methane) shall be provided at the LNG Plant to detect gas leaks. Purchaser's preference is for "IR type" and "sniffer type" gas detectors, either point detection or open path as appropriate.

- **Flame Detectors**

Flame detectors shall be provided at the LNG Plant and shall be infrared type unaffected by sunlight, artificial light or flashes from welding equipment. The flame detector design shall minimize false alarms through the use of narrow window IR response and flame flickering discrimination. Double or triple spectrum IR detectors are preferred.

- **Smoke Detectors**

Smoke detectors are not generally required, however the use of a VESDA system in the control room is mandatory.

- **Audible Alarms**

A siren/strobe audible and visual alarm shall be included at the LNG Plant to identify the triggering of any fire or gas detection.

2.12 Safety and Security

- **Risk Management Philosophy**

The engineering design of the process shall include recognized good practice for the identification and management of risks.
The management of risks shall include a formal risk assessments and evaluation of hazards to reduce risks so far as is reasonably practicable (**SFARP**).
Typical recognized good practice includes, but is not limited to:
• HAZOP
The completion and timeframe of the risk assessments shall be included in the Project Execution Plan (**PEP**).

- **Manual Emergency Shutdown**

Emergency shutdown (**ESD**) of a unit may be manually initiated from ESD buttons located on each module. ESD buttons shall consist of a red "mushroom" type ESD button with normally closed, fail open contacts.

- **Cause and Effect Functionality**

The cause and effect diagram shall incorporate a detailed summary of the PCS functionality.

- **Alarm Reset Philosophy**

Input signals from instruments shall be self-resetting. However, trips shall latch. Interlocking shall be configured such that outputs cannot be reset prior to the associated input becoming clear.
Resetting shall be accomplished through the use of hard button resets at the local control panel.

- **Fire & Gas System**

The fire and gas (**F&G**) system shall monitor fire and gas devices and initiate shutdowns as required.
The F&G detection function shall be provided with individual flame and gas detectors.
F&G system detectors and shall be connected to and monitored by the safety control system.

- **Security network and communications systems**

CCTV security network will be provided by CEFA. Cryosys will incorporate CCTV feed from various locations to interface with the HMI and SCADA system.
Communications shall be provided by CEFA and will be either microwave and/or satellite. Cryosys shall interface its HMI and SCADA system to allow access for remote support services.

2.13 Controls

- **Control Philosophy and Hierarchy of Controls**

A process control system (**PCS**) shall be present at the LNG Plant. The PCS shall be used to adjust process parameters to ensure design operating limits are maintained.
The PCS shall provide the facility to annunciate (audio and visual) and log alarms as well as data logging of process parameters at the storage and truck loading infrastructure.

  - **Cause and Effect Functionality**

The cause and effect diagram shall provide a detailed summary of the PCS functionality.

- **Equipment Communication**

Equipment shall communicate via a common master facility controller. Standalone package controllers may be utilized in the design, however, all controllers shall be capable of relaying data to the master controller. The facility master controller shall be capable of remote access and communications.

- **Protection Systems**

The site shall include an ESD system incorporating field mounted ESD buttons.
Remote isolation of the gas supply into the LNG Plant shall be possible via the ESD system.

2.14 Operations and Maintenance

- **Operating and Maintenance Philosophy**

All LNG Plant equipment will be maintained in line with the recommendations of Cryosys and its vendors at all times.

Cryosys will provide detailed maintenance schedules and maintenance parts and consumables lists as well as desk-top and in-field training for maintenance technicians.
Maintenance schedules will form part of the Cryosys's Manufacturers Data Records (**MDR**) and will be a deliverable milestone.

- **Commissioning and Start-up Philosophy**

The LNG Plant will be commissioned in accordance with recommendations of Cryosys.
Cryosys will be responsible for overseeing the final installation of the LNG Plant as well as supervising commissioning and testing of the LNG Plant, with local skilled labor supplied by CEFA. Cryosys shall provide detailed commissioning and start-up procedures.

3 REGULATIONS AND STANDARDS

The LNG Plant shall be designed according to the following regulations, codes and standards:

3.1 LNG Specific Standards

- AS/NZS 3961 – 2017 The Storage and Handling of LNG

3.2 Process Engineering

- API RP 520 Sizing selection and installation of pressure relieving devices in refineries:
  - Part I – Sizing and Selection (7th Edition)
  - Part II – Installation (5th Edition)
- API Standard 521 Guide for pressure relieving and depressurizing systems (5th Edition)
- API Standard 526 Flanged Steel Pressure Relief Valves (5th Edition)

3.3 Civil and Structural Engineering

- AS/NZS 1170.0 General principles
- AS/NZS 1170.1 Permanent, imposed and other actions
- AS/NZS 1170.2 Wind actions
- AS 1170.4 Earthquake actions in Australia
- AS 1554 Structural Steel Welding
- AS 1657 Fixed platforms, walkways, stairways and ladders – design, construction and Installation
- AS 1725 Chain-link fabric security fencing and gates
- AS 1743 Road signs – specifications
- AS 3990 Mechanical equipment – steelwork
- AS 4100 Steel structures
- AS/NZS 4600 Cold-formed steel structures
- AS/NZS 4680 Hot-dip galvanised coatings on fabricated ferrous articles

3.4 Mechanical Engineering

- ASME Section VIII Boiler and Pressure Vessel Code Division 1 & 2
- ASME II Material Specifications
- ASME V Non-Destructive Testing

- ASME IX Welding and Brazing Qualifications
- ASME B16.5 Steel Pipe Flanges and Flanged Fittings
- ASME B31.3 Process Piping
- API 660 Heat Exchangers for General Refinery Service
- API 661 Air Cooled Heat Exchangers for General Refinery Services
- API 662 Plate Frame Heat Exchangers for General Refinery Service
- AS 1210 Pressure Vessels
- AS 1210 Supplement 1 Unfired Pressure Vessels - Advanced design and construction (Supplement to AS 1210)
- AS 2473 Valves for compressed gas cylinders Part 1 – Specifications, type testing and manufacturing tests and inspections
- AS/NZS 2229 Fuel dispensing equipment for explosive atmospheres
- AS/NZS 3788 Pressure equipment – In-service inspection
- AS 4024 Safeguarding of machinery – general principles
- AS 4041 Pressure piping
- AS 4332 The storage and handling of gases in cylinders
- AS 4343 Pressure equipment – hazard levels
- AS 4360 Risk Management

3.5 Electrical and Instrumentation Engineering

- AS/NZS 1020 Control of undesirable static electricity
- AS 1271 Safety valves, other valves, liquid level gauges, other fittings for boilers and unfired pressure vessels.
- AS 1349 Bourdon tube pressure and vacuum gauges
- AS 1359 (set) Rotating electrical machines
- AS 1670 Automatic fire detection and alarm systems – system design, installation and commissioning
- AS/NZS 1768 Lightning protection
- AS/NZS 3000 Electrical Installations (Australia / New Zealand Wiring Rules)
- AS/NZS 3008 Electrical installations - Selection of cables
- AS/NZS 3100 Approval and test specification – General requirements for electrical equipment
- AS/NZS 3439 (set) Low voltage switchgear and control assemblies
- AS 4029 Stationary batteries - Lead acid
- AS 4044 Battery chargers for stationary batteries
- AS 4428.1 Fire detection, warning, control and intercom systems
- AS/NZS 60079 (set) Explosive atmosphere
- AS 60038 – 2012 Standard Voltages
- AS 60529 Degrees of protection provided by enclosures (IP code)
- AS 60947 (set) Low voltage switchgear and control gear
- AS/NZS 61347.1 Lamp control gear – General and safety requirements
- AS/NZS 61347.2.8 Lamp control gear - Particular requirements for ballasts for fluorescent lamps
- AS 62040 Uninterruptible power systems (UPS)

3.6 International I&E Codes

- ASTM A269 Specification for stainless steel tubing
- EEUMA 160 Safety related instrumentation systems for the process industries
- IEC 60079(set) Explosive atmospheres
- IEC 60331-1 Tests for electric cables under fire conditions – Circuit integrity – Part 1: Test method for fire with shock at a temperature of at least 830oC for cables of rated voltage up to and including 0.6/1.0kV and with an overall diameter exceeding 20mm
- IEC 60332-1 Tests on electric and optical fibre cables under fire conditions - Part 1-1: test for vertical flame propagation for a single insulated wire or cable - Apparatus
- IEC 60332-3-24 Tests on electric and optical fibre cables under fire conditions - Part 3-24: Test for vertical flame spread of vertically mounted bunched wires or cables – Category C
- IEC 60073 Basic and safety principles for man-machine interface, marking and identification - Coding principles for indication devices and actuators
- IEC 61131 Programming industrial control systems
- IEC 61508 (set) Functional Safety of Electrical/Electronic/Programmable Electronic safety related system
- IEC 61511 Functional Safety – Safety instrumented systems for the process industry sector – Part 1: Framework, definitions, system, hardware and software requirements.

4 ENVIRONMENTAL DATA AND SITE CONDITIONS

Location:	Moranbah, QLD, Australia
	21.99°S, 148.03°E
Elevation above MSL:	260 m
Maximum Design Air Temperature:	45 °C
Minimum Design Air Temperature:	0 °C
Design Air Temperature:	40 °C
Design Wind Speed:	193 km/hr or AS 1170.2 (Regional 162km/hr)
	Wind Region A0
	Wind Return Period 1:500
Earthquake actions:	Designed per AS 1170.4
Cyclone rating:	Region C
	Terrain Category 2
	Building Importance Level 2

Seismic:	Code: ASCE 7-10

- Terrain Category 2 for all structures below 100m in height.
- Seismic Hazard Factor 0.06
- Seismic return period 1:500
- Probability factor 1.0

Soil Conditions:	Site Subsoil Class - Ce (To be confirmed from Geotechnical Investigation Report)
Rainfall:	Annual average = 613mm Monthly maximum=350mm

5 FEED GAS CONDITIONS

5.1 Feed Gas Parameters

Feed gas shall be delivered to the LNG Plant as follows:

Feed Gas Conditions	
Inlet Gas Flow to Pre-Treatment	3306 to 4147 nm^3/hr
Inlet Gas Temperature	40 °C
Inlet Gas Pressure	38 barg (72 barg design)

5.2 Feed Gas Composition

The feed gas composition being delivered to the LNG Plant is presented in the table below. The gas analysis used in the design of the LNG Plant was supplied by CEFA.

Table 5-1: Feed Gas Composition

	Normal Feed Gas
Component	Mole %
Nitrogen	4.00
CO_2	1.20
O2	0.50
Methane	94.3
Ethane	0.00
Propane	0.00
i-Butane	0.00
N-Butane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexane	0.00
Heptane	0.00
Total	**100**

Notes:

1. H_2S content: the H_2S content is assumed <2 mg/m^3
2. Mercury content: no mercury is expected in feed gas
3. Heavy hydrocarbons: assumed negligible
4. Sand: no sand
5. Formation water: not expected
6. Maximum moisture content of feed gas is 48 mg/m^3

6 PRODUCT SPECIFICATIONS

Treatment of feed gas is required to remove contaminants and impurities that adversely affect the quality of the LNG. The maximum concentrations of contaminants and impurities of the LNG product are listed on the table below:

Table 6-1: Product Specification

LNG Specification			
H_2S	Max	4	mg/m^3
Max C5+ (loaded LNG)	Max	0.1	mol%
Benzene/ BTEX	Max	0.8	mg/m^3
CO_2	Max	50	mg/m^3
Mercury (Hg)	Max	10	mg/m^3
Water	Max	0.1	mg/m^3

7 PROCESS SYSTEMS

The purpose of this section is to describe the main process systems that are required for the LNG Plant. LNG, a colorless, odorless, and nontoxic gas, is produced when natural gas (predominantly Methane CH_4) is refrigerated to a temperature of approximately (-160˚C). LNG occupies $1/600^{th}$ of the volume of natural gas, creating a cost effective and efficient method of storage and transport to remote locations where pipelines are not available.

To ensure a successful liquefaction process, the natural gas should be pretreated to remove CO_2 < 50 mg/m^3 (to avoid solidification in the refrigeration stage), H_2S< 3 mg/m^3 (to minimize the corrosion) and H_2O<1 mg/m^3 (to avoid freezing and causing blockage in the refrigeration stage). The gas then enters the refrigeration stage where the gas is cooled down to the liquefaction temperature and ready to store and transport.

7.1 Inlet Gas Metering and Filtration/Separation

The feed gas enters the boundary of the LNG Plant with pressure and temperature as previously described. The feed gas entering the LNG Plant could carry moisture, contaminants, and impurities, requiring pre-separation and filtration. The gas will then flow into a feed gas scrubber to separate any entrained liquids. A pressure and temperature-compensated flow transmitter is used to measure and record plant inlet gas flow. Means of protection to handle any variations in the feed gas should be considered based on the certainty of upstream conditions.

7.2 Amine Unit

The Amine Unit shall be designed to reduce the concentration of 2.5% CO_2 in the feed gas to a maximum concentration of 50 ppm(v) to avoid freezing in the liquefaction process. H_2S concentration of three (3) ppm(v) shall be considered. The LNG Plant will be designed based on a regenerative amine process. Proven solvents will be used and formulated/activated MDEA is the most appropriate amine for this service.

Feed gas enters the amine plant after having passed thru the flow, pressure, and temperature sensing instruments. The feed gas next enters the Amine Contactor. The gas initially enters the Inlet Scrubber portion of the contactor which eliminates liquid slugs and other entrained hydrocarbon liquids within the gas. The likelihood of liquids collecting in the Inlet Scrubber is small given the pipeline source of the feed gas, but the Inlet Scrubber does provide an insurance protection against a liquid slug entering and damaging the Amine Unit. Lean amine is pumped into the contactor packing. Feed gas flows up from the Inlet Scrubber thru the packing where the amine chemically reacts with the CO_2 in the feed gas. The CO_2 binds with the Amine allowing sweet (CO_2-free) gas to leave thru the top of the contactor. Rich Amine is collected at the bottom of the packing section and sent to the Rich Amine Flash tank. The sweet gas flows thru the Feed Gas/Treated Gas Exchanger before leaving the Amine Unit headed for the Dehydration section of the plant.

The Rich Amine Flash Tank captures and stores the CO_2 rich amine after it leaves the Contactor. Blanket gas is supplied to the flash tank to ensure that there is always positive pressure within the vessel. Rich amine leaves the bottom of the flash tank headed for the filtration.

After leaving the flash tank, the rich amine passes thru three filters in series:

1. Rich Amine Pre-filter
2. Rich Amine Charcoal Filter
3. Rich Amine After-filter

The contaminant-free rich amine then enters the Amine Lean/Rich Exchanger. Here the rich amine lowers the temperature of the lean amine. The rich amine then enters the Amine Still Column where the rich amine liquid flows down thru packing further collecting CO_2 from the regenerated lean amine flash gas leaving the Amine Reboiler. The rich amine liquid leaves the Still Column and goes to the Amine Reboiler. Reflux gas (primarily CO_2 sour gas) leaves thru the top of the Amine Still Column passing thru the Reflux Condenser before entering the Reflux Accumulator. CO_2 is vented out of the top of the Reflux Accumulator and liquid from the bottom is collected in the Lean Amine Surge Tank.

The rich amine leaving the Still Column enters the Amine Reboiler where an electric immersion heater is supplies heat that vaporizes the CO_2 from rich amine generating flash gas that returns to the Still Column and warm, lean amine that goes to the Lean/Rich Amine Exchanger. From the Lean/Rich Amine Exchanger the lean amine passes thru the Lean Amine Cooler where the temperature is further reduced by forced air convention. Then the lean amine enters the Lean Amine Surge Tank which is a storage vessel that supplies Lean Amine to the Amine Circulation pumps. The Amine Circulation pumps drive the lean amine back to the Amine Contactor to start the process again.

7.3 Dehydration

Molecular sieve gas dehydration will be employed for LNG feed gas drying as it can reduce the water

content to less than 0.1 ppm required for the gas liquefaction.

Special designed molecular sieves, such as UOP's 4A-LNG is recommended to remove water and low molecular weight mercaptans that are not removed in the upstream amine system.

The inlet gas stream must be fully dehydrated to a dew point less than -100 °C before being processed in the cryogenic section of the facility. A conventional two-bed molecular sieve dehydration system is used to completely dry the inlet gas. One of the two Dehydrators operates in the adsorption cycle while one bed is in the regeneration cycle. The gas flow is downwards during dehydration and upwards during regeneration.

The regeneration gas is taken from the dry gas line downstream from the Dry Gas Dust Filters and / or flash gas coming from the Flash Drum. Regeneration gas is then heated to about 230°C in the Regeneration Gas Heater. The hot regeneration gas is routed to the bottom of the exhausted Dehydrator and desorbs the water and CO_2 from the molecular sieve. The wet regeneration gas exits the top of the bed and is cooled to 50 °C with air in the Regeneration Gas Cooler. Water that condenses out of the regeneration gas is removed in the Regeneration Gas Scrubber and the dry gas is then sent to a fuel stream. During the cooling cycle, the regeneration gas bypasses the Regeneration Gas Heater and flows directly into the hot dehydration bed.

Bone-dry gas from the Dehydrators is routed to the Dry Gas Dust Filters to remove any sieve dust prior to entering the cryogenic portion of the plant. A 100% spare Dust Filter is provided so that one unit is always in service even during element change-out periods. It is critical that a Dust Filter be in service at all times in order to avoid plugging in the downstream brazed aluminum plate-fin heat exchangers.

With the acid gas and water removed from the feed gas, the treated gas with CO_2 content of less than 50 ppm, and water content of less than 0.1 ppm is now ready for pre-cooling and liquefaction.

7.4 Liquefaction

The purpose of the liquefaction system is to cool, condense, sub cool and stabilize the LNG at storage tank pressure. The liquefaction process consists of two, separate loops. The Mixed Refrigerant loop is a closed loop that contains a combination of refrigerants that experience a repeated vapor compression refrigeration process. The condensation of the sweet, dehydrated process gas into LNG forms the other loop (open not closed).

The Single Mixed Refrigerant (MR) cycle is designed to minimize compression power and is optimized by using a specific refrigerant mixture for this customized plant design. This refrigerant mixture can be compressed as required to meet the refrigeration requirements. The mixed refrigerant is initially introduced, and MR levels are periodically topped off as needed from the MR Makeup and Storage system into the MR Compressor Suction Scrubber.

The Suction Scrubber prevents a slug of MR liquid from being introduced into the MR Compressor. MR vapor leaves the Suction Scrubber and is compressed in the first stage of the MR Compressor. After compression, the vapor is cooled in the MR Compressor Intercooler. The MR vapor then enters the MR Inter Stage Scrubber before being compressed in the 2nd stage of the MR Compressor and then cooled in the MR Compressor After Cooler. The compressed MR then travels thru pass within the aluminum brazed exchanger where it cools process gas. The MR is then expanded across a valve further cooling the MR before it travels thru a second pass within the brazed heat exchanger condensing the process gas into

LNG. The MR then travels back to the suction compressor scrubber to restart the closed loop process. There is an MR Flash Drum within the Cold Box that is used to capture and separate MR that liquefies after the expansion across the valve.

Cryosys has developed a proprietary liquefaction process which is contained in a perlite filled cold box. The cold box includes the main MR/process gas exchanger, a brazed aluminum heat exchanger for optimal heat transfer, and the flash separation vessels. The cold box, as designed, also acts as a secondary LNG containment vessel in the unexpected event of an internal leak. The lower section of the cold box will be stainless steel for this purpose and all LNG cold box penetrations will be above this secondary containment volume and will be made of 304 stainless steel to comply with NFPA 59A.

The Cold Box also contains an ANGLE Column that is capable of removing heavy hydrocarbon liquids (NGLs) before the process gas is liquefied into LNG.

The dry gas, after removal of CO_2 and moisture, can be used as methane makeup to the refrigerant.

The MR composition will be monitored on a gas chromatograph that will be supplied with the LNG Plant.

7.5 MR Storage and Makeup System

To minimize the loss of the mixed refrigerant, a refrigerant holding tank, MR Accumulator, is provided to "absorb" the MR system settle out and to hold refrigerant expansion after a shutdown. A MR storage and charge system will be installed to provide MR makeup. A MR make up system will be provided to make up MR components as required due to seal gas losses. Gas chromatograph reports will be created to facilitate analyzing the composition and determine the required MR make up.

The MR will contain a mixture of methane, nitrogen, propane, ethylene and Iso-pentane. Methane will be provided from the system after removal of moisture and CO_2. Nitrogen will be provided from the nitrogen generator provided with the LNG Plant. Propane, ethylene, and Iso-pentane will be provided in storage bottles and drums as follows:

- *R-290 Propane Bottles (Refrigerant Grade).* Makeup propane bottles will be provided to add propane to the MR-refrigeration system.
- *R-1150 Ethylene Bottles (Refrigerant Grade).* Makeup ethylene bottles will be provided to add ethylene to the refrigeration system.
- *Iso-Pentane Bottles (Refrigerant Grade).* An iso-pentane bottle will be provided to add iso-pentane to the refrigeration system.

7.6 Tail Gas

Any remaining boil off gas from the liquefaction process will be removed and blended with any suitable outputs of the natural gas pre-treatment skid, and/or pipeline gas to be fed into the fuel gas stream for the on-site power generators.

7.7 Flare System

Cryosys will design and supply a flare system with a capacity of at least 125% of the anticipated requirements for the Mt. Magnet including but not limited to LNG Plant, storage tanks and loading skids. The flare and flame arrestor shall be designed to function and capture the entire LNG plant facility. The flow of gas to the flare will be metered. The flare shall function normally in the event of a general power outage.

7.8 LNG Storage (CEFA Scope)

LNG will be stored at the LNG Plant prior to loading into the LNG road tankers. LNG storage and LNG loadout are outside the Cryosys scope and will be provided by CEFA. LNG storage will comprise 1 x 350m3 LNG tanks.
LNG storage tanks shall be of the double walled vacuum insulated type and shall be mounted horizontally.
If required, boil-off gas from the LNG storage tanks shall be re-directed into the LNG
Plant for re-liquefaction or used as a fuel for on-Site power generation.

7.9 LNG Loading and Connections (CEFA Scope)

LNG will be loaded into ~55kl LNG tankers configured in groups of three as triple road trains. LNG loading and logistics is outside the Cryosys scope.
The LNG tanker loading system shall be capable of loading all three trailers of a triple road train simultaneously in approximately 1 hour.
Boil-off gas from the LNG tankers shall be re-directed into the LNG Plant for re-liquefaction or used as a fuel for on-Site power generation.

7.10 Truck Scale (CEFA Scope)

A computerized above-ground weighbridge system shall be supplied and installed by CEFA to ensure that all road tankers entering and exiting the Site are weighed. The weighbridge shall be designed to accommodate the various configurations of LNG road tankers i.e. single, double or triple. The weighbridge electrical supply will be from the Supplier main distribution board and accordingly provision will need to be provided in the Supplier's panel. The equipment will record vehicle weights and issue tickets indicating the tare weight, gross weight, net weight. CCTV cameras will be positioned to view the front and rear of the vehicles on the weighbridge. Audio-visual communication will to be provided between the weighbridge and the central control room.

7.11 Office Buildings and Parking Lot (CEFA Scope)

The Mt. Magnet facility will include a transportable style building which will be separate from the LNG Plant switch room. This shall include the plant control room, office, meeting room, lunchroom and toilet/shower facilities. A separate transportable style maintenance workshop and stores will also be provided.

The car park shall be located adjacent to the plant control room and office with dedicated access connecting the Site to the public highway.

8 UTILITY SYSTEMS

The purpose of this section is to describe utilities required for the LNG Plant.
Operating and design data provided in sections below are preliminary figures and will be modified/corrected during project development as necessary.

8.1 Power Supply and Electrical Guidelines

Electrical design shall follow AS 60038 (2012) and shall be based upon incoming utility power of 415 V, 3-Phase, 4 wires (+ earth), 50 Hz, neutral solidly earthed (MEN).
The following guidelines will be used for electrical loads:

- Utility (Convenience receptacles, task lighting, etc.): 240V, 1 Phase, 2 wires, 50 Hz
- Motors 200 kW and Smaller: 415V, 3-Phase, 50 Hz
- Motors > 200 Kw: 4,160 V, 3-Phase, 50 Hz
- UPS power: 240 VAC, 1 phase, 2 wires, 50 Hz
- Instrumentation and Controls: 24 VDC

Electric equipment shall be designed for AC voltage system variations in the range of ±10%, and AC frequency variations in the range of ±2.5%. Total harmonic distortion shall be less than 5%.

CEFA provides 4160v and 415v service to the Cryosys PCR. The required gensets, switchgear, distribution gear, and transformers are the responsibility of CEFA.

8.2 Battery/UPS

Battery and UPS shall comply with electrical code requirements.

8.3 Nitrogen

Nitrogen for purging, blanketing, and refrigerant makeup are available at the following operating and design conditions from the supplied nitrogen generator:

Table 9-2: Nitrogen conditions

Nitrogen		
Pressure, operation	620	kPa
Pressure, design	690	kPa
Temperature, operation	27	°C
Temperature, design	40	°C

Conditions are given at N_2 production unit outlet.

Notes:
Nitrogen shall be produced with the following specifications:

- Oxygen less than 5 ppm(v).
- Carbon dioxide less than 1 ppm(v).
- Moisture content less than 1 ppm(v).
- Free of oil or other hydrocarbons.

8.4 Instrument Air

Instrument air for instrumentation and controls are available at the following operating and design conditions from the supplied instrument air generator:

Table 9-3: Instrument Air conditions

Instrument Air		
Pressure, operation	760	kPa
Pressure, design	1035	kPa
Temperature, operation	27	°C
Temperature, design	40	°C

Conditions are given at IA production unit outlet.

Notes:
Instrument Air shall be produced with the following specifications:

- Moisture content less than 1 ppm(v).
- Free of oil or other hydrocarbons.

8.5 Water

The Amine Unit requires water makeup to function properly. A reverse osmosis (RO) system capable of providing at least 0.023 m^3/hr (0.1 GPM) of water will be provided with the following qualities:

Amine Unit Make-Up Water Quality	
Total Dissolved Solids	<100 ppm
Total Hardness	<3 grains/gallon
Chlorides	<2ppm
Sodium	<3ppm
Potassium	<3ppm
Iron	<10ppm
Conductivity	<10 micro ohm
PH	7.0 – 7.7

The water supply system will also include a pump and storage container for the treated water.

8.6 Ancillary Equipment and Structures

In addition to the main LNG Plant the site will also contain the following ancillary and support plant & equipment:

- Potable water tank for kitchen and shower facilities;
- Raw water tank for general facility wash-down including hoses at all appropriate locations;

- Process make-up water tank (fed from potable water tank);
- Fire water tanks for fire monitors and hoses;
- Lighting;
- Pumping station and foul water main connecting to the municipal sewer system;
- Site perimeter fencing and access gates; and
- Highway crossover for ingress and egress to the Site.

Water storage requirements shall be sized by the Cryosys for the LNG Plant with justification provided for the selected volume(s).

These items will be supplied by client, CEFA.

8.7 Power Supply

Power supply will be generated from on-site GenSets. The estimated power requirements are shown in the table below:

LNG ELECTRICAL POWER ESTIMATE

MAJOR EQUIPMENT ELECTRICAL LOADS	NUMBER INSTALLED	HP / EACH	INSTALLED HP	LOAD FACTOR	NUMBER OPERATING	BHP / EACH	OPERATING BHP
4,160 VOLT POWER							
Compressors							
MR Compressor	1	1,250	1,250	0.92	1	1,146	1,146
Inlet Compressor	1	900	900	0.95	1	855	855
Subtotal			2,150				2,001
Total Horsepower			**2,150**				**2,001**
TOTAL 4160 OPERATING POWER				**1,492 KW**			
415 VOLT POWER							
Inlet Compression							
Inlet Compressor After Cooler	2	15.0	30.0	0.90	2	13.5	27.0
Inlet Compressor Lube Oil Pump	1	3.0	3.0	0.90	1	2.7	2.7
Inlet Compressor Lube Oil Cooler	1	5.0	5.0	0.90	1	4.5	4.5
Inlet Compressor Oil Heater	4	0.5	2.0	0.05	4	0.0	0.1
Subtotal			40.0				34.3
8 GPM Amine System							
Treated Gas Cooler	1	10.0	10.0	0.90	1	9.0	9.0
Amine Reboiler	1	270.0	270.0	0.90	1	243.0	243.0
Reflux Condenser	1	10.0	10.0	0.90	1	9.0	9.0
Lean Amine Cooler	1	10.0	10.0	0.90	1	9.0	9.0
Amine Circulation Pump	2	10.0	20.0	0.90	1	9.0	9.0
Subtotal			320.0				279.0
Mole Sieve Dehydration System							
Regeneration Gas Cooler	1	5.0	5.0	0.90	1	4.5	4.5
Regen Gas Compressor	1	3.0	3.0	0.90	1	2.7	2.7
Regen Gas Heater	1	120.0	120.0	1.00	1	120.0	120.0
Subtotal			128.0				127.2
LNG System							
MR Compressor Lube Oil Pump	1	3.0	3.0	0.90	1	2.7	2.7
MR Compressor Lube Oil Cooler	1	5.0	5.0	0.90	1	4.5	4.5
MR Compressor Oil Heater	4	0.5	2.0	0.05	4	0.0	0.1
MR Compressor Inter Cooler Fan	1	15.0	15.0	0.90	1	13.5	13.5
MR Compressor After Cooler Fan	3	15.0	45.0	0.90	3	13.5	40.5
MR Evacuation Compressor	1	7.5	7.5	0.05	1	0.4	0.4
MR Evacuation Compressor Cooler Fan	1	1.5	1.5	0.05	1	0.1	0.1
Immersion Heaters	1	35.0	35.0	0.05	1	1.8	1.8
Subtotal			114.0				63.5
Utilities							
Nitrogen Generator	1	140.0	140.0	0.90	1	126.0	126.0
I-Pentane Pump	1	1.0	1.0	0.10	1	0.1	0.1
RO Booster Pump	1	5.0	5.0	0.10	1	0.5	0.5
RO Treated Water Pump	1	0.5	0.5	0.10	1	0.1	0.1
PCR Building HVAC 1	1	20.0	20.0	0.90	1	18.0	18.0
PCR Building HVAC 2	1	20.0	20.0	0.90	1	18.0	18.0
PCR Building HVAC 3	1	20.0	20.0	0.90	1	18.0	18.0
UPS Panel Board	1	25.0	25.0	0.90	1	22.5	22.5
Heat Trace Panel Board	1	20.0	20.0	0.90	1	18.0	18.0
Lights and Receptacles	1	20.0	20.0	0.90	1	18.0	18.0
Subtotal			271.5				239.2
Total Horsepower			**873.5**				**743.2**
TOTAL 480V OPERATING POWER				**554.2 KW**			
120 / 110 VOLT POWER							
Instruments, Control Panels, Control System, Etc.				**20.0 KW**			
TOTAL ELECTRICAL POWER USAGE				**2,066 KW**			

APPENDIX I. – DRAFT DANGEROUS GOODS MANIFEST

Dangerous goods manifest

1. General information

Operator: CLEAN ENERGY FUELS AUSTRALIA PTY LTD

Address of site: Centurion Mine Site, Suttor Development Road, Glenden

Date prepared/updated: 7-October-2025

Reference: Sched11-001 Rev1

2. Emergency contacts (at least one person at all times)

Position	Telephone
Duty Operator	TBC
General Manager	TBC

3. Summary information about dangerous goods quantities

Class, Division, C1 or GtDtT	PG	Maximum quantity (L or kg)
Flammable Gases		1,428,960 litres
Flammable Liquid		5,370

4. Bulk (other than IBC) dangerous goods storage information

Storage ID (as per site plan)	**Proper shipping name**	**UN no.**	**Class / Division / C1 / GtDtT**	**PG**	**Container type**	**Quantity (L or kg)**
LNG 2	Methane, Refrigerated Liquid	1972	Flammable Gases Category 1	PG1	Pressure Vessel	365,000 litres
LNG 3	Methane, Refrigerated Liquid	1972	Flammable Gases Category 1	PG1	Pressure Vessel	365,000 litres
LNG 4	Methane, Refrigerated Liquid	1972	Flammable Gases Category 1	PG1	Pressure Vessel	365,000 litres
V-700	Ethylene	1962	Flammable Gases Category 1	PG1	Storage cylinder	1000
V-701	Propane	1978	Flammable Gases Category 1	PG1	Storage cylinder	760
V-702	Isopentane	1265	Flammabe Liquid Category 1	PG 1		
Road tankers	Methane, Refrigerated Liquid	1972	Flammable Gases Category 1	PG1	Pressure Vessel	318,000 litres

5. Packaged or IBC dangerous goods information at placard amount storage locations

Packaged or IBC of Divisions 2.1, 2.2, PGII/III or C1

Storage location ID (as per site plan)	**Class / Division / C1**	**Quantity (L or kg) current / maximum**
TBC	TBC	TBC

6. Dangerous goods information, in placard amount, manufacture or process locations

Storage location ID (as per site plan)	**Class / Division**	**Maximum quantity** (L or kg)
TBC	TBC	TBC

7. Dangerous goods in transit information

NA

This document is under version control.

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Created By	David Trembecki	**Modified Date**	10 Sep 2021
Modified By	David Trembecki	**Status**	Accepted
Document No:	CEA-MWL-SR-LS-001	**Approved By**	Basil Lenzo

APPENDIX J. – AIR ASSESSMENT (TRINITY CONSULTANTS)

CENTURION LIQUEFIED NATURAL GAS FACILITY

Goonyella North

Air Quality Assessment

South Queensland Environmental Expertise & Services Pty Ltd

Date
19 January 2026

Report
257401.5023.R01V01

DOCUMENT CONTROL

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Document Approval	
Approver Signature	
Name	Samuel Wong
Title	Manager – Air and Noise

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1. INTRODUCTION

1.1 Overview

Trinity Consultants Australia (Trinity) was commissioned by South Queensland Environmental Expertise & Services Pty Ltd to provide an air quality assessment for the proposed Micro Liquefied Natural Gas (LNG) Plant at North Goonyella, Moranbah, Queensland.

The proposed development involves operation of a 70 tonnes per day (tpd) Micro LNG Plant. The plant will receive incidental coal seam gas diverted from flaring at the Centurion North Goonyella Mine, which will be piped to the site. The Micro LNG Plant is a modular facility and has recently been in operation at Mt Magnet in Western Australia. The plant will also include amine regeneration plant, gas heater, diesel backup generator and flare.

This air quality report is to accompany an Environmental Authority (EA) Application for consideration by the Department of Environment, Tourism, Science, and Innovation (DETSI) to carry out the proposed development.

1.2 Scope

This report describes the assessment of the air quality impacts, which is based on the following tasks:

- Review the project operations with respect to air quality.
- Review existing air quality monitoring data applicable to the project site
- Conduct a review to identify and understand:
  - existing sensitive receptors via desktop,
  - topography, and characterise surrounding land uses,
  - expected regional background concentrations of relevant pollutants using monitoring data from the Queensland Government air monitoring stations and other available sources,
  - existing operations and associated air emissions that could contribute to cumulative impacts
- Estimate pollutant emission rates based on available equipment supplier specifications and air emission databases
- Model meteorological conditions using TAPM and CALMET.
- Model the dispersion of expected air pollutants based on proposed activities using CALPUFF to estimate levels of the emissions reaching sensitive receptors and develop contours over the modelling domain.
- Analyse the results of meteorological and pollutant dispersion modelling, and compare modelling results with the relevant air quality criteria.

To aid in the understanding of the terms in this report a glossary is included in **Appendix A**.

2. STUDY AREA DESCRIPTION

2.1 Zoning of Site and Surrounding

The proposed site for the facility is located at the northern quadrant or the ML6949 Centurion Coal Mine lease area at North Goonyella, Moranbah, Queensland, approximately 41.3 km from the northwest edge of the Moranbah township. The site is a previously disturbed laydown area with existing hardstand and minimal vegetation.

The site for the development is designated as being within a Rural Zone under the Isaac Regional Council Planning Scheme 2021. The proposed development is surrounded by the following uses:

- To the north and east is predominantly vegetation
- To the west is the Old Denham Park
- To the south is North Goonyella Coal Mine

The zoning of the subject site and surrounding area is shown in **Figure 2.1**. The proposed development within the subject site is shown in **Figure 2.2**.

Figure 2.1: Zoning Map (Isaac Regional Council Plan)

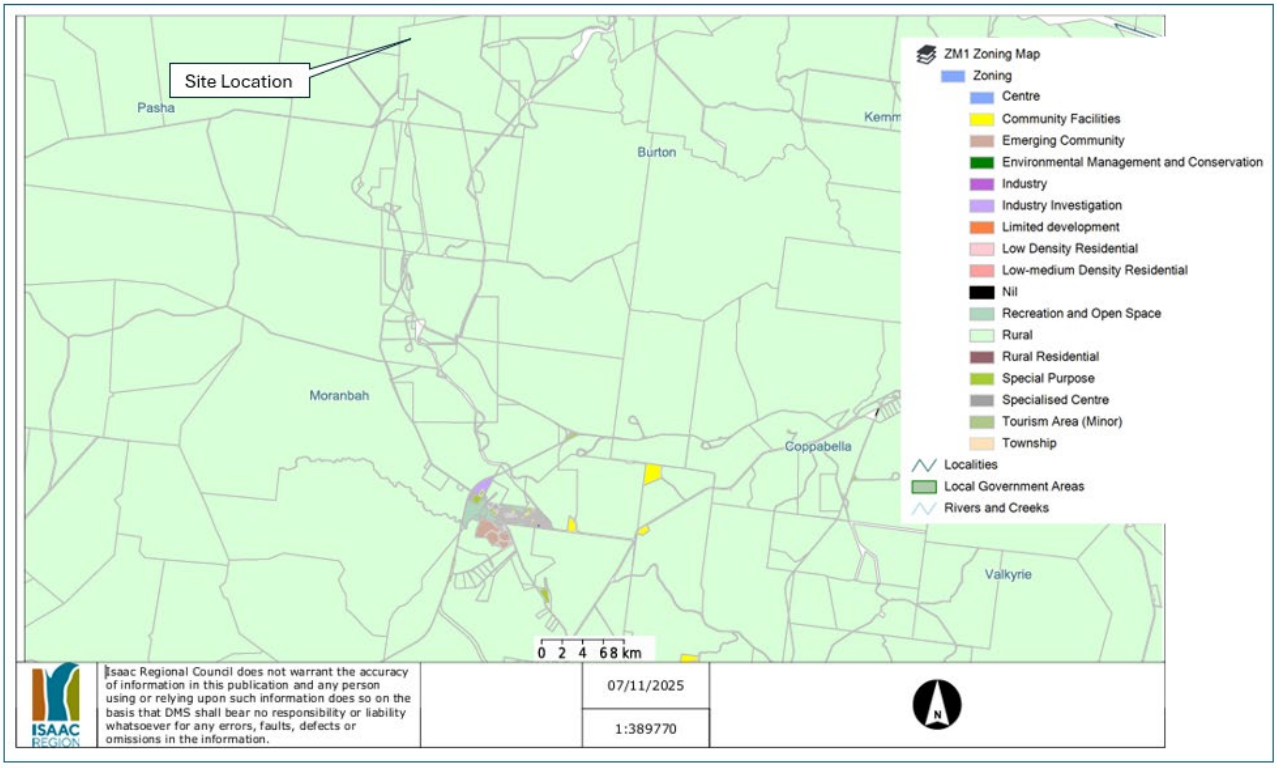
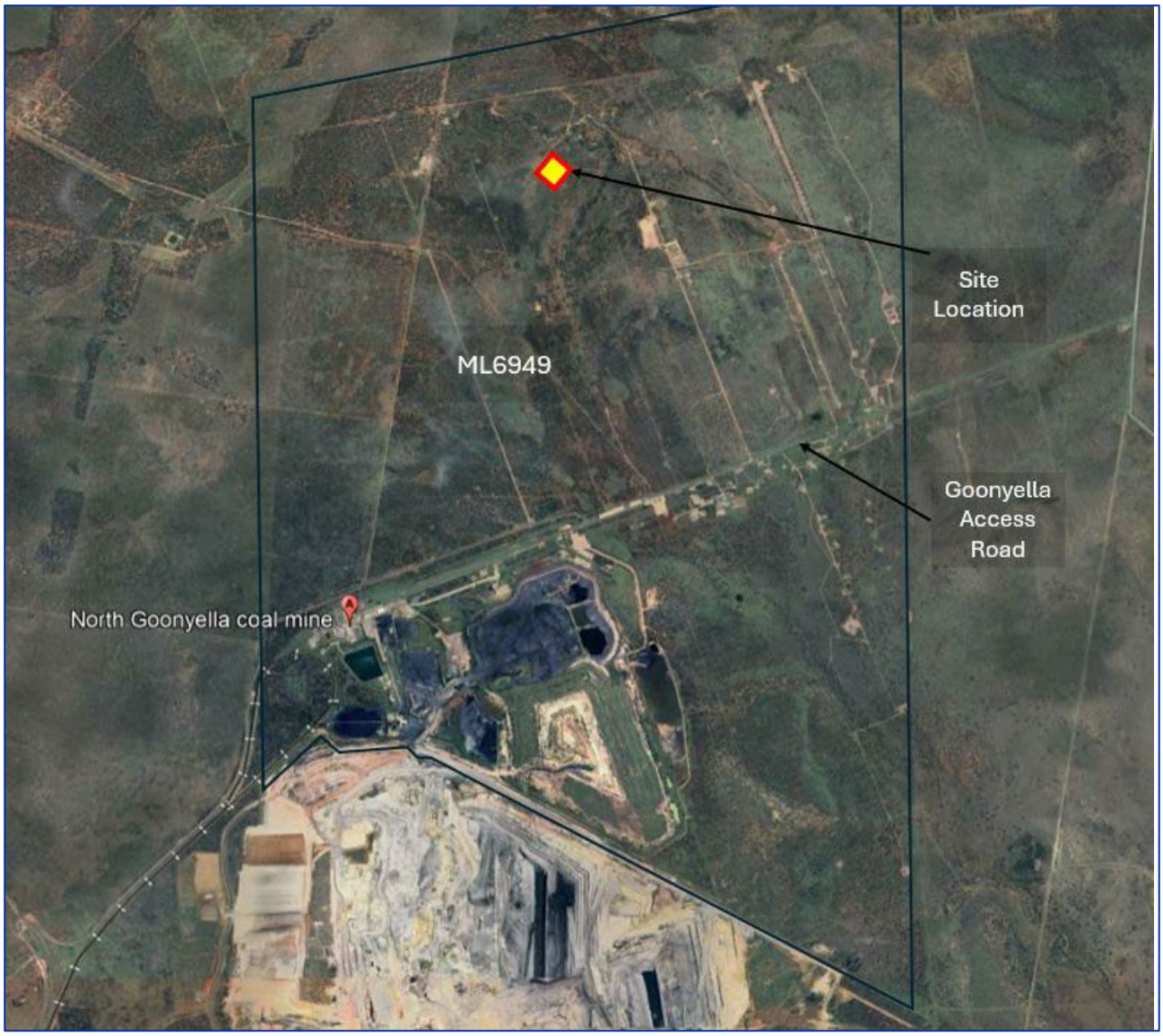


Figure 2.2: Site Locations



2.2 Identification of Sensitive Receptors

The Department of Environment, Tourism, Science and Innovation (DETSI) defines a sensitive place and commercial place as follows:

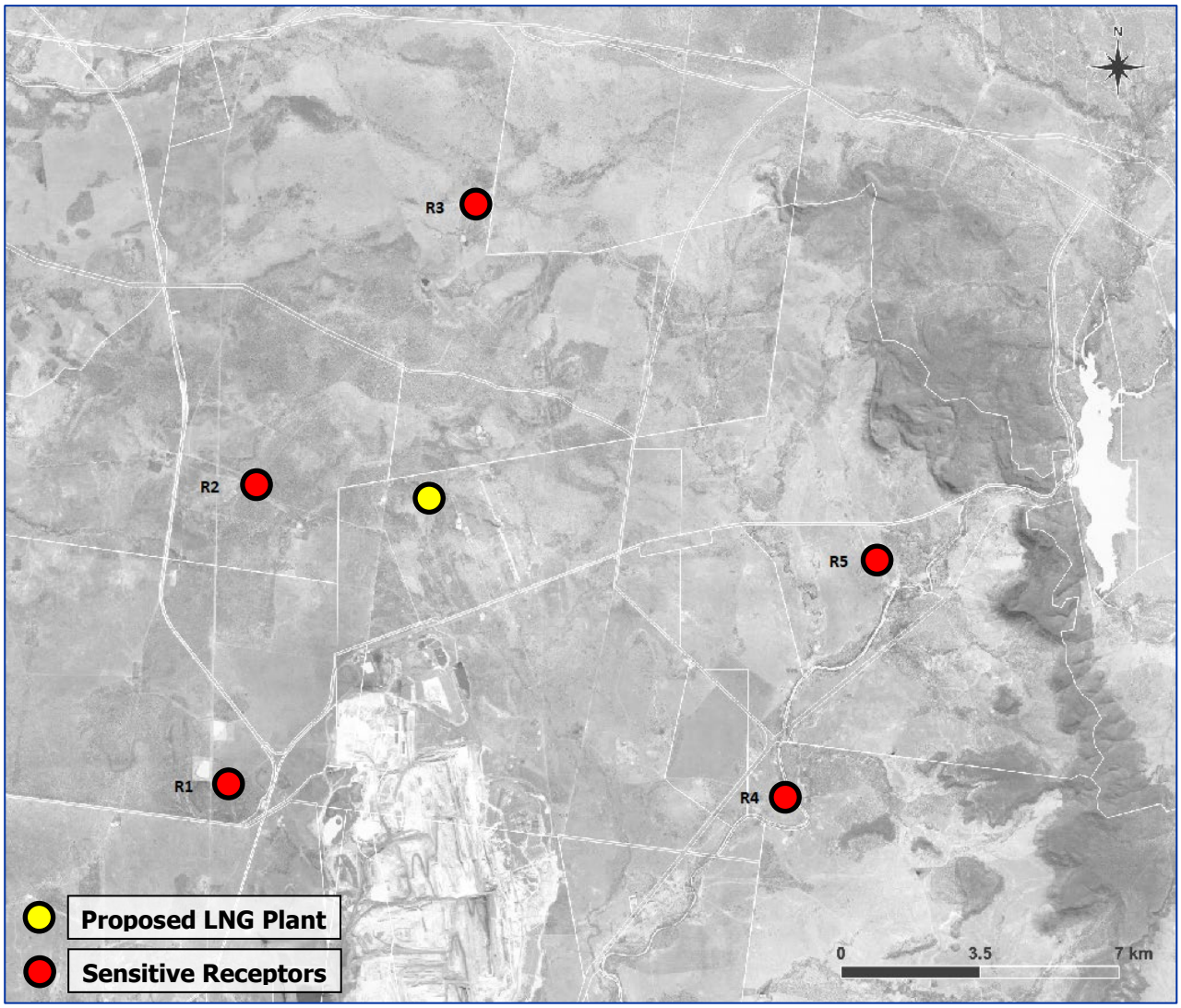
- Sensitive place:
  - A dwelling, mobile home or caravan park, residential marina or other residential place;
    - "dwelling" means any of the following structures or vehicles that is principally used as a residence-
      - a house, unit, motel, nursing home or other building or part of a building;
      - a caravan, mobile home or other vehicle or structure on land;
      - a watercraft in a marina.
  - a motel, hotel or hostel;
  - a kindergarten, school, university or other educational institution;
  - a medical centre or hospital;
  - a protected area;
  - a park or gardens; or
  - a place used as an office or for business or commercial purposes.
- Commercial place:
  - a place used as an office or for business or commercial purposes

Based on the definition, the nearest sensitive uses and separation distances from the development site are defined as follows:

- Residential/accommodation:
  - (R1) Lapunyah Homestead – 8.8 km south-west
  - (R2) Denham Homestead – 4.3 km west
  - (R3) Wards Well Homestead – 7.4 km north
  - (R4) Redhill Homestead – 11.6 km south-east
  - (R5) Burton Down Homestead – 11.3 km east

Locations of the nearest sensitive receptors are shown in **Figure 2.3**.

Figure 2.3: Sensitive Receptors



3. PROPOSED DEVELOPMENT

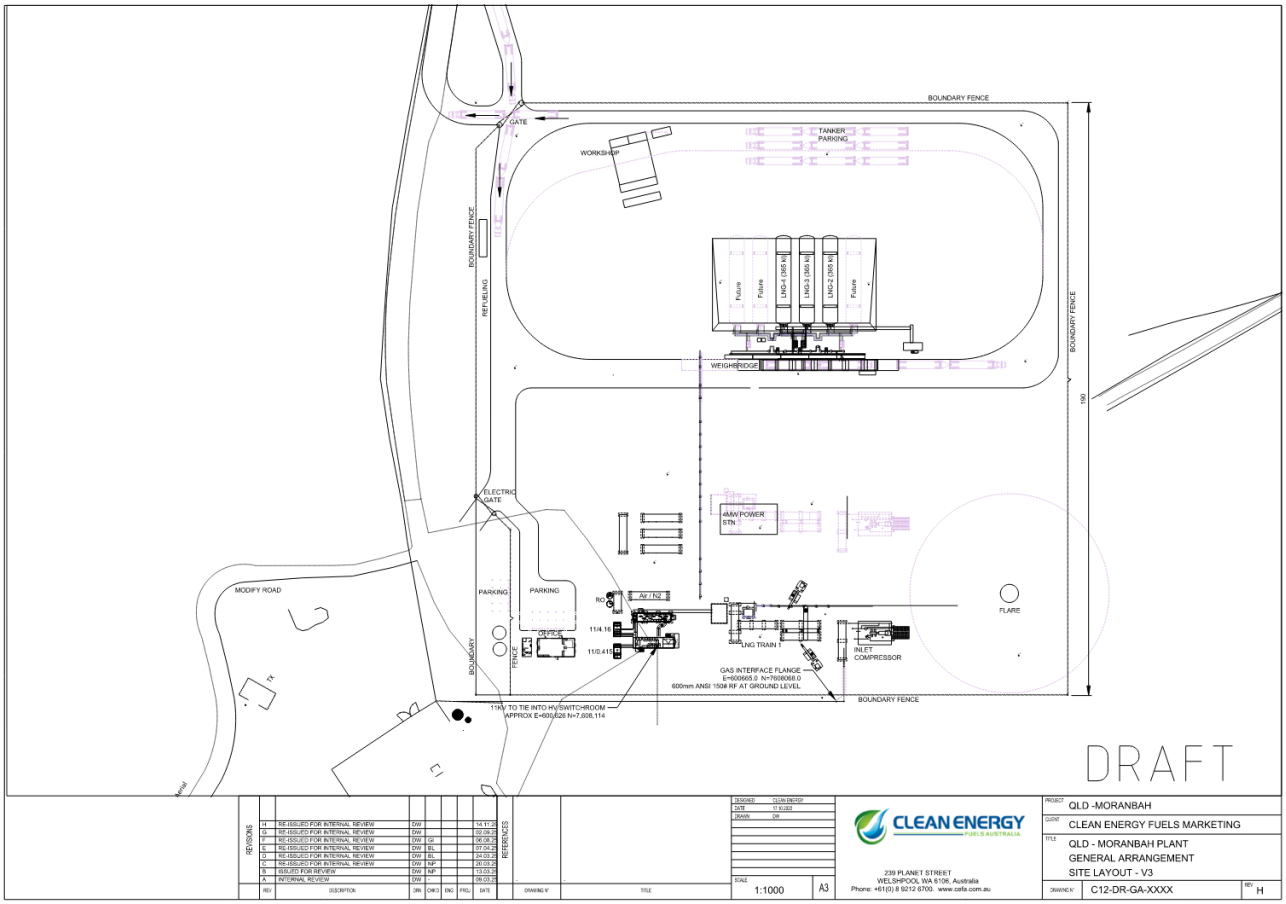
3.1 Key Features

The Micro LNG plant will be moved from another site to the new proposed location. The site layout of the plant is presented in **Figure 3.1.**

The development will include the following key components:

- LNG Production Facility
  - Modular liquefaction plant with a nominal capacity of 70 tonnes per day (t/d).
  - Approximately eight processing modules (each ~12 m long), vertical cold box, and switch-room.
  - Proprietary mixed refrigerant liquefaction technology.
- Ancillary Infrastructure
  - One HV transformer and electrical switch-room.
  - Offices, control room, first aid room, ablutions.
  - Potable and fire water tanks.
- Storage and Loading
  - Cryogenic LNG storage tank with 150 t capacity (below Major Hazard Facility threshold).
  - Road tanker loading bay for LNG transfer.
- Safety and Environmental Systems.
  - Flare system for non-liquefied gases.
  - Nitrogen generation for purging and instrument air.
  - Spill containment and fire protection systems.

Figure 3.1: Proposed Site Layout (Provided on 4th December 2025)



3.2 Description of Operations

The micro LNG Plant will convert incidental coal seam gas (ICSG) from the Centurion Mine into LNG for beneficial use, reducing flaring and displacing diesel consumption in regional operations. The process includes:

- Gas Pre-treatment and Compression:
  - Filtration, amine treating for CO_2 removal, molecular sieve dehydration.
  - Pre-compression from ~0.05 bar to ~6 bar.
- Liquefaction:
  - Mixed refrigerant system cooling gas to -161°C.
- Storage and Distribution:
  - LNG stored in cryogenic tanks and transferred to road tankers for offsite delivery.

A summary of the operating profile is provided below:

- Continuous operation 24/7, remotely monitored.
- LNG production: 70 t/d, equivalent to ~35 million m^3 of natural gas annually.
- Road tanker dispatch: ~70 t/day (single or multi-trailer configurations).
- Electrical demand: ~1.8 MW continuous.

The facility footprint is approximately 150 m x 170 m.

3.3 Air Emission Sources

3.3.1 Operational Sources

The proposed development incorporates a flare system designed for controlled combustion of LNG during non-routine events. Flaring will occur intermittently, primarily during start-up, shutdown, commissioning, and emergency conditions. All compressors and engines on site will operate using grid-supplied electricity, and no additional combustion equipment is proposed for the site. Other than this, other minor sources include emissions from on-site traffic / trucks.

Overall, there are no continuous air emission sources associated with the site operations. This lack of major emission sources means that air quality impacts represent a low risk for the site.

3.3.2 Construction Phase

Construction activities may generate minor air emissions; however, these impacts are expected to be negligible. The proposed facility will utilise the existing hardstand and vehicle access, and the modular design of the micro LNG plant minimises construction intensity. Works will primarily involve installation of prefabricated LNG modules and ancillary infrastructure, including:

- Site preparation (minimal earthworks, no vegetation clearing).
- Delivery and unloading of modules using cranes and forklifts.
- Installation of cryogenic storage tank and flare stack.
- Mechanical and electrical works, piping, and instrumentation.
- Road tanker loading bay construction.

Construction is anticipated to occur over 6–8 months, with a peak workforce of approximately 30 personnel. Heavy vehicle movements will be limited to module and equipment deliveries. Given the modular nature of the plant, minimal earthworks, and the separation distance of approximately 4.3 km to the nearest sensitive receptor, air quality impacts during construction are expected to be negligible.

4. AIR QUALITY VALUES AND CRITERIA

4.1 Relevant Pollutants

4.1.1 Operation

The proposed development includes a flare used to combust LNG. Flaring is an intermittent activity and is primarily associated with start-up, shutdown, commissioning, and emergency or abnormal operating conditions.

Combustion of LNG, which is predominantly methane, results in emissions that are limited to a small number of combustion-related pollutants. Based on the nature of the emission source, the following pollutants are considered relevant to this assessment:

- Nitrogen dioxide (NO_2), formed from high-temperature combustion processes.
- Carbon monoxide (CO), produced under conditions of incomplete combustion.
- Volatile organic compounds (VOCs), arising from incomplete combustion.

Particulate matter (PM_{10} and $PM_{2.5}$), expected to be negligible due to the clean-burning nature of LNG and has not been considered in this assessment.

Sulfur dioxide (SO_2) has not been considered further, as LNG contains negligible sulfur.

The assessment focuses on pollutants with established ambient air quality objectives under the Environmental Protection (Air) Policy 2019 and its amendments, and which have the potential to impact human health.

4.1.2 Construction

Construction of the proposed development will be limited in duration and scale due to the modular nature of the plant. The LNG modular plant will be relocated from the existing Mt Magnet facility in Western Australia and installed on site as a prefabricated modular unit.

Construction activities will primarily comprise preparation of concrete footings, delivery of modular plant components by truck, lifting and placement of equipment using mobile cranes, and mechanical and electrical connections and commissioning activities. No bulk earthworks, on-site material processing, or extended construction campaigns are required.

Potential air quality emissions during construction would be limited to short-term fugitive dust generated during footing preparation and vehicle movements, and exhaust emissions from construction vehicles, cranes, and delivery trucks. These emissions are typical of small-scale construction activities and are expected to be intermittent and of low intensity.

The nearest sensitive receptor is located approximately 4.3 kilometres from the construction area. Given this separation distance, together with the limited extent and duration of construction works, construction-related air quality impacts at off-site receptors are expected to be negligible.

Accordingly, construction emissions have not been quantitatively assessed, and no construction-specific air dispersion modelling has been undertaken.

4.2 Environmental Protection Air Policy

The Environmental Protection (Air) Policy 2019 (EPP(Air)) (and Amendment Policy 2024) provides objectives for air quality indicators (pollutants) that address health, the aesthetic environment, ecosystem and agriculture. The criteria have been used in this assessment. The objectives relevant to this project and human health and wellbeing, and protecting aesthetic environment have been summarised in **Table 4.1**.

Table 4.1: EPP (Air) Ambient Air Quality Objectives

Pollutant	Environmental Value	Averaging Period	Air quality objectives (µg/m^3)
Carbon Monoxide (CO)	Health and wellbeing	8-hour	11,000
Nitrogen dioxide (NO_2)	Health and wellbeing	1-hour	164
		Annual	31
Benzene	Health and wellbeing	Annual	5.4
Formaldehyde	Protecting aesthetic environment	30-min	109
	Health and wellbeing	24-hour	54
Xylenes	Health and wellbeing	24-hour	1,200
		Annual	950
Toluene	Protecting aesthetic environment	30-min	1,100
	Health and wellbeing	24-hour	4,100
		Annual	400

5. BACKGROUND AIR QUALITY

5.1 Overview

The following sections present information on background air quality for the purpose of the assessing cumulative impacts. This includes a review of existing air emission sources and ambient air monitoring data.

5.2 Existing Local Air Emission Sources

Section 2.3 presents details of the surrounding land uses. The key air emission sources other than the Project are associated with the operation of the North Goonyella Coal Mine to the south of the site. For the purposes of this assessment, these sources have not been modelled in combination with the proposed facilities. Instead, conservative background air monitoring data have been adopted, as discussed in the following section.

5.3 Air Quality Monitoring Data

To account for cumulative impacts, predicted results have been added to background air quality data obtained from the most representative air monitoring stations. DETSI operates air monitoring stations throughout Queensland. Raw data from 2010 is freely available on the Queensland Government data website (https://data.qld.gov.au). The period from 2020 to 2024 has been specifically analysed for the purpose of the assessment.

The nearest DETSI air quality monitoring stations are Moranbah West and Moranbah East, located approximately 42 to 43 km south-east of the site. These stations measure $PM_{2.5}$ and PM_{10} only. No background monitoring data for NO_2, CO, or VOCs are available for the Moranbah area.

A review of DETSI's air quality network for the 2020 to 2024 period identified 27 monitoring stations that recorded at least one year of NO_2 data, including both active sites and stations decommissioned during this interval. A map showing their locations respect to the subject site location is provided in **Figure 5.1**. As illustrated, none of these stations are located close to the site. The nearest is North Ward in Townsville, approximately 285 kilometres northwest, followed by the stations in the Gladstone region located about 400 kilometres southeast.

To provide context, a review of all available data from 2020 to 2024 has been completed. The results are presented in **Table 5.1** and **Table 5.2** for the 70th percentile one hour concentrations and the annual averages. As can be seen, the monitoring stations with the highest recorded NO_2 concentrations, namely Woolloongabba and South Brisbane are heavily influenced by traffic which is the main source of background NO_2 in Queensland. Other stations closer to industrial areas or more rural areas present significantly lower NO_2 measurements than stations in urban areas.

On this basis, a conservative approach has been adopted for the cumulative assessment by applying background NO_2 concentrations measured at the Woolloongabba station. Given that background CO levels are predominantly traffic-related, Woolloongabba has likewise been adopted as a conservative location for assessing cumulative CO impacts. A summary of the 70th percentile 8-hour average concentrations at the Woolloongabba station is presented in **Table 5.3**.

For VOCs, the only monitoring station currently measuring VOC concentrations is Memorial Park in Gladstone. This station has been adopted to represent existing background VOC concentrations, as it is located in a setting broadly comparable to the project area. The Memorial Park station, established in 2009, is influenced by major industrial activities, including the RG Tanna Coal Terminal, but is not directly adjacent to such operations, which is considered representative of the nearest sensitive receptors to the project. Details on the measured concentrations are provided in **Table 5.4**.

Figure 5.1: DETSI's Air Quality Monitoring Stations with at least 1 Year of NO_2 Data (2020 – 2024)

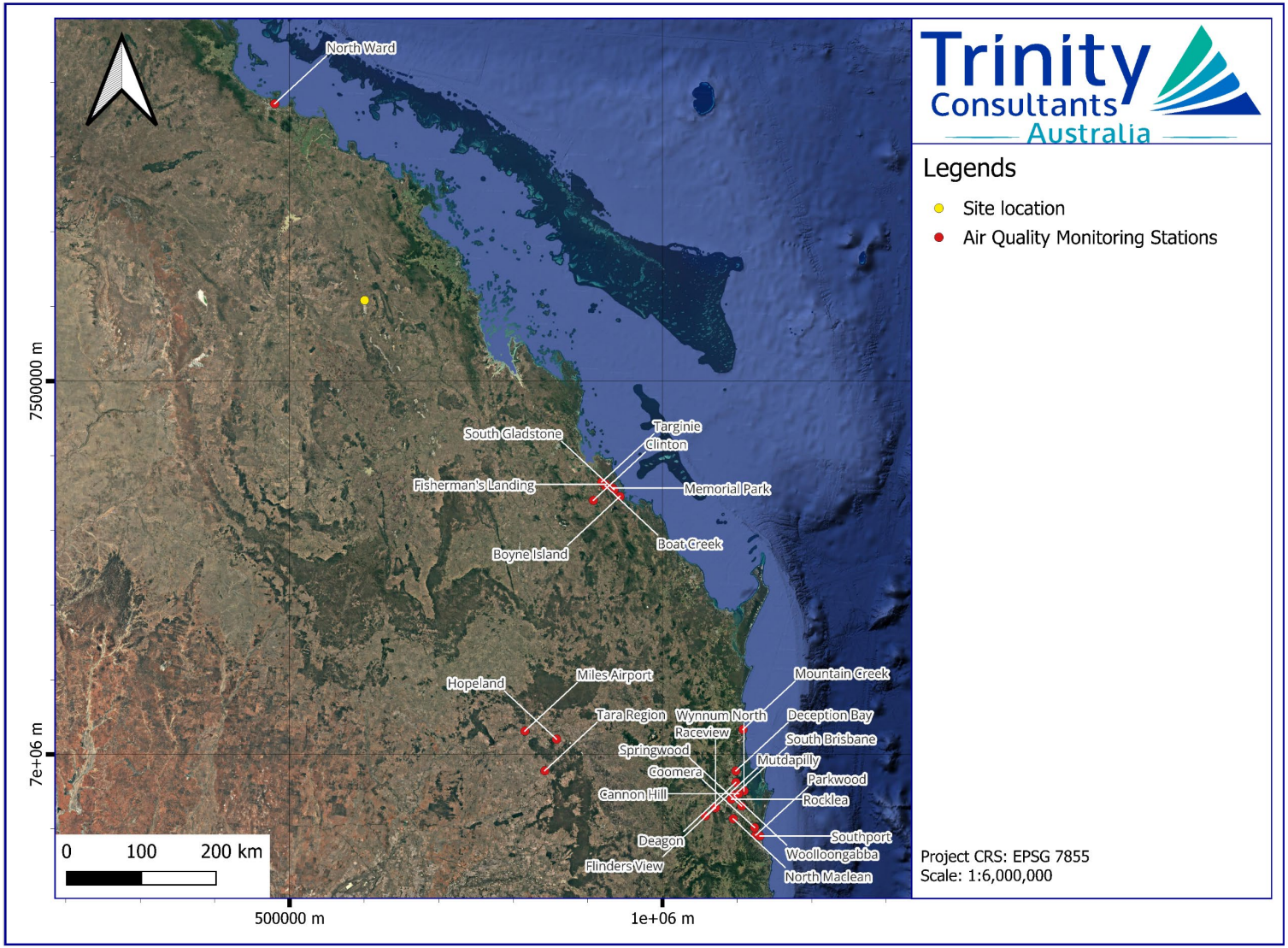


Table 5.1: NO_2 Measured Concentrations in Queensland – 70th Percentile (1-hour Concentrations)

Station Name	70th Percentile (1-hour Concentrations) µg/m³					
	2020	2021	2022	2023	2024	Maximum
Woolloongabba	36.9	36.9	34.9	32.8	28.7	36.9
South Brisbane	32.8	30.8	32.8	30.8	30.8	32.8
Rocklea	14.4	14.4	20.5	22.6	22.6	22.6
Parkwood	-	-	-	20.5	16.4	20.5
Deagon	-	18.5	18.5	18.5	18.5	18.5
Wynnum North	12.3	18.5	14.4	14.4	12.3	18.5
Cannon Hill	-	16.4	16.4	16.4	16.4	16.4
Flinders View	16.4	16.4	14.4	16.4	14.4	16.4
Boat Creek	12.3	12.3	12.3	12.3	12.3	12.3
Raceview	-	-	-	-	12.3	12.3
Springwood	12.3	12.3	12.3	12.3	10.3	12.3
Clinton	8.2	6.2	8.2	10.3	10.3	10.3
Coomera	-	-	-	10.3	8.2	10.3
Deception Bay	10.3	10.3	10.3	10.3	10.3	10.3
Memorial Park	8.2	10.3	8.2	8.2	6.2	10.3
South Gladstone	10.3	10.3	10.3	10.3	10.3	10.3
Southport	8.2	10.3	8.2	10.3	8.2	10.3
Mountain Creek	8.2	8.2	8.2	8.2	6.2	8.2
Mutdapilly	8.2	8.2	6.2	8.2	6.2	8.2
North Maclean	8.2	8.2	6.2	8.2	6.2	8.2
Fisherman's Landing	8.2	6.2	-	-	-	8.2
North Ward	4.1	6.2	6.2	6.2	6.2	6.2
Targinie	6.2	6.2	6.2	6.2	6.2	6.2
Hopeland	4.1	4.1	2.1	4.1	-	4.1
Tara Region	4.1	4.1	-	-	-	4.1
Boyne Island	2.1	2.1	2.1	2.1	2.1	2.1

Table 5.2: NO_2 Measured Concentrations in Queensland – Annual Averages

Station Name	Annual Average µg/m³					
	2020	2021	2022	2023	2024	Maximum
Woolloongabba	28.8	29.4	27.7	26.7	23.3	29.4
South Brisbane	26.0	25.3	25.7	24.2	25.4	26.0
Rocklea	11.8	11.4	15.1	18.5	17.8	18.5
Parkwood	-	-	-	16.9	13.9	16.9
Deagon	-	14.6	15.5	15.2	15.1	15.5
Wynnum North	10.5	15.2	12.5	12.6	11.5	15.2
Cannon Hill	-	13.7	13.2	14.7	13.8	14.7
Flinders View	14.1	13.0	11.9	13.7	12.8	14.1
Boat Creek	10.1	9.6	9.3	9.9	10.4	10.4
Raceview	-	-	-	-	9.9	9.9
Springwood	10.6	10.7	10.6	10.8	9.3	10.8
Clinton	6.6	5.9	6.8	8.5	8.0	8.5
Coomera	-	-	-	9.3	7.9	9.3
Deception Bay	8.9	9.5	8.5	9.6	8.2	9.6
Memorial Park	8.0	8.8	8.2	8.4	6.7	8.8
South Gladstone	9.8	9.4	9.2	8.8	8.4	9.8
Southport	8.1	9.0	7.8	9.8	8.1	9.8
Mountain Creek	6.7	7.2	6.7	7.2	6.4	7.2
Mutdapilly	6.6	6.1	5.8	6.2	5.2	6.6
North Maclean	6.5	6.0	5.0	6.4	4.8	6.5
Fisherman's Landing	7.6	6.1	-	-	-	7.6
North Ward	5.9	6.1	5.3	4.8	-	6.1
Targinie	4.5	5.3	5.5	5.0	4.9	5.5
Hopeland	7.1	7.3	6.5	6.9	7.1	7.3
Tara Region	3.7	3.4	2.9	3.8	0.0	3.8
Boyne Island	4.3	3.2	-	-	-	4.3

Table 5.3: CO Measured Concentrations at the Woolloongabba Station – 70th Percentile (8-hour Concentrations)

Station Name	70th Percentile (8-hour Concentrations) µg/m³					
	2020	2021	2022	2023	2024	Maximum
Woolloongabba	285.5	295.5	221.7	251.3	221.7	295.5

Table 5.4: VOCs Measured Concentrations at Memorial Park Station

Pollutant	Averaging Period	Statistical Value	Concentration µg/m³					
			2020	2021	2022	2023	2024	Maximum
Benzene	Annual	Average	3.8	4.3	2.5	2.9	4.0	4.3
Formaldehyde	1-hour	70th Percentile	6.1	6.3	4.3	3.6	3.4	6.3
	24-hour	70th Percentile	6.6	5.9	4.0	3.4	3.1	6.6
Toluene	1-hour	70th Percentile	7.8	7.4	5.8	4.9	5.3	7.8
	24-hour	70th Percentile	7.6	7.2	5.2	5.1	4.7	7.6
	Annual	Average	6.8	6.6	4.9	4.7	4.5	6.8
Xylenes	24-hour	70th Percentile	36.6	33.0	18.6	21.2	25.3	36.6
	Annual	Average	32.6	30.7	17.9	19.5	23.5	32.6

5.4 Summary of Background Data

The adopted conservative background concentrations for the assessment of cumulative impacts are summarised in **Table 5.5**.

Table 5.5: Summary of Adopted Background Concentrations

Pollutant	Averaging Period	Value µg/m³	Source
NO_2	1-hour	36.9	70th Percentile Woolloongabba (2021)
	Annual	29.4	Max. Annual Woolloongabba (2021)
CO	8-hour	295.5	70th Percentile Woolloongabba (2021)
Benzene	Annual	4.3	Max. Annual Memorial Park (2021)
Formaldehyde	1-hour	6.3	70th Percentile Memorial Park (2021)
	24-hour	6.6	70th Percentile Memorial Park (2020)
Toluene	1-hour	7.8	70th Percentile Memorial Park (2020)
	24-hour	7.6	70th Percentile Memorial Park (2020)
	Annual	6.8	Max. Annual Memorial Park (2020)

Pollutant	Averaging Period	Value µg/m³	Source
Xylenes	24-hour	36.6	70th Percentile Memorial Park (2020)
	Annual	32.6	Max. Annual Memorial Park (2020)

Note:
For pollutants with 30-minute average criteria, the corresponding 1-hour average background concentration has been adopted as the best available dataset.

6. METEOROLOGICAL MODELLING

6.1 Overview

Atmospheric dispersion modelling involves the mathematical simulation of the dispersion of air contaminants in the environment. The modelling utilises a range of information to estimate the dispersion of pollutants released from a source including:

- Meteorological data for surface and upper air winds, temperature and pressure profiles, as well as humidity, rainfall, cloud cover and ceiling height information;
- Emissions parameters including source location and height, source dimensions and physical parameters (e.g. effective height and length of side) along with pollutant mass emission rates;
- Terrain elevations and land-use both at the source and throughout the surrounding region;
- The location, height, and width of any obstructions (such as buildings or other structures) that could significantly impact on the dispersion of the plume; and
- Sensitive receptor locations and heights.

Meteorological modelling has been undertaken using TAPM and CALMET. The following sections present the methodology and outcomes of the meteorological modelling.

6.2 Model Year

Table 6.1 presents the measured average wind speed, proportion of calm conditions and proportion of wind speed less than 2.0 m/s for the BoM Moranbah Airport meteorological station for the years 2019 to 2023. The BoM Moranbah Airport Meteorological Station is the nearest permanent monitoring station to the site with complete dataset (approximately 50 km south of the subject site).

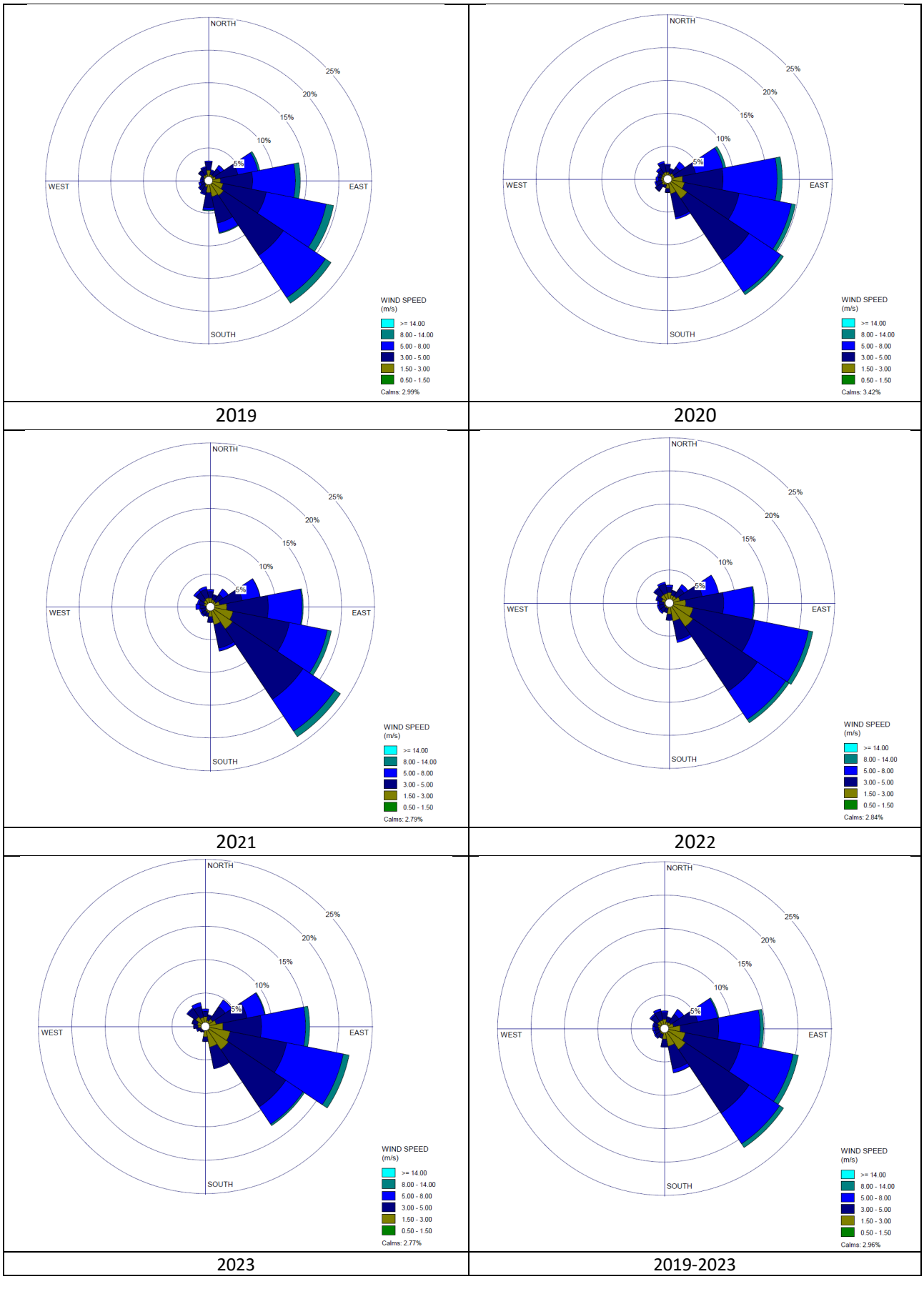
Figure 6.1 presents annual wind roses for the years 2019 to 2023. The wind roses show minimal variability in wind direction and speed. The 2020 wind rose shows a slightly higher proportion of easterly winds, which represent worst-case conditions for this assessment, given the nearest sensitive receptor is located approximately 4.3 km west of the site.

The model year 2020 has been adopted for the purpose of the assessment and is considered representative of the long-term average in terms of wind speeds and slightly conservative in terms of wind direction.

Table 6.1: BoM Moranbah Meteorological Station Data Comparison

Year	Calm Conditions (%)	Average Wind Speed (m/s)	Wind speeds <2.0 m/s (%)
2019	3.0	4.2	7.2
2020	**3.4**	**4.1**	**8.0**
2021	2.8	3.9	7.3
2022	2.8	3.8	8.0
2023	2.7	3.9	7.5
Average	**2.9**	**4.0**	**7.6**

Figure 6.1: 2019 -2023 Annual Wind Roses for the BoM Moranbah Airport Meteorological Station



6.2.1 TAPM Fundamentals

The meteorological component of The Air Pollution Model (TAPM) was used to provide wind fields over the region. The databases required to run TAPM are provided by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and include global and Australian terrain height data, vegetation and soil type datasets, sea surface temperature datasets and synoptic-scale meteorological datasets.

TAPM was setup using four nested 30 x 30 grids centred on latitude 21°37.5′ south, longitude 147°58.5′ east. The four nested grids were as follows:

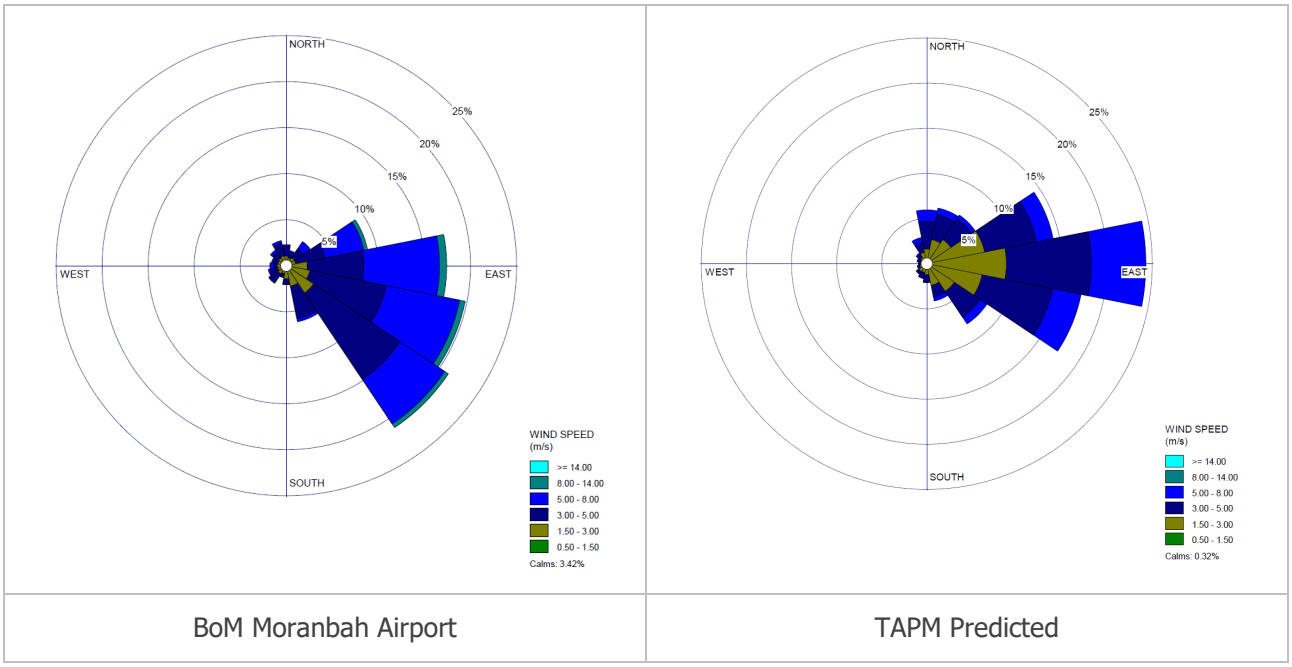
- 900 km x 900 km with 30 km resolution
- 300 km x 300 km with 10 km resolution
- 90 km x 90 km with 3 km resolution
- 30 km x 30 km with 1 km resolution

Twenty-five (25) vertical levels were used with lower-level steps at 10, 25, 50 and 100 metres up to 8 kilometres in altitude. Boundary conditions on the outer grid were derived from the synoptic analysis. Non-hydrostatic pressures were ignored due to the gentle terrain and moderate resolution.

6.2.2 Observational Data Assimilation

Wind data for the period from 1 January to 31 December 2020 were evaluated for assimilation into the model. TAPM was initially run without data assimilation, and a wind rose for the same period from the selected observational dataset was generated for comparison, as shown in **Figure 6.2**. Overall, the predicted and observed wind patterns are similar, with dominant easterly winds. Some differences are evident, including an under-prediction of south-easterly winds and an over-prediction of easterly winds. TAPM also under-predicts the frequency of calm conditions. On this basis, observational data from the Moranbah Airport station were assimilated into the TAPM model to generate the project meteorological dataset.

Figure 6.2: Wind Rose of BoM Moranbah Airport Meteorological Station Data and TAPM for year 2020



BoM Moranbah Airport	TAPM Predicted

6.3 CALMET

6.3.1 Overview

As discussed in the previous section, a three-dimensional prognostic and observational dataset derived from the TAPM model was input to CALMET to predict meteorological conditions at the development and surrounding area. The following sections provide an overview of the data utilised in the CALMET modelling, along with details of some of the key parameters selected to establish calculation limits within CALMET.

6.3.2 CALMET Modelling Configuration

The CALMET configuration used is consistent with NSW OEH guidance (TRC, 2011). The model was run over the full year based on a 3-dimensional grid produced using the CALTAPM utility program to convert TAPM data to MM5 format suitable for CALMET to read. The CALMET grid was set to grid spacing of 250 metres and 110 by 110 grid points. Eleven vertical layers were modelled with cell face heights of 0, 20, 40, 80, 160, 320, 640, 1200, 2000, 3000, and 4000 metres.

Mixing height calculation parameters were set to default values except the Coriolis parameter which was set to -5.36 x 10^{-5} as calculated from the Coriolis parameter equation:

$$f = 2\ \Omega \sin(\phi)$$

Where:

- F is the Coriolis parameter;
- Ω is the Earth's rotation rate (2π/86400 or 7.29x10-5 rad·s-1);
- ϕ is the latitude which in this case is -21.627°.

6.3.3 Terrain and Land Use Data

Terrain height was based on data from the Shuttle Radar Imaging Mission (SRTM) and obtained from Geoscience Australia. This produced terrain height data on 1 arc-second longitude/latitude grid (approximately 0.03 kilometres) for a grid representative of the area around the existing landfill and waste management facility.

The TERRAD value in CALMET is used to determine the radius of influence for terrain features within the model domain. The TERRAD value has been calculated based on the rule 'ridge-to-ridge divided by 2, rounded up' recommended by the NSW Office of Environment and Heritage (TRC, 2011). Based on an average ridge to ridge distance a TERRAD value of 1 has been adopted.

Land use data was also created based on the Queensland Government Land Use Dataset and satellite imagery and incorporated into the CALMET model. Where land use categories do not correspond with the CALMET land use input file categories, satellite imagery has been reviewed to determine the most appropriate land use category. **Figure 6.3** and **Figure 6.4** present the modelled Terrain and land use in CALMET.

Figure 6.3: Modelled Terrain

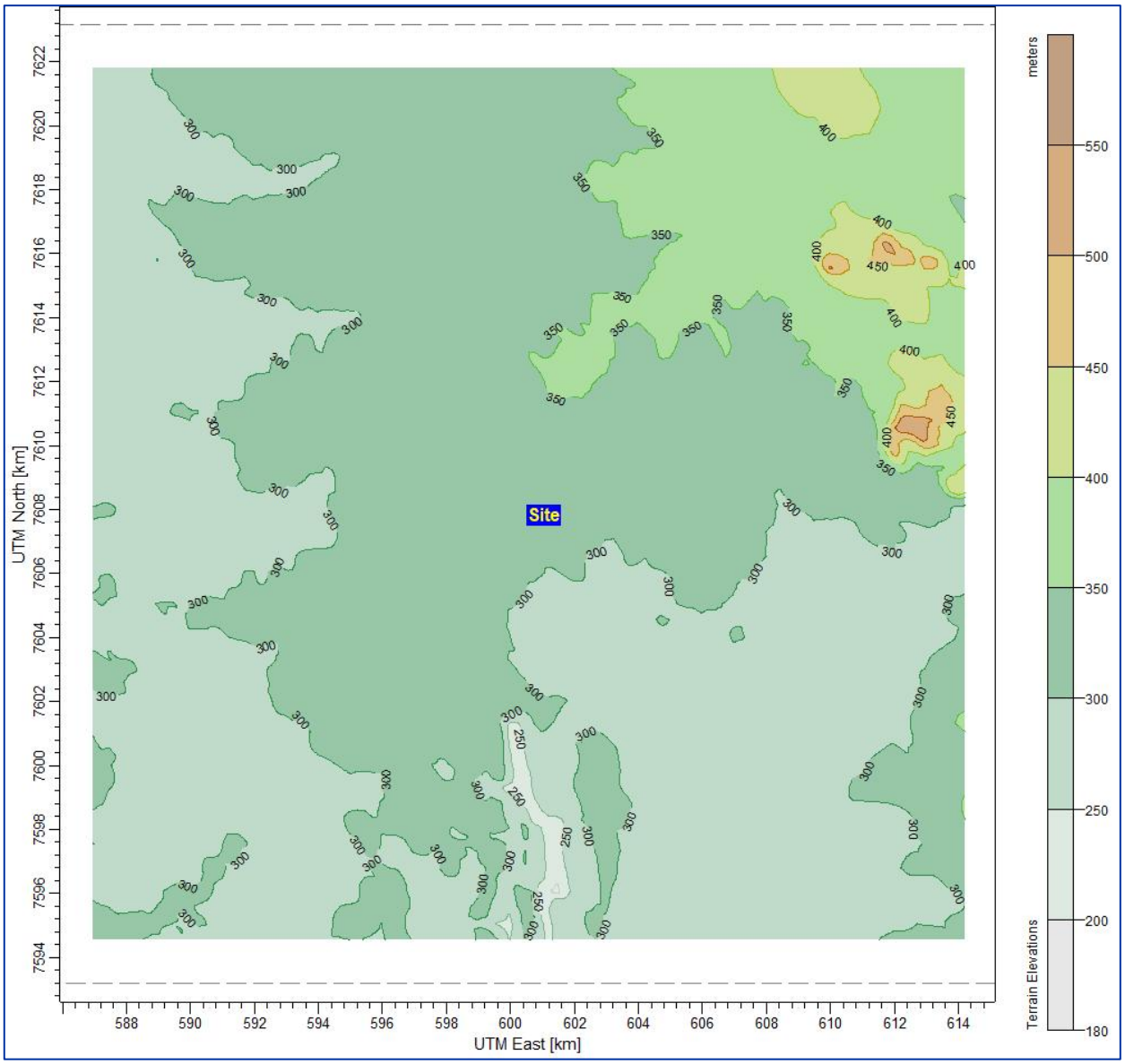
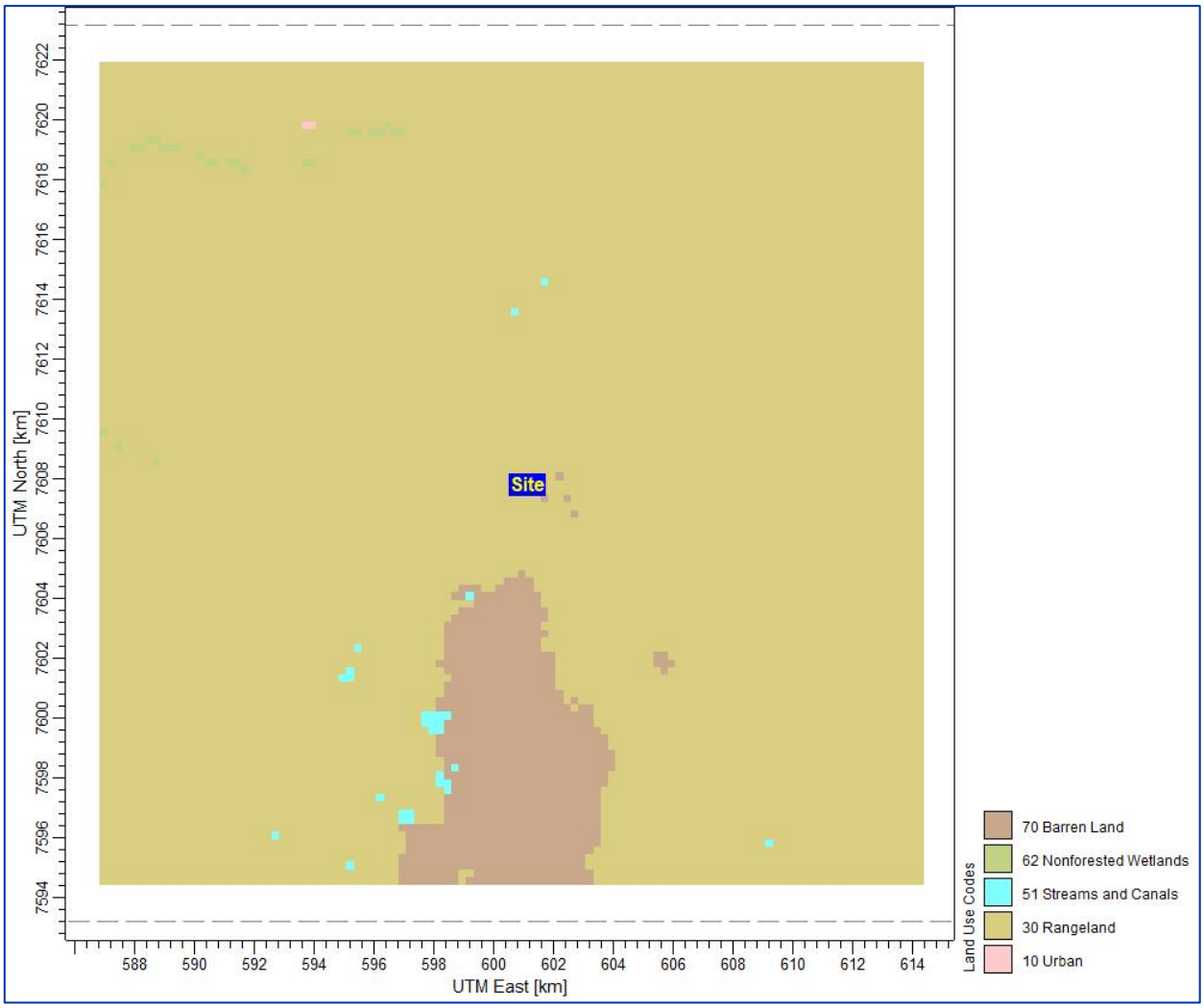


Figure 6.4: Modelled Land Use



6.4 CALMET Results

The frequency distributions of occurrences of winds for each direction sector and for each wind class (wind rose) as generated by CALMET are illustrated in **Figure 6.5**. The predicted wind rose is comparable to that measured at the BoM Moranbah Airport station, which is consistent with the predominantly flat terrain and absence of significant topographic features affecting local wind flows.

Figure 6.5: CALMET Site Predicted Wind Rose

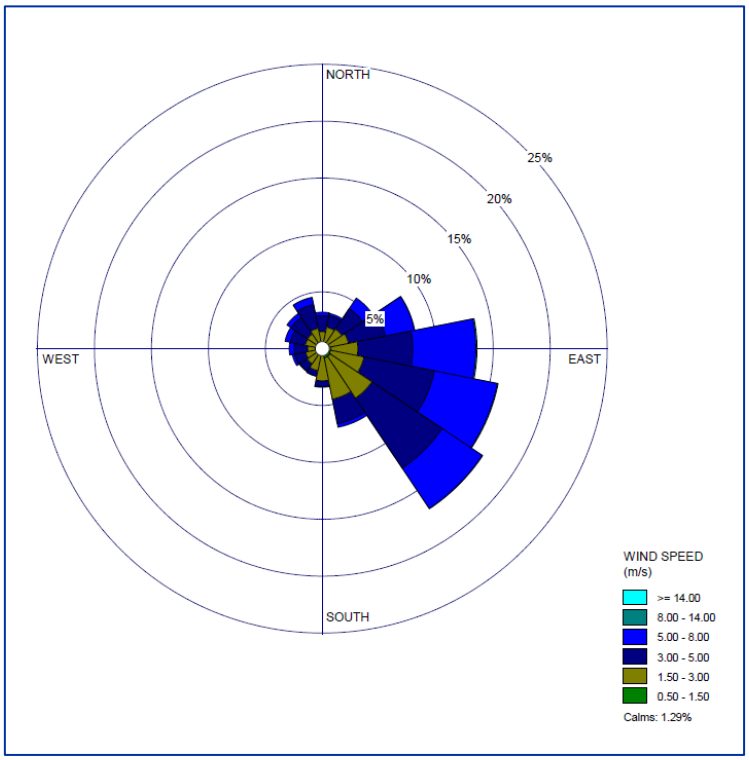


Figure 6.6 presents a plot showing predicted mixing heights for each hour of the day. As expected, higher mixing heights occur during the day period, while lower mixing heights occur during the night period when stable conditions are dominant and temperature inversions occur. In the morning, the mixing rises gradually, reaching an average of approximately 1.2 kilometres by the afternoon, then reforming near ground level again at nightfall.

Figure 6.6: CALMET Site Predicted Mixing Heights

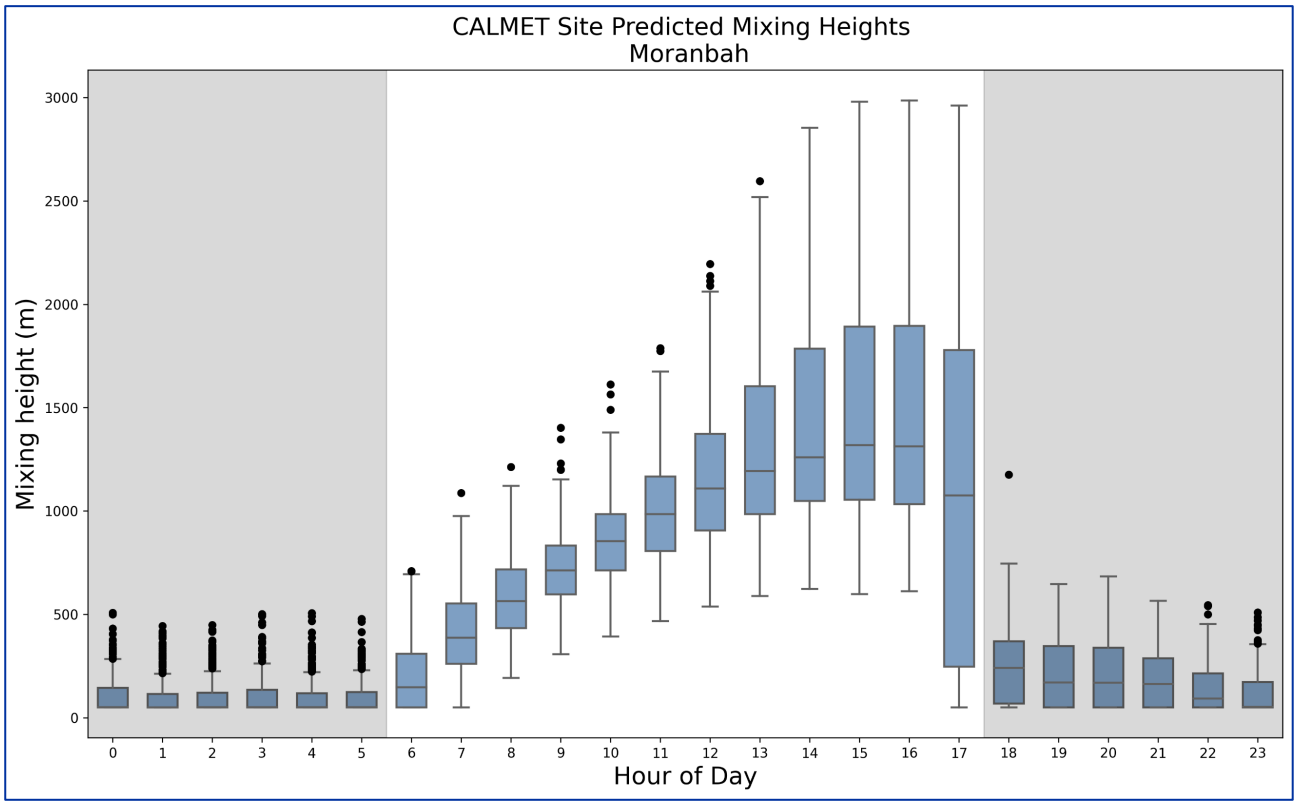
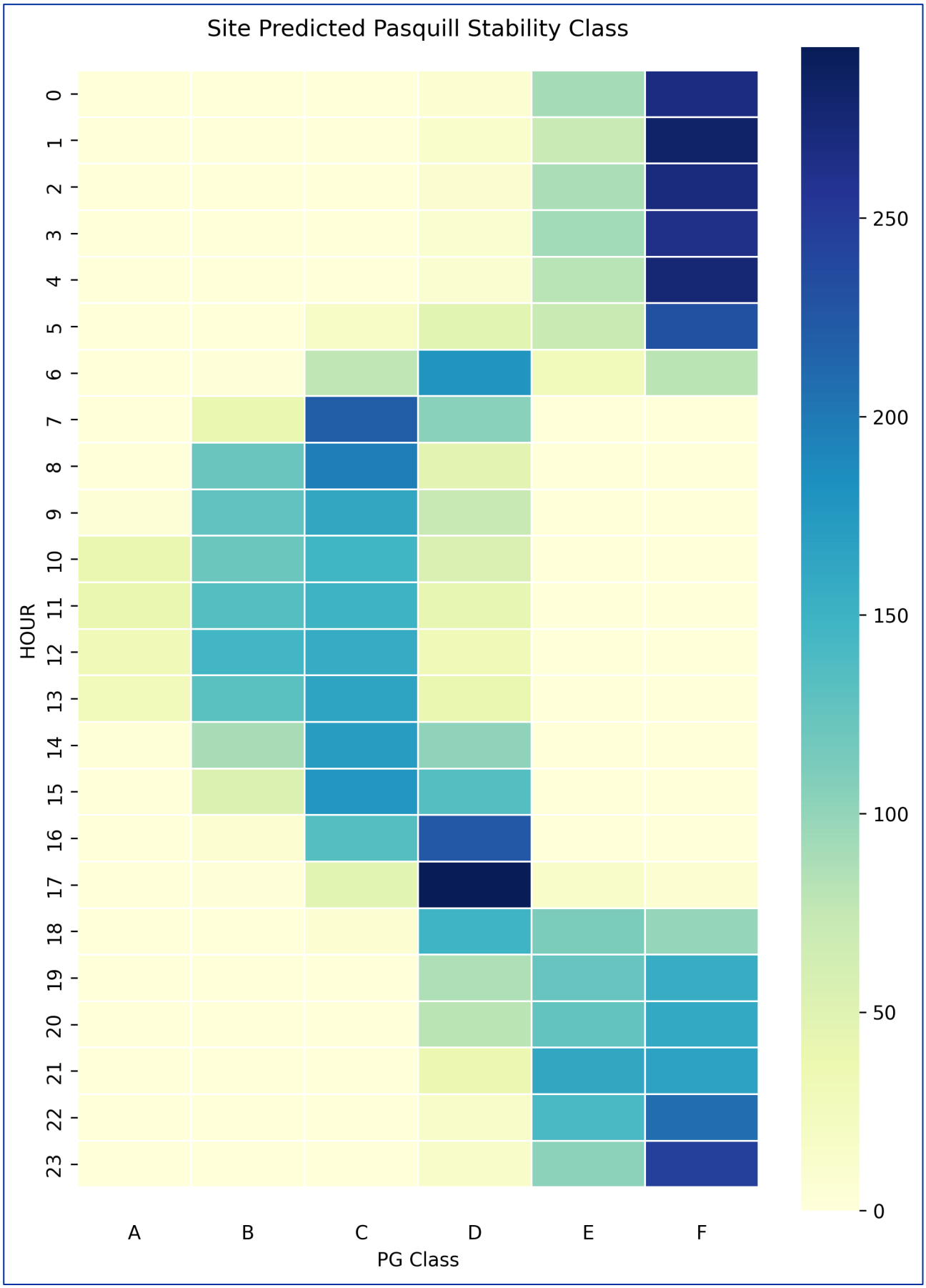


Figure 6.7 shows the frequency of stability classes throughout the day. Day time conditions are either neutral or unstable, whilst nighttime conditions are stable.

Figure 6.7: Diurnal Frequency of Stability Classes



7. EMISSION SOURCES

7.1 Overview

As discussed in **Section 3.3**, the only air emission source during the operational phase is the gas flare. The flare operates intermittently and is not used during normal operations. Emissions occur during venting events and upset conditions, when excess gas is directed to the flare for controlled combustion to maintain safe operation of the facility.

Construction emissions would be limited to short-term fugitive dust and vehicle exhaust from minor construction activities. Given the separation distance of approximately 4.3 km to the nearest sensitive receptor and the limited duration of works, off-site air quality impacts are expected to be negligible. Accordingly, construction emissions have not been quantitatively assessed or modelled.

7.2 Emission Rates

Flare emission rates were calculated using emission factors published in the USEPA AP-42 Compilation of Air Pollutant Emission Factors from Stationary Sources (USEPA, 2018). *Chapter 13.5 Industrial Flares* provides emission factors for nitrogen oxides, carbon monoxide and volatile organic compounds based on the thermal energy released. For non-smoking flares operating under normal conditions, particulate matter emissions (PM_{10} and $PM_{2.5}$) are considered negligible due to the clean-burning nature of LNG and have therefore not been assessed.

The emission rates included in the air dispersion modelling are presented in **Table 7.1**. Although these emissions are intermittent, they have been modelled as continuous to provide a conservative assessment.

Table 7.1: Emission Factors and Calculated Emission Rates

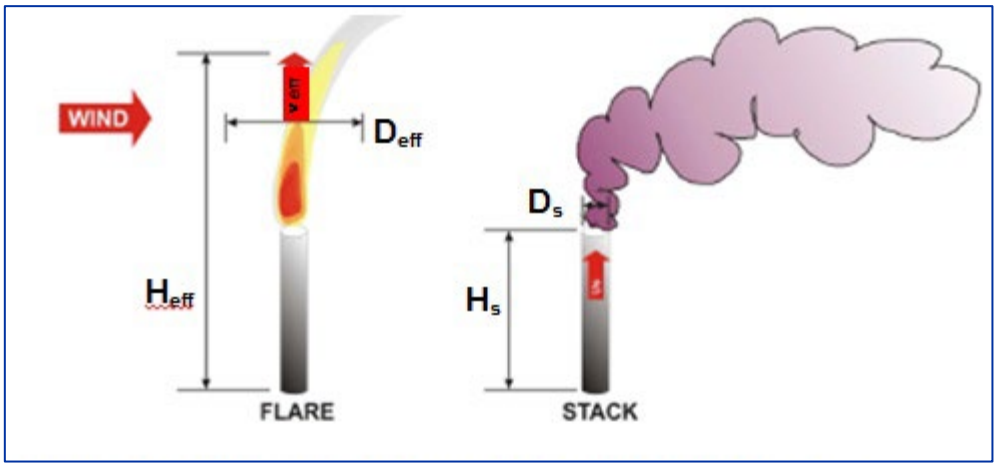
Pollutant	Emission Factor (lb/10^6 Btu)	Emission Rate [a,b] (lb/h)	Emission Rate (g/s)
NO_x	0.068	17.07	2.15
CO	0.31	77.81	9.80
Total VOCs [c]	0.66	165.66	20.87

Notes:
a – Calculations are based on a total heat release of 251 MMBtu per hour, as specified in the flare design provided by Aereon.
b – 1 MMBtu equivalent to 1,000,000 Btu.
c – Speciated VOC data is unavailable; therefore, the total VOC emission rate has been applied conservatively to each individual VOC species considered in this assessment.

7.3 Other Source Parameters

Open flares are typically represented in dispersion models using a point source formulation, as most models do not include a dedicated flare source type. While this approach is acceptable, the key challenge lies in defining representative source parameters. Unlike conventional stacks typically seen at industrial facilities, open flares do not have a physical exhaust outlet. Emissions are released from the flame, which is characterised by high temperature and strong buoyancy. To account for this, effective source parameters, such as an effective release height and effective diameter (see **Figure 7.1**), are derived to approximate the location and characteristics of the emission point. These parameters are used to ensure that plume rise and dispersion are represented appropriately within the limitations of the model.

Figure 7.1: Flare Emissions Illustration



The effective release height above ground is calculated by adding the flare height to the stack height using Beychok equation as described in the *Workbook of Screening Techniques for Assessing Impacts of Toxic Air Pollutants* (USEPA, 1992):

$$H_{eff} = H_s + 4.56 \times 10^{-3} \times \left(\frac{H_r}{4.1868}\right)^{0.478} \qquad \text{Equation 1}$$

Where:

- H_{eff} is the effective release height above ground (metres)
- H_s is the actual flare stack height above ground (metres)
- H_r is the net heat release rate (J/s)

$$H_r = H_t \times (1 - f) \qquad \text{Equation 2}$$

Where:

- H_t is the total heat available from combustion (J/s)
- f is the percentage of heat loss by radiation (typically conservatively assumed 55% for example in the USEPA SCREEN3 model)

Based on Equations 1 and 2, and adopting an actual stack height of 15 m provided by the client with a total heat available from combustion of 251 MMBtu/h (73,560,839 J/s), the effective release height modelled is 24.04 m.

Typical values used for modelling flares, obtained from the SCREEN3 model, are somewhat arbitrary but are considered to produce reasonable buoyancy flux and plume rise estimates. These values are:

- T_s = 1273 K (pseudo point source release temperature)
- V_{eff} = 20 m/s (vertical velocity)

The approach used to calculate the effective diameter, which is widely applied by regulatory agencies such as the US EPA, uses Equations 3 and 4 derived from the Briggs plume rise equation:

$$D_{eff} = 2 \times \sqrt{\frac{F_b \times T_s}{g \times V_{eff} \times (T_s - T_{amb})}} \qquad \text{Equation 3}$$

$$F_b = \mathrm{g} \times \frac{H_r}{\pi \times \rho_{air} \times T_{amb} \times C_{p,air}} \qquad \text{Equation 4}$$

Where:

- D_{eff} is the effective diameter (metres)
- F_b is the buoyancy flux (m^4/s^3)
- g is the acceleration due to gravity (9.81 m/s^2)

- T_{amb} is the ambient temperature in K (assumed 298 K)
- ρ_{air} is density of air at ambient temperature and pressure (1.2 kg/m^3)
- $C_{p,air}$ is the specific heat of dry air at ambient temperature (1004 J/kg.K)

The effective diameter of the pseudo point source is therefore 1.86 metres.

The modelled source details are summarised in **Table 7.2**.

Table 7.2: Modelled Source Parameters

X-Coordinate (m)	Y-Coordinate (m)	Effective Stack Height (m)	Exit Temperature (K)	Effective Diameter (m)	Exit Velocity (m/s)
600,731.1	7,608,063.6	24.04	1,273	1.86	20

8. DISPERSION MODELLING METHOD

8.1 Overview

A mathematical model is used to simulate the dispersion and deposition of pollutants after they are emitted into air. It is accepted by regulatory agencies that this type of modelling has associated uncertainties. These are normally addressed by using statistics over long simulation times and deriving emission rates based on published emission factors or data representing high emission conditions.

CALPUFF (Version 7.2.1) was chosen as the appropriate model for this assessment. The predictions undertaken for this assessment are based on the following method:

- Prediction of input meteorology was completed using TAPM developed by the CSIRO Division of Atmospheric Research. TAPM's prognostic 3-dimensional meteorological components can be used to generate hourly meteorological data for input into dispersion models. TAPM was run over a full representative year (2020) to include all seasons. It uses gridded terrain data at approximately 300 metre grid spacing to shape the wind fields.
- TAPM input meteorology was enhanced using CALMET, the meteorological pre-processor for CALPUFF. This fits the wind fields to the terrain based on gridded terrain data at approximately 5 metre grid spacing.
- Pollutant concentrations were predicted using CALPUFF.

8.2 CALPUFF Configuration

The 3-dimensional wind fields from CALMET were entered into CALPUFF for the full year (2020). CALPUFF was run over a computational grid the same size as the meteorological grid (28 kilometres x 28 kilometres) with 250 metre grid spacing.

Wind speed profile was set to the Industrial Source Complex (ISC) Rural exponents. Transitional plume rise, stack tip downwash and partial penetration of boundary layers were included. Numerical plume rise method was used as the emissions are significantly hotter than the ambient air.

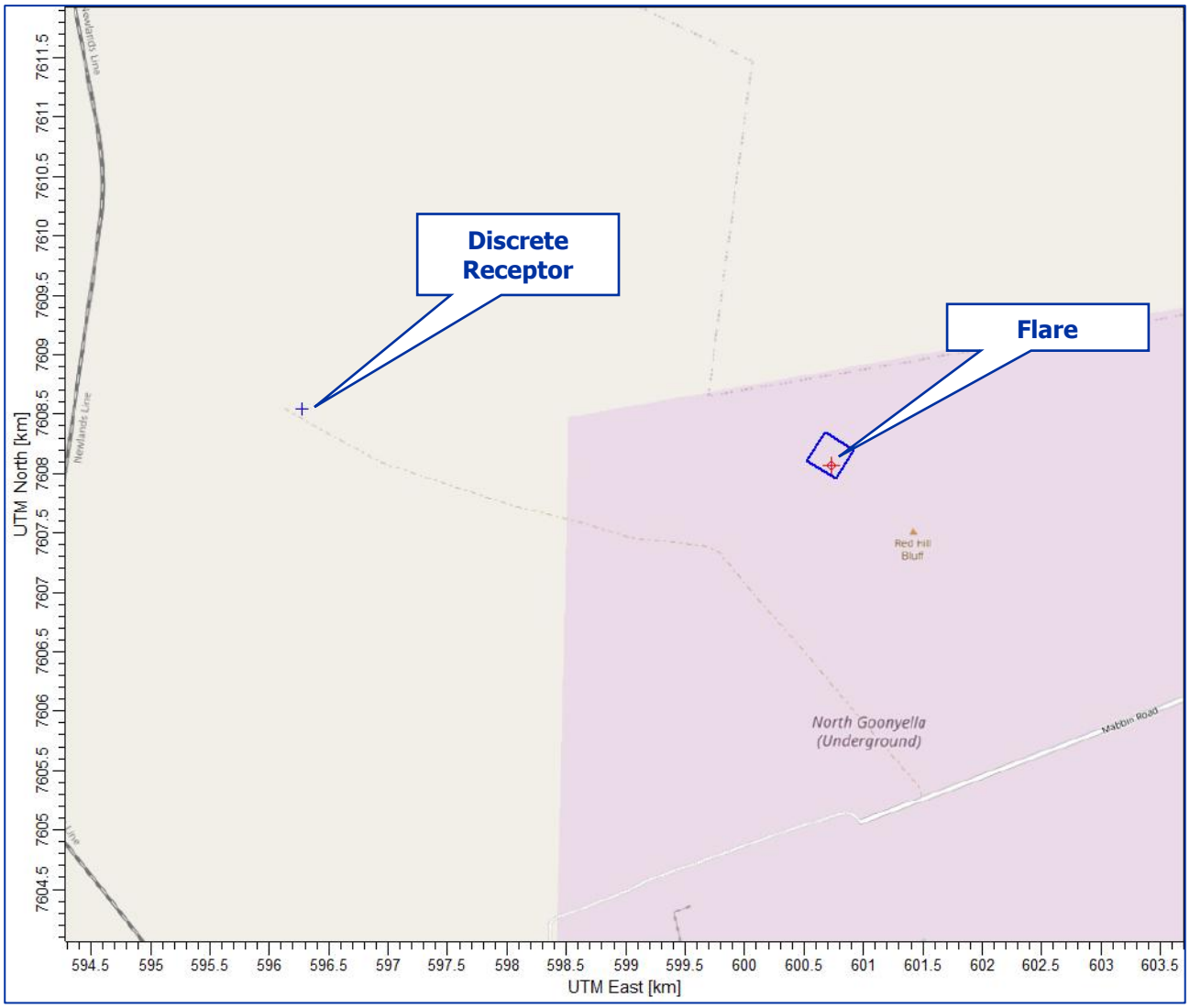
The emissions were modelled as puffs (no slugs) for more accurate point source modelling and puff splitting was turned off.

Dispersion coefficients were derived by the model using turbulence computed from micrometeorology. The Heffter curve was used to compute time-dependent dispersion beyond 550 metres. The partial plume path adjustment method was used to allow winds to approach hills as terrain increases.

The minimum turbulence velocity, sigma v, was set to 0.2 m/s.

Figure 8.1 shows the modelled source and receptor.

Figure 8.1: Modelled Receptor and Source



8.3 Nitrogen Dioxide Modelling

As a conservative approach, all predicted NO_x concentrations were assumed to be fully converted to NO_2.

9. DISPERSION MODELLING RESULTS

9.1 Limitations

The uncertainties associated with this type of assessment are normally only dealt with in a qualitative manner, but include:

- source measurement estimation techniques
- source strength variability
- meteorological data variability
- inherent uncertainty in dispersion modelling.

Typically 95% confidence intervals are estimated to require a multiplicative factor of 2 or 3. In this case, the uncertainty is mostly due to assumptions regarding the details of emission sources. This has been addressed by adopting conservative source parameters, assuming continuous flare operation for modelling purposes, assuming 100% conversion of NO_x to NO_2, and applying total VOC concentrations to each individual speciated VOC.

9.2 Predicted Concentrations

The maximum predicted concentrations for the modelled discrete receptor are summarised in **Table 9.1** and **Table 9.2**. Concentration plots for CO (8-hour average) and (NO_2 1-hour average) are presented in **Figure 9.1** and **Figure 9.2**.

The modelling predicts compliance with the air quality criteria for all pollutants and averaging periods assessed at the nearest sensitive receptor location. CO and NO_2 source-only predictions are very low and even considering highly conservative background concentrations, the cumulative concentrations are predicted to be well below the criteria.

VOC predictions also demonstrate compliance with their respective goals, even under the conservative assumption that total VOCs are assigned to each individual VOC species. The closest result to a criterion is the annual average benzene concentration, with a predicted total VOC value of 5.3 µg/m^3 compared to a benzene criterion of 5.4 µg/m^3. However, the flare is an intermittent source that has been conservatively modelled as operating continuously, and therefore the predicted annual average concentration is highly conservative and actual annual concentrations are expected to be significantly lower.

Overall, the results show very low source contribution at sensitive receptors, and this is largely due to the large separation distance. It is concluded that the Project is suitably located and designed with respect to minimising air quality impacts.

Table 9.1: Maximum Predicted Concentrations – CO and NO_2

Type	CO (µg/m^3)	NO_2 (µg/m^3)	
Averaging Period	**8-hour**	**1-hour**	**Annual**
Source Only	6.8	2.8	0.1
Cumulative	302.3	39.7	29.5
Criteria	11,000	164	31

Table 9.2: Maximum Predicted Concentrations – VOCs

Type	Benzene (µg/m³)	Formaldehyde (µg/m³)		Toluene (µg/m³)			Xylenes (µg/m³)	
Averaging Period	Annual	30-minute	24-hour	30-minute	24-hour	Annual	24-hour	Annual
Source Only	1.0	30.9	1.0	30.9	6.7	1.0	6.7	1.0
Cumulative	5.3	37.2	7.6	38.7	14.3	7.8	43.3	33.6
Criteria	5.4	109	54	1,100	4,100	400	1,200	950

Figure 9.1: Predicted Cumulative CO 8-Hour Average Concentrations

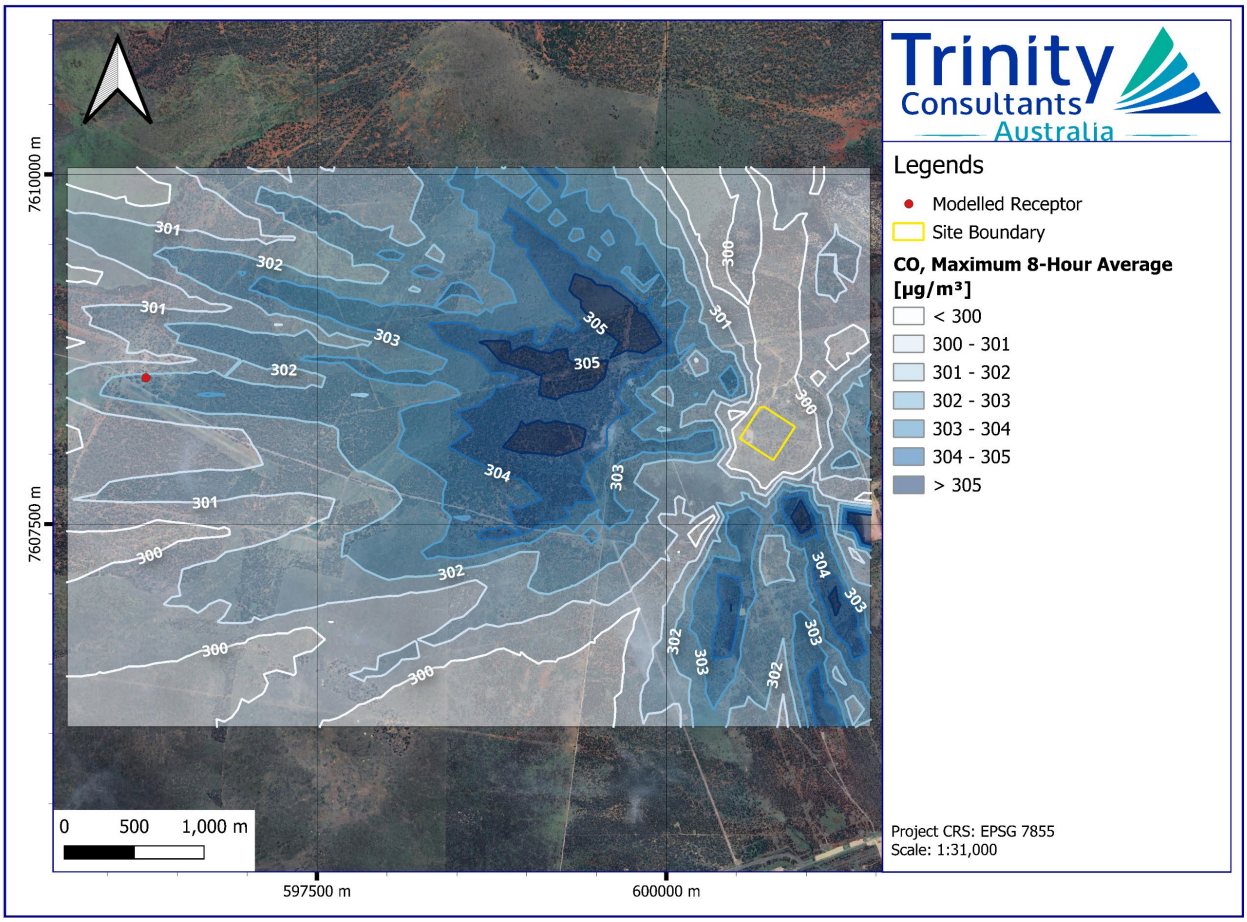
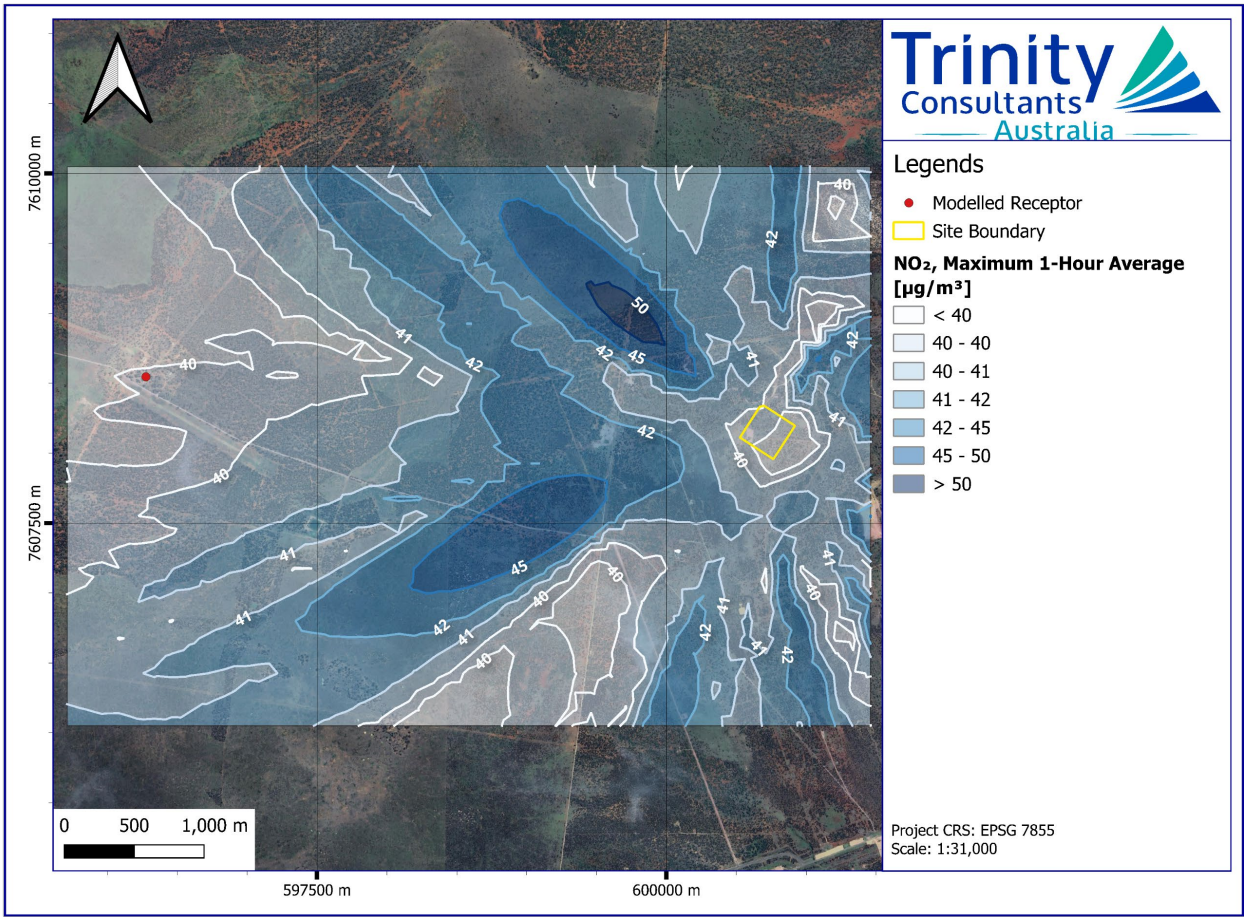


Figure 9.2: Predicted Cumulative NO_2 1-Hour Average Concentrations



10. CONCLUSIONS

An air quality assessment has been conducted for the Micro Liquefied Natural Gas (LNG) Plant at North Goonyella, Moranbah, Queensland. The conclusions of the assessment are summarised as follows:

- The main air emission sources during operation are intermittent flaring events associated with start-up, shutdown, commissioning, and upset conditions. The facility will be powered by the grid, therefore, there will be no combustion emissions from a power station or generators. Construction emissions are limited to minor fugitive dust and vehicle exhaust during plant installation and minimal earthworks.
- The key pollutants considered are nitrogen dioxide, carbon monoxide, and volatile organic compounds associated with the proposed flare, with particulate matter and sulfur dioxide deemed negligible.
- The nearest sensitive receptor is Denham Homestead located approximately 4.3 kilometres west of the proposed site, with other receptors further away from the site.
- Air dispersion modelling predicts compliance with all relevant ambient air quality objectives for nitrogen dioxide, carbon monoxide, and volatile organic compounds at the nearest sensitive receptor, even under conservative assumptions such as continuous flare operation, full conversion of NO_x to NO_2 and elevated background levels.

Overall, the low predicted concentrations demonstrate that the Project is suitably located and designed with respect to minimising air quality impacts.

11. REFERENCES

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APPENDIX A GLOSSARY

Parameter or Term	Description
BoM	Bureau of Meteorology
CALMET	Diagnostic meteorological model included in the CALPUFF Modelling System
CALPUFF	Gaussian puff dispersion model included in the CALPUFF Modelling System
CALTAPM	Utility used to convert TAPM output files into a format readable by CALMET
CO	Carbon monoxide
Conversion of ppm to mg/m^3	Where R is the ideal gas constant; T, the temperature in Kelvin (273.16 + T°C); and P, the pressure in mm Hg, the conversion is as follows: mg/m^3 = (P/RT) x Molecular weight x (concentration in ppm) = P x Molecular weight x (concentration in ppm) 62.4 x (273.2 + T°C)
DETSI	Queensland Department of Environment, Tourism, Science and Innovation
EA	Environmental Authority
EPP(Air)	Queensland Environmental Protection (Air) Policy 2019
g/s	Grams per second
m/s	Metres per second
NO_x	Oxides of nitrogen including nitric oxide and nitrogen dioxide
NO_2	Nitrogen dioxide
$PM_{2.5}$	Particulates suspended in air with aerodynamic diameter less than 2.5 microns
PM_{10}	Particulates suspended in air with aerodynamic diameter less than 10 microns
ppb	Parts per billion by volume
ppm	Parts per million by volume
SO_2	Sulphur dioxide
TAPM	The Air Pollution Model developed by CSIRO and used by ASK for meteorological modelling
Terrad	Radius of influence of terrain features in the CALMET model
$\mu g/m^3$	Micrograms per cubic metre
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UTM	Universal Transverse Mercator coordinate system
Vic EPA SEPP	Victorian Environment Protection Agency State Environment Protection Policy
VOCs	Volatile organic compounds



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Acoustics • Air Quality • Marine Ecology • Noise • Stack Testing • Water Quality

APPENDIX K. – NOISE ASSESSMENT (TRINITY CONSULTANTS)

CENTURION LIQUEFIED NATURAL GAS FACILITY

Noise Impact Assessment

South Queensland Environmental Expertise & Services Pty Ltd

Date
19 January 2026

Report
257401.5023.R02V01

DOCUMENT CONTROL

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APPENDICES

Appendix A Glossary

Appendix B Noise Contours

1. INTRODUCTION

Trinity Consultants Australia (Trinity) was commissioned by South Queensland Environmental Expertise & Services Pty Ltd to provide a noise impact assessment for the proposed Micro Liquefied Natural Gas (LNG) Plant at North Goonyella, Moranbah, Queensland.

The proposed development involves operation of a 70 tonnes per day (tpd) Micro LNG Plant. The plant will receive incidental coal seam gas diverted from flaring at the Centurion North Goonyella Mine, which will be piped to the site. The Micro LNG Plant is a modular facility and has recently been in operation at Mt Magnet in Western Australia. The plant will also include amine regeneration plant, gas heater, diesel backup generator and flare.

This noise impact assessment report is to accompany an Environmental Authority (EA) Application for consideration by the Department of Environment, Tourism, Science, and Innovation (DETSI) to carry out the proposed development.

The purpose of this report is as follows:

- Outline the relevant project noise criteria.
- Present the results of historical noise monitoring.
- Predict and assess the noise emissions from the development and assess the noise impacts onto nearby noise sensitive receivers.
- Describe noise mitigation requirements, if any.

To aid in the understanding of the terms in this report a glossary is included in **Appendix A**.

2. STUDY AREA DESCRIPTION

2.1 Zoning of Site and Surroundings

The proposed site for the facility is located at the northern quadrant of the ML6949 Centurion Coal Mine lease area at North Goonyella, Moranbah, Queensland, approximately 41.3 km from the northwest edge of the Moranbah township. The site is a previously disturbed laydown area with existing hardstand and minimal vegetation.

The site for the development is designated as being within a Rural Zone under the Isaac Regional council planning scheme 2021. The proposed development is surrounded by the following uses:

- To the north is predominantly vegetation
- To the west is the Old Denham Park
- To the east is predominantly vegetation
- To the south is North Goonyella Coal Mine

The zoning of the subject site and surrounding area is shown in **Figure 2.1**. The proposed development within the subject site is shown in **Figure 2.2**.

Figure 2.1: Zoning Map (Isaac Regional Council Plan)

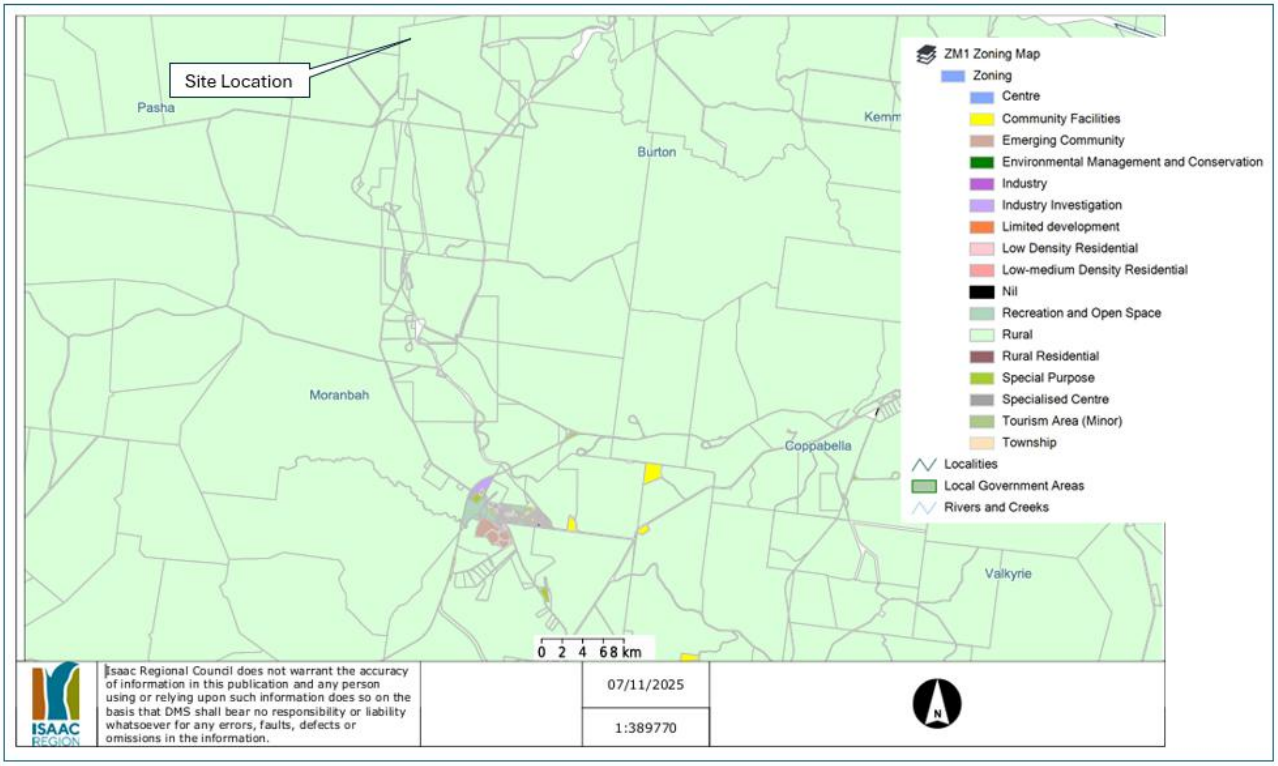
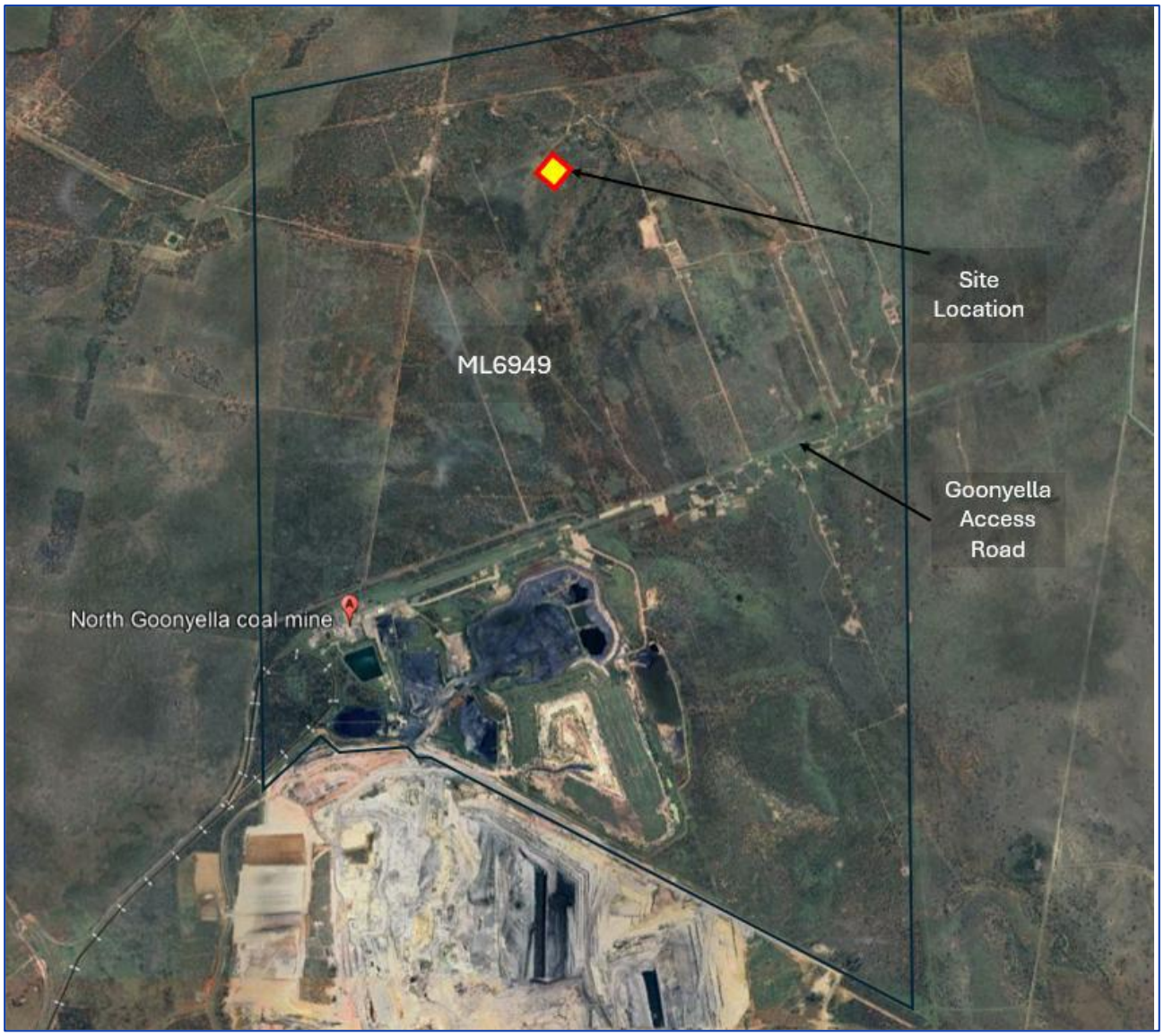


Figure 2.2: Site Locations



2.2 Identification of Sensitive Receptors

The Department of Environment, Tourism, Science and Innovation (DETSI) defines a sensitive place and commercial place as follows:

- Sensitive place:
  - A dwelling, mobile home or caravan park, residential marina or other residential place;
    - "dwelling" means any of the following structures or vehicles that is principally used as a residence-
      - a house, unit, motel, nursing home or other building or part of a building;
      - a caravan, mobile home or other vehicle or structure on land;
      - a watercraft in a marina.
  - a motel, hotel or hostel;
  - a kindergarten, school, university or other educational institution;
  - a medical centre or hospital;
  - a protected area;

- a park or gardens; or
- a place used as an office or for business or commercial purposes.

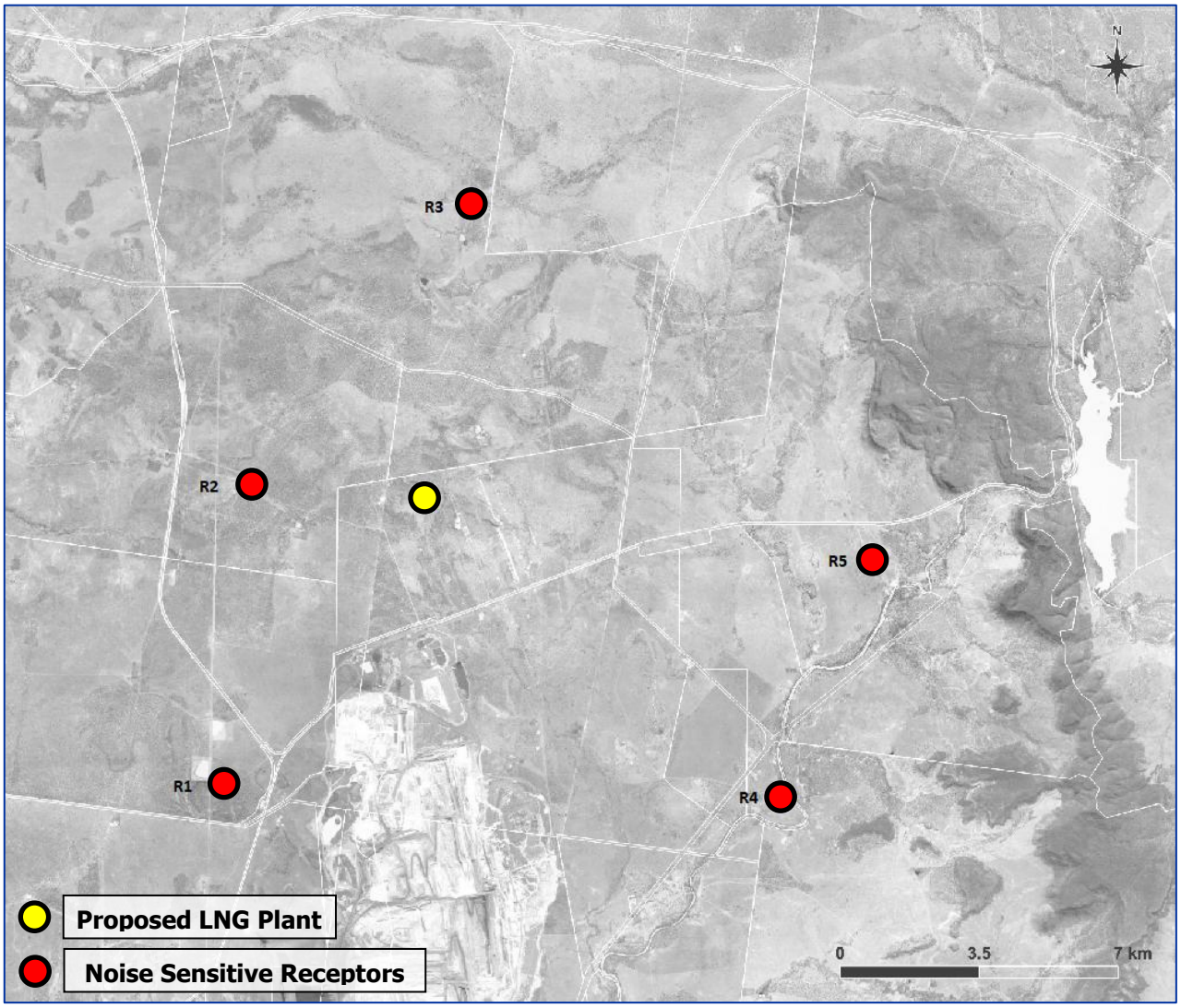
- Commercial place:
  - a place used as an office or for business or commercial purposes

Based on the definition, the nearest sensitive uses and separation distances from the development site are defined as follows:

- Residential/accommodation:
  - (R1) Lapunyah Homestead – 8.8 km south-west
  - (R2) Denham Homestead – 4.3 km west
  - (R3) Wards Well Homestead – 7.4 km north
  - (R4) Redhill Homestead – 11.6 km south-east
  - (R5) Burton Down Homestead – 11.3 km east

The locations of noise sensitive receptors are shown in **Figure 2.3**.

Figure 2.3: Noise Sensitive Receptors



3. PROPOSED DEVELOPMENT

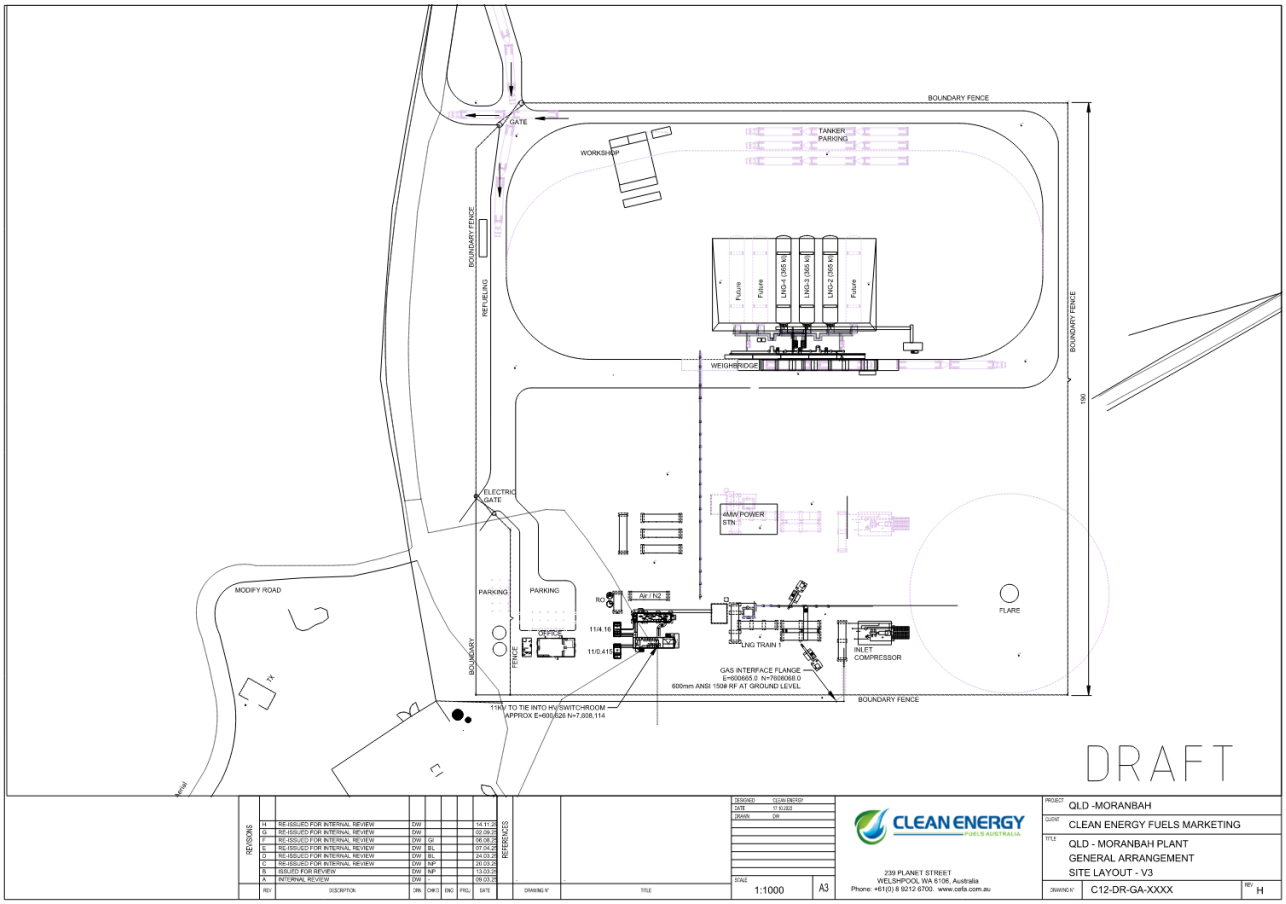
3.1 Key Features

The Micro LNG plant will be moved from another site to the new proposed location. The site layout of the plant is presented in **Figure 3.1.**

The development will include the following key components:

- LNG Production Facility
  - Modular liquefaction plant with a nominal capacity of 70 tonnes per day (t/d).
  - Approximately eight processing modules (each ~12 m long), vertical cold box, and switch-room.
  - Proprietary mixed refrigerant liquefaction technology.
- Ancillary Infrastructure
  - One HV transformer and electrical switch-room.
  - Offices, control room, first aid room, ablutions.
  - Potable and fire water tanks.
- Storage and Loading
  - Cryogenic LNG storage tank with 150 t capacity (below Major Hazard Facility threshold).
  - Road tanker loading bay for LNG transfer.
- Safety and Environmental Systems.
  - Flare system for non-liquefied gases.
  - Nitrogen generation for purging and instrument air.
  - Spill containment and fire protection systems.

Figure 3.1: Proposed Site Layout (Provided on 4th December 2025)



3.2 Description of Operations

The micro LNG Plant will convert incidental coal seam gas (ICSG) from the Centurion Mine into LNG for beneficial use, reducing flaring and displacing diesel consumption in regional operations. The process includes:

- Gas Pre-treatment and Compression:
  - Filtration, amine treating for CO_2 removal, molecular sieve dehydration.
  - Pre-compression from ~0.05 bar to ~6 bar.
- Liquefaction:
  - Mixed refrigerant system cooling gas to -161°C.
- Storage and Distribution:
  - LNG stored in cryogenic tanks and transferred to road tankers for offsite delivery.

A summary of the operating profile is provided below:

- Continuous operation 24/7, remotely monitored.
- LNG production: 70 t/d, equivalent to ~35 million m^3 of natural gas annually.
- Road tanker dispatch: ~70 t/day (single or multi-trailer configurations).
- Electrical demand: ~1.8 MW continuous.

The facility footprint is approximately 150 m x 170 m.

3.3 Noise Sources

3.3.1 Operational Sources

The primary operational noise sources include:

- Compressors (MR compressor, gas booster) – continuous, high sound power levels.
- Cold Box Fans – continuous airflow noise.
- Pumps (amine circulation, MR makeup) – continuous.
- Flare System – intermittent during venting or upset conditions.
- Nitrogen Generation Package – compressors and PSA vessels.
- Road Tanker Loading – intermittent truck movements and loading pump noise.

Noise emissions from these sources are expected to be continuous or quasi-continuous, dominated by pumps and compressors. Tonal components and low-frequency noise (<250 Hz) may occur from compressors and fans. Supplier data indicates typical sound pressure levels in the range of 68–95 dBA in close proximity to each source. The dominant noise sources are continuous in nature. The flare represents the main intermittent since it will be used during upset conditions only. All noise sources modelled, along with supplier noise specifications, are detailed in **Section 6**.

3.3.2 Other Operating Scenarios

This assessment focuses on the prediction of noise impacts during operations. The following comments are made with respect to noise impacts from other operational scenarios:

- Commissioning: Includes functional testing of compressors, pumps, and control systems. Noise levels expected to be similar or lower than normal operations.
- Upset Conditions: Short-term flaring or venting may occur, producing intermittent elevated noise. These events are rare and of short duration.
- Decommissioning: Removal of modular equipment and rehabilitation of site. Noise emissions are expected to be similar to or less than operation phase.

Given the above information, no further detailed assessment of the above scenarios is considered warranted.

3.3.3 Construction Phase

Construction activity will generate noise; however, noise emissions are expected to be low because the proposed facility will utilise existing handstand, vehicle access, and the proposed micro LNG Plant is modular. Construction will involve installation of modular LNG plant components and ancillary infrastructure. Activities include:

- Site preparation (minimal earthworks, no vegetation clearing).
- Delivery and unloading of modules using cranes and forklifts.
- Installation of cryogenic storage tank and flare stack.
- Mechanical and electrical works, piping, and instrumentation.
- Road tanker loading bay construction.

Construction is expected to occur over 6–8 months, with peak workforce of ~30 personnel. Heavy vehicle movements will include delivery of modules and equipment. Given the modular nature of the plant and existing hardstand, earthworks will be minimal, reducing noise impacts. Furthermore, the nearest sensitive receptor is approximately 4 km from the site, so construction noise impacts are expected to be negligible.

4. EXISTING ACOUSTIC ENVIRONMENT

Acoustic measurements were obtained from the noise assessment conducted by SLR for the Centurion Coal Mine environmental authority amendment application[1]. As part of the study, noise monitoring data for the nearest sensitive receptors to the mine were reviewed. The noise measurement locations and sensitive receptors relevant to this assessment are shown in **Figure 4.1** and described as follows:

- Lapunyah Homestead: Noise logger located in south-eastern corner of front yard, approximately 20 m from the homestead.
- Denham Park: Noise logger located in south-eastern corner of front yard, approximately 15 m from the homestead.
- Buton Downs Homestead: Noise logger located in centre of front yard, approximately 100 m from the homestead (between homestead and working shed, next to fruit garden).

The SLR report states that all acoustic instruments used for noise monitoring were configured to A-weighting with a 'Fast' response, in accordance with the relevant Australian Standards and DESI's Noise Measurement Manual (EPA, 2020). The equipment employed during the surveys was designed to comply with AS/NZS IEC 61672.1-2019 Electroacoustics – Sound Level Meters: Specifications, and each carried a current manufacturer calibration certificate.

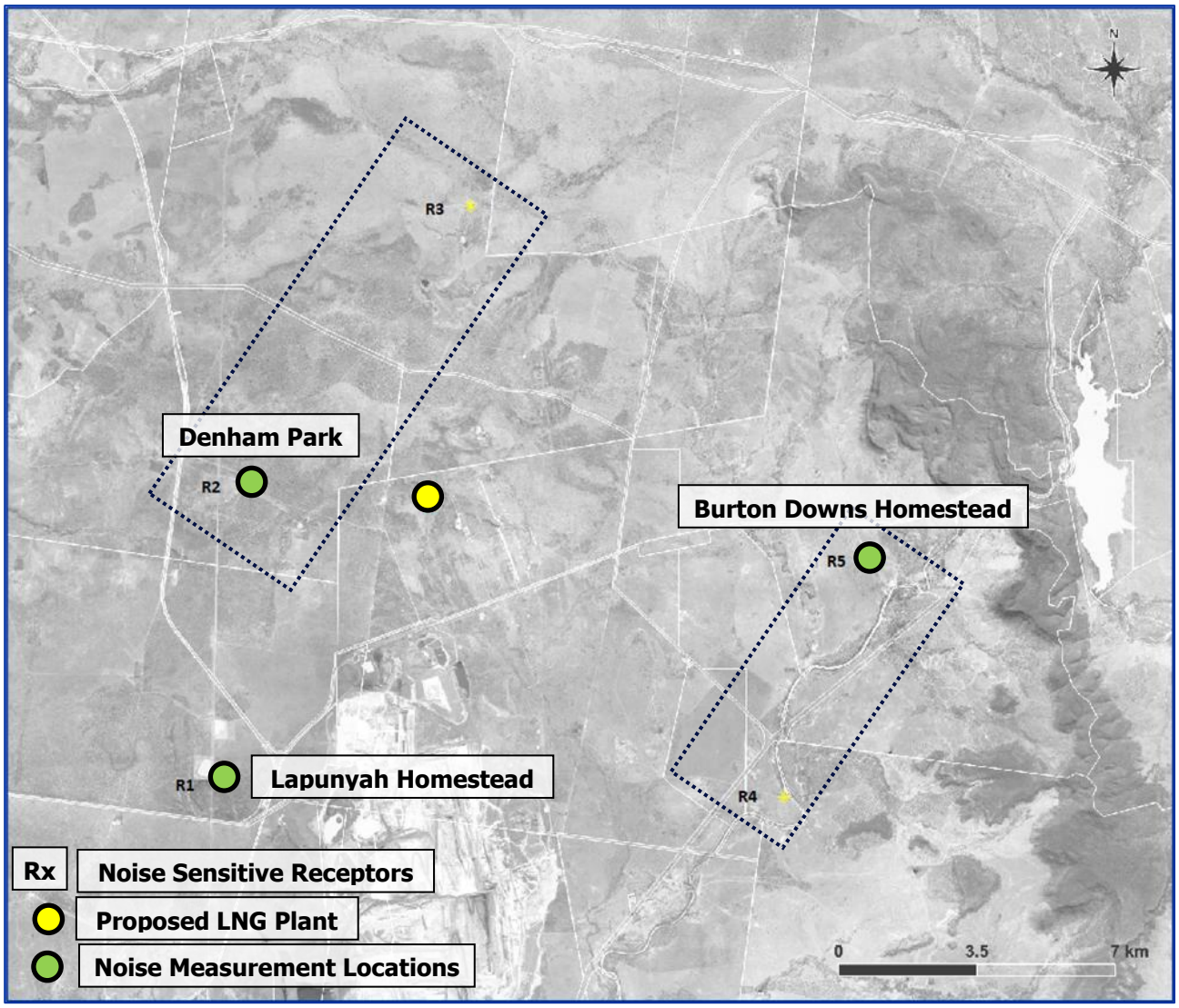
The measured baseline noise levels are summarised in **Table 4.1**.

Table 4.1: Background Noise Levels at Location L1

Period	Rating Background Noise Level (RBL) L_{90} dBA		
Location	Lapunyah Homestead	Denham Park	Burton Down Homestead
Day (7am to 6pm)	26	28	25
Evening (6pm to 10pm)	30	25	24
Night (10pm to 6am)	28	25	24

[1] Centurion Coal Mining Pty Ltd Environmental Authority Amendment Application Supporting Report, SLR Ref No.: 620.040594_Major EA Supporting Doc_V4.0.docx, SLR Project no: 620.040594, Dated 4 February 2025

Figure 4.1: Noise Measurement Locations



5. NOISE CRITERIA

5.1 Overview

Noise criteria are required to assess the potential impacts of the proposed operations on noise sensitive receptors. The relevant Department of Environment, Tourism, Science and Innovation (DETSI) noise criteria have been considered and are based on the following documents:

- Environmental Protection Act 1994
- Environmental Protection (Noise) Policy 2019

5.2 Environmental Protection Act 1994

In Queensland, the environment is protected under the Environmental Protection Act (EP Act) 1994. Key sections of the EP Act are summarised below:

- Section 3 of the EP Act states that the object of the 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 the ecological processes on which life depends (ecologically sustainable development).
- Section 319 of the EP Act relates to General Environmental Duty and states that a person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm.
- Section 14(1) of the EP Act defines environmental harm as any adverse effect, or potential adverse effect (whether temporary or permanent and of whatever magnitude, duration or frequency) on an environmental value, and includes environmental nuisance.
- Section 15 of the EP Act defines environmental nuisance as an unreasonable interference or likely interference with an environmental value caused by (a) ... noise. The EP Act refers to the Environmental Protection Policies as being subordinate legislation to the Act.

The following sections presents details of the Environmental Protection (Noise) Policy, one of the subordinate legislative documents implemented for the protection of the acoustic environment and for achieving the EP Act outcomes detailed above.

5.3 Environmental Protection (Noise) Policy 2019

5.3.1 Overview

In respect of the acoustic environment, the object of the Act is achieved by the Environmental Protection (Noise) Policy 2019 (EPP (Noise)). This policy identifies environmental values to be enhanced or protected, states acoustic quality objectives, and provides a framework for making decisions about the acoustic environment.

5.3.2 Acoustic Quality Objectives

The EPP (Noise) contains a range of acoustic quality objectives for a range of receptors. The objectives are in the form of noise levels, and are defined for various periods of the day, and use several acoustic parameters. The objectives are not target levels but rather maximum levels. The reasonableness of the objectives should also consider the existing noise environment.

Schedule 1 of the EPP(Noise) includes the following acoustic quality objectives which must be satisfied:

- Residence:
  - Outdoors
    - Daytime and Evening: 50 dBA $L_{Aeq,adj,1hr}$, 55 dBA $L_{A10,adj,1hr}$ and 65 dBA $L_{A1,adj,1hr}$

- Indoors
  - Daytime and Evening: 35 dBA $L_{Aeq,adj,1hr}$, 40 dBA $L_{A10,adj,1hr}$ and 45 dBA $L_{A1,adj,1hr}$
  - Night: 30 dBA $L_{Aeq,adj,1hr}$, 35 dBA $L_{A10,adj,1hr}$ and 40 dBA $L_{A1,adj,1hr}$
- Commercial:
  - Indoors
    - When activity is open for business: 45 dBA $L_{Aeq,adj,1hr}$

The attenuation provided by a façade can range considerably depending on various factors including construction materials and room dimensions. Façade attenuation for an open window may range from 5 to 15 dBA. In the absence of details of construction materials, a commonly adopted attenuation for a typical residential building façade is 7 dBA assuming open windows. That is, with an external noise source, a 7 dBA reduction in noise levels from outside a house to inside a house is expected when windows are fully open. For commercial building, 10 dBA reduction was assumed. The indoor noise objectives noted above could be converted to the following external objectives (with windows open):

- Residence:
  - Daytime and Evening: 42 dBA $L_{Aeq,adj,1hr}$, 47 dBA $L_{A10,adj,1hr}$ and 52 dBA $L_{A1,adj,1hr}$
  - Night: 37 dBA $L_{Aeq,adj,1hr}$, 42 dBA $L_{A10,adj,1hr}$ and 47 dBA $L_{A1,adj,1hr}$
- Commercial:
  - When activity is open for business: 55 dBA $L_{Aeq,adj,1hr}$

5.3.3 Background Creep

The current 2019 version of the EPP (Noise) no longer contains criteria for background creep, but states that background creep should be prevented or minimised, to the extent that it is reasonable to do so.

Background creep is defined as "a gradual increase in the total amount of background noise in the area or place as measured applying the document called the 'Noise Measurement Manual' published on the department's website" (Section 9(4) of EPP Noise). This is understood to require consideration of cumulative impacts, including other developments.

The EPP Noise (2019) does not specifically define background creep criteria, however, it is noted that the 2008 version specified a Background Plus 5 dBA limit and relevant noise sections presented a Background 3-5 dBA limit depending on the noise source and time of the day (e.g. +5 for the day and + 3 for the night). For the purpose of the assessment, this Plus 3-5 dBA approach has been adopted.

When using background creep criteria, it is customary to use a minimum background noise level. Currently, the Queensland Department of Environmental Science and Innovation documents adopt the following lowest background levels for the purpose of deriving noise criteria:

- QLD Model Mining Conditions (7 March 2017) – 30 dBA for day/evening/night
- QLD Streamlined model conditions for petroleum activities (5 May 2016):
  - Day (7am to 6pm): 35 dBA
  - Evening (6pm to 10pm): 30 dBA
  - Night (10pm to 6am): 25 dBA
  - Morning (6am to 7am): 30 dBA.
- Draft Planning for Noise Control Guideline (2013 review) – 30 dBA.

Table 5.1 presents the background plus criteria based on the measured RBL values presented in **Section 4**.

Table 5.1: Background Plus Criteria

Location	Lapunyah Homestead		Denham Park		Burton Down Homestead	
Period	**RBL**	**Noise Limit, L_{Aeq}**	**RBL**	**Noise Limit, L_{Aeq}**	**RBL**	**Noise Limit, L_{Aeq}**
Day (7am to 6pm)	26	35 [a]	28	35 [a]	25	35 [a]
Evening (6pm to 10pm)	30	35 [a]	25	35 [a]	24	35 [a]
Night (10pm to 6am)	28	31	25	28	24	27

Note a: Minimum RBL of 30 dBA has been adopted for day and evening

5.4 Proposed Criteria

Based on the above review of noise criteria, **Table 5.2** presents a summary of the criteria adopted for the assessment. The most stringent criteria, which is Background Plus Criteria, was adopted.

Table 5.2: Proposed Noise Limits for Sensitive Receptors

Location	Lapunyah Homestead	Denham Park	Burton Down Homestead
Period	**Noise Limit, L_{Aeq}**	**Noise Limit, L_{Aeq}**	**Noise Limit, L_{Aeq}**
Day (7am to 6pm)	35	35	35
Evening (6pm to 10pm)	35	35	35
Night (10pm to 6am)	31	28	27

6. OPERATIONAL NOISE ASSESSMENT

6.1 Model Description

Noise modelling was carried out using the CONCAWE method, which is widely used and accepted for noise modelling and is accepted by DETSI. The CONCAWE method allows for modelling a number of discrete meteorological scenarios.

The SoundPLAN V8.2 program was used to develop a three-dimensional digital terrain noise model of the project area and the surrounding area including the location of sensitive receptors. The model incorporates terrain data for the proposed Project and the existing surrounding topography.

6.2 Meteorology

Noise levels from the facility at sensitive receptors can vary significantly depending upon the meteorological conditions, particularly due to changes in wind speed and direction and vertical temperature gradients, which include temperature inversions. It is possible to measure noise variations of the order of 10 to 15 dBA due to changes in meteorological conditions, depending on distance between noise source and receiver.

The SoundPLAN v8.2 model was set up to predict noise levels under neutral and adverse meteorological conditions. The conditions used in the noise model are shown in **Table 6.1**.

Table 6.1: Meteorological Scenarios

Parameter	Day Meteorological Scenario		Night Meteorological Scenario	
	Scenario D1-Neutral	Scenario D2-Adverse	Scenario N1-Neutral	Scenario N2-Adverse
Pasquill Stability Class	D	D	F	F
Temperature (°C)	25	25	10	10
Wind Speed (m/s)	0	2	0	2
Wind direction	No wind	Towards receptor	No wind	Towards receptor
Relative Humidity (%)	40	40	70	70

These meteorological scenarios are presented to give an indication of the range of noise levels from neutral to adverse conditions and are assessed against the criteria corresponding to the periods when they are most likely to occur. The most critical predictions are the night scenarios since this assesses the highest predicted noise levels against the most stringent night-time criteria.

6.3 Noise Source Data

The model uses the sound power level (L_w) of each noise source to predict noise emissions. The sound power levels used in the model were based on noise source data obtained from the supplier and are exclusive of tonality and impulsiveness penalties. The sound power levels for the proposed equipment for the project and modelled source heights are presented in **Table 6.2**.

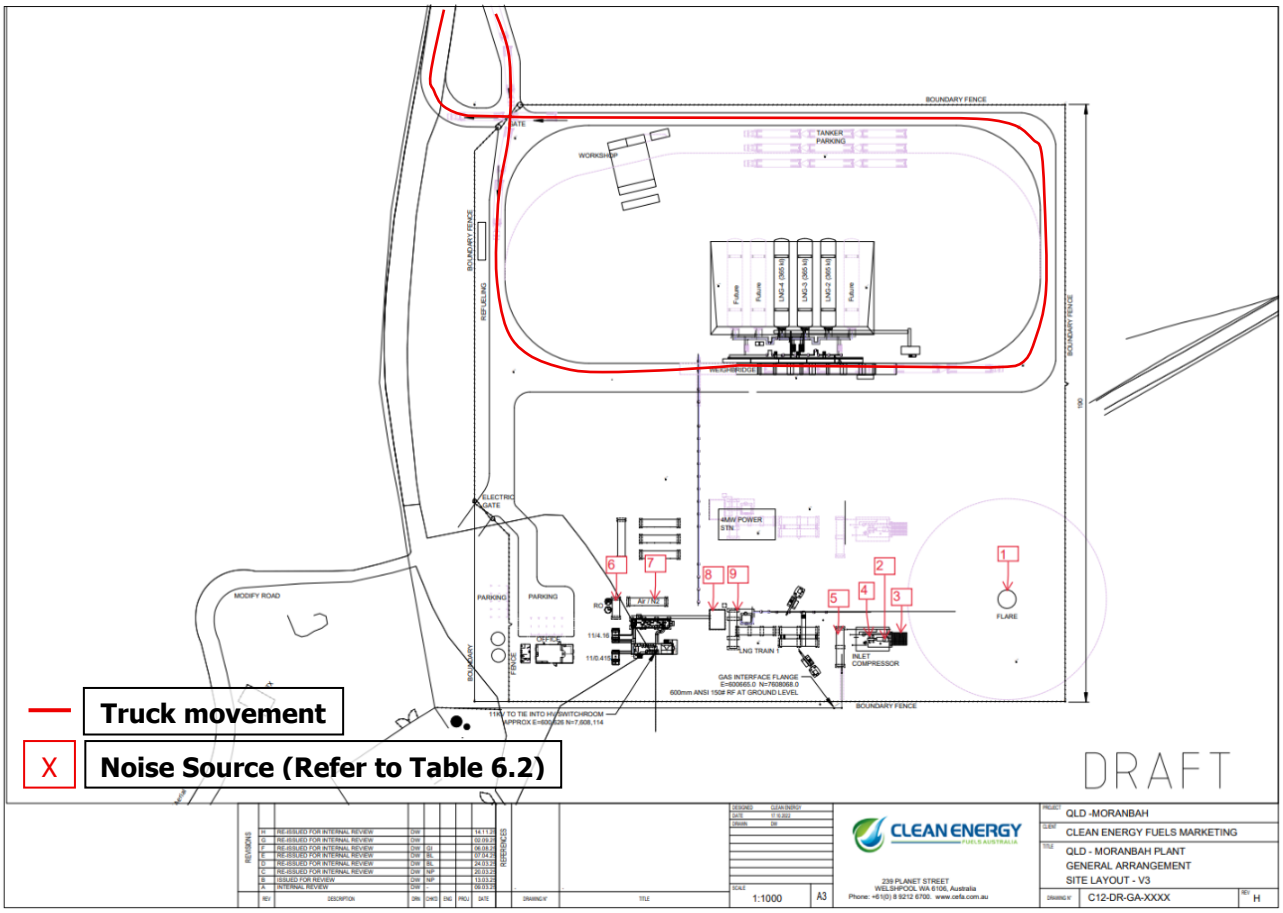
Table 6.2: Noise Source Sound Power Levels

	Equipment	Height	Octave Band Sound Power Level $L_{w,eq}$ dBZ									Overall $L_{w,eq}$	
#		Meter	32	63	125	250	500	1k	2k	4k	8k	dBZ	dBA
9	Regen Gas Compressor	2.0	45	51	56	60	63	65	62	57	52	70	69
9	Regen Gas Cooler	2.0		94	91	88	88	84	84	85		98	91

#	Equipment	Height	Octave Band Sound Power Level $L_{w,eq}$ dBZ									Overall $L_{w,eq}$	
		Meter	32	63	125	250	500	1k	2k	4k	8k	dBZ	dBA
9	MR Evac Compressor	2.0	64	70	75	79	82	84	81	76	71	89	88
8	MR Compressor	2.0	87	93	98	102	105	107	104	99	94	112	111
8	MR Compressor Lube Oil Cooler	2.0	-	94	91	88	88	84	84	85		98	91
8	MR Compressor Inter Cooler	2.0	-	99	96	93	93	89	89	90		103	96
8	MR Compressor After Cooler	2.0	79	81	84	88	91	92	90	86	81	97	96
7	Nitrogen Package	2.0		92	80	88	81	82	84	75		95	88
6	RO Unit	2.0	77	76	72	75	82	75	75	75	76	86	84
5	Inlet Filter Skid	2.0	68	71	75	73	74	71	70	68	61	81	77
4	Pre-compression Skid Compressor	2.0	84	90	95	99	102	104	101	96	91	109	108
3	Pre Compression Skid Cooler	2.0	86	89	93	91	92	89	88	86	79	99	95
2	Pre Compression Skid Motor	2.0	76	79	83	81	82	79	78	76	69	89	85
1	Flare	15.0	113	114	109	103	98	97	94	90	84	118	103
-	Road Train	2.0	-	84	92	97	102	106	105	98	85	110	110

The modelled noise locations are shown in **Figure 6.1**.

Figure 6.1: Noise Source Locations



It is conservatively assumed that the LNG plant equipment within the facility will operate 24/7, including the night.

6.4 Predicted Noise Levels

The predicted noise levels at nearby sensitive receptors are presented in **Table 6.3**. Predicted noise levels are also shown graphically as noise contours in **Appendix C** for the modelled scenario and day and night meteorological conditions, as follows:

- **Figure C.1** Day Scenario D1 - Neutral
- **Figure C.2** Day Scenario D2 - Adverse
- **Figure C.3** Night Scenario N1 - Neutral
- **Figure C.4** Night Scenario N2 - Adverse

These predicted noise levels (or component noise levels) do not include ambient noise level, indicating noise impact of the proposed facility only. Ambient noise levels at the noise sensitive receptors may be higher than the level predicted due to local noise sources such as insects, local traffic, and other extraneous noise sources.

Given that noise sources within the proposed LNG Plant are continuous in nature, impulsive characteristics under normal operating conditions are not expected. However, +2 dBA of tonality correction to predicted A-weighted results has been conservatively applied.

Table 6.3: Predicted A-weighted Noise Level

Receptor ID	Predicted Noise Immissions Level, $L_{eq,adj,T}$ dBA				Noise Criteria $L_{eq,adj,T}$ dBA
	D1	D2	N1	N2	
R1	-3	3	8	5	35 Day 35 Evening 31 Night
R2	10	17	20	19	35 Day 35 Evening 28 Night
R3	0	6	10	8	35 Day 35 Evening 28 Night
R4	-8	-2	2	-1	35 Day 35 Evening 27 Night
R5	-7	-2	1	-1	35 Day 35 Evening 27 Night

Full compliance with the noise criteria is predicted. In particular, it is noted that compliance by a significant margin (at least 13 dBA) is predicted during the day and evening periods. During the night, predicted noise levels are at least 8 dBA below the night period limit.

It is also noted that full compliance with the EPP Noise acoustic quality objective of 42 dBA is predicted (based on internal objective of 35 dBA plus 7 dBA open window attenuation).

Overall, the results show very low noise levels at sensitive receptors, and this is largely due to the large separation distance. It is concluded that the Project is suitably located and designed with respect to minimising noise impacts.

7. RECOMMENDATIONS AND CONCLUSION

A noise impact assessment has been conducted for the Micro Liquefied Natural Gas (LNG) Plant at North Goonyella, Moranbah, Queensland. The conclusions of the assessment are summarised as follows:

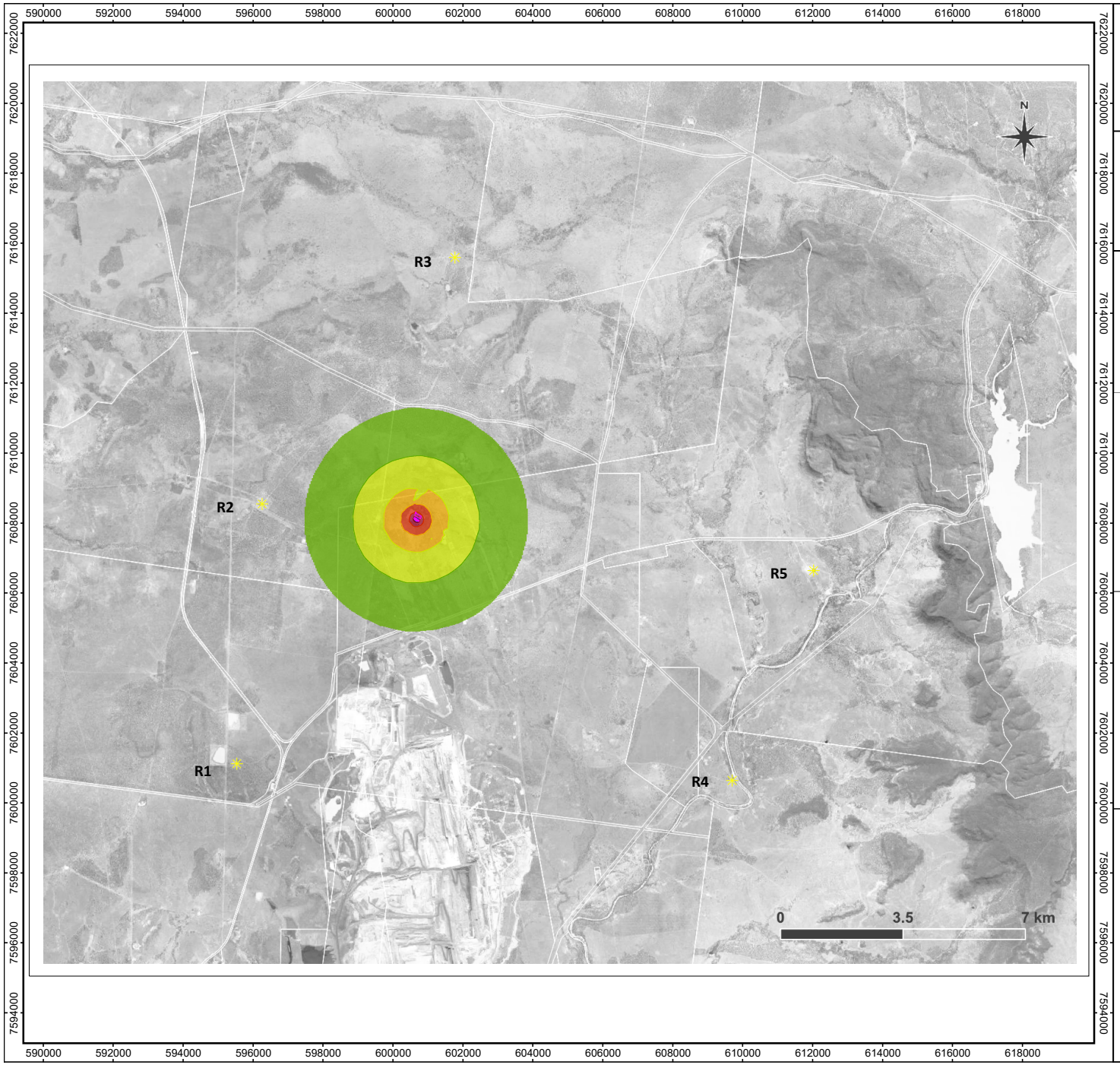
- The key noise sources are continuous in nature and include compressors, pumps and gas flare stack. All noise sources modelled using the supplier noise specifications, are detailed in **Section 6.**
- The nearest noise sensitive receptor is a residential dwelling, approximately 4 km west to the proposed site. Identified noise sensitive receptors are shown in **Figure 2.3**.
- Noise criteria is outlined in **Section 5**. Proposed noise criteria is based on historical background noise monitoring data from the project area and the Environmental Protection (Noise) Policy 2019.
- Operational noise impact has been assessed in **Section 6** through computational noise modelling. Full compliance with the noise criteria was predicted for all periods of the day, including the night (associated with the most stringent noise criteria), and at all nearest sensitive receptors.
- The potential for noise impacts during other operational phases (e.g. startup, shutdown) and during construction are expected to be no greater than those predicted for normal operations. Ultimately, the nearest sensitive receptors are separated by a large distance, resulting in very low noise levels at these receptors.

Overall, the assessment demonstrates that the Project is suitably located and designed with respect to minimising noise impacts.

APPENDIX A GLOSSARY

Parameter or Term	Description
dB	The decibel (dB) is the unit measure of sound. Most noises occur in a range of 20 dB (quiet rural area at night) to 120 dB (nightclub dance floor or concert).
dBA	Noise levels are most commonly expressed in terms of the 'A' weighted decibel scale, dBA. This scale closely approximates the response of the human ear, thus providing a measure of the subjective loudness of noise and enabling the intensity of noises with different frequency characteristics (e.g. pitch and tone) to be compared.
Day	The period between 7am and 6pm.
Evening	The period between 6pm and 10pm.
Night	The period between 10pm and 7am.
Free-field	The description of a noise receiver or source location which is away from any significantly reflective objects (e.g. buildings, walls).
L_1	The noise level exceeded for 1% of the measurement period.
L_{10}	The noise level exceeded for 10% of the measurement period. It is sometimes referred to as the average maximum noise level.
L_{90}	The noise level exceeded for 90% of the measurement period. This is commonly referred to as the background noise level.
L_{eq}	The equivalent continuous sound level, which is the constant sound level over a given time period, which is equivalent in total sound energy to the time-varying sound level, measured over the same time period.
$L_{eq,1hour}$	As for Leq except the measurement intervals are defined as 1 hour duration.
L_{max}	Maximum A-weighted sound pressure level.
L_{eq}(24 hour)	The average Leq noise level over the 24-hour period from midnight to midnight.
L_{10}(18 hour)	The arithmetic average of the one-hour L10 values between 6am and midnight. This parameter is used in the assessment of road traffic noise.
R_w	Weighted Sound Reduction Index – is a single number evaluation of the property of a partition to attenuate sounds. For the majority of partitions, the value of Rw will be similar to the value for STC. Partitions with particularly poor performance at 100 Hz may have lower values for Rw than for STC. Conversely, partitions with poor performance at 4000 Hz may have higher Rw than for STC. (As per AS1276.1-1999).

APPENDIX B NOISE CONTOURS



Moranbah LNG Plant
Project Number: 257401.5023

N

Figure

C.1

Day - Scenario D1

Date: 5/12/2025
Drawn By: Burak Ayva
Prepared For: Clean Energy Fuel

Free Field Noise Levels Leq(1 hour) dBA

Ground Contour Calculation Height = 1.8m

15 <	<=	25
25 <	<=	35
35 <	<=	45
45 <	<=	55
55 <	<=	65
65 <		

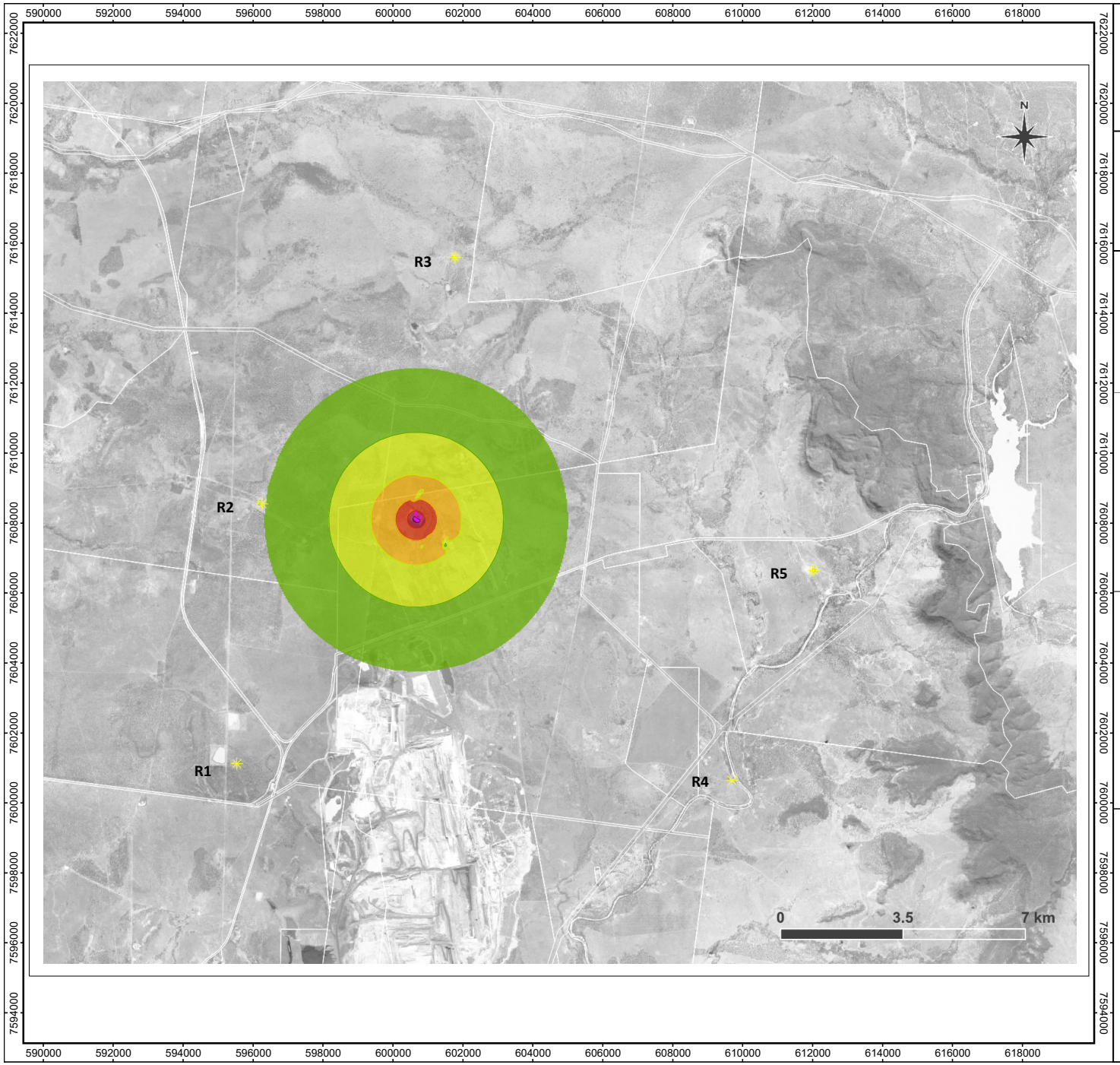
Signs and Symbols

- Point receiver
- Point source
- Line source
- Area source

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Moranbah LNG Plant
Project Number: 257401.5023

N

Figure

C.2

Day - Scenario D2

Date: 5/12/2025
Drawn By: Burak Ayva
Prepared For: Clean Energy Fuel

Free Field Noise Levels Leq(1 hour) dBA

Ground Contour Calculation Height = 1.8m

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25 <		<=	35
35 <		<=	45
45 <		<=	55
55 <		<=	65
65 <			

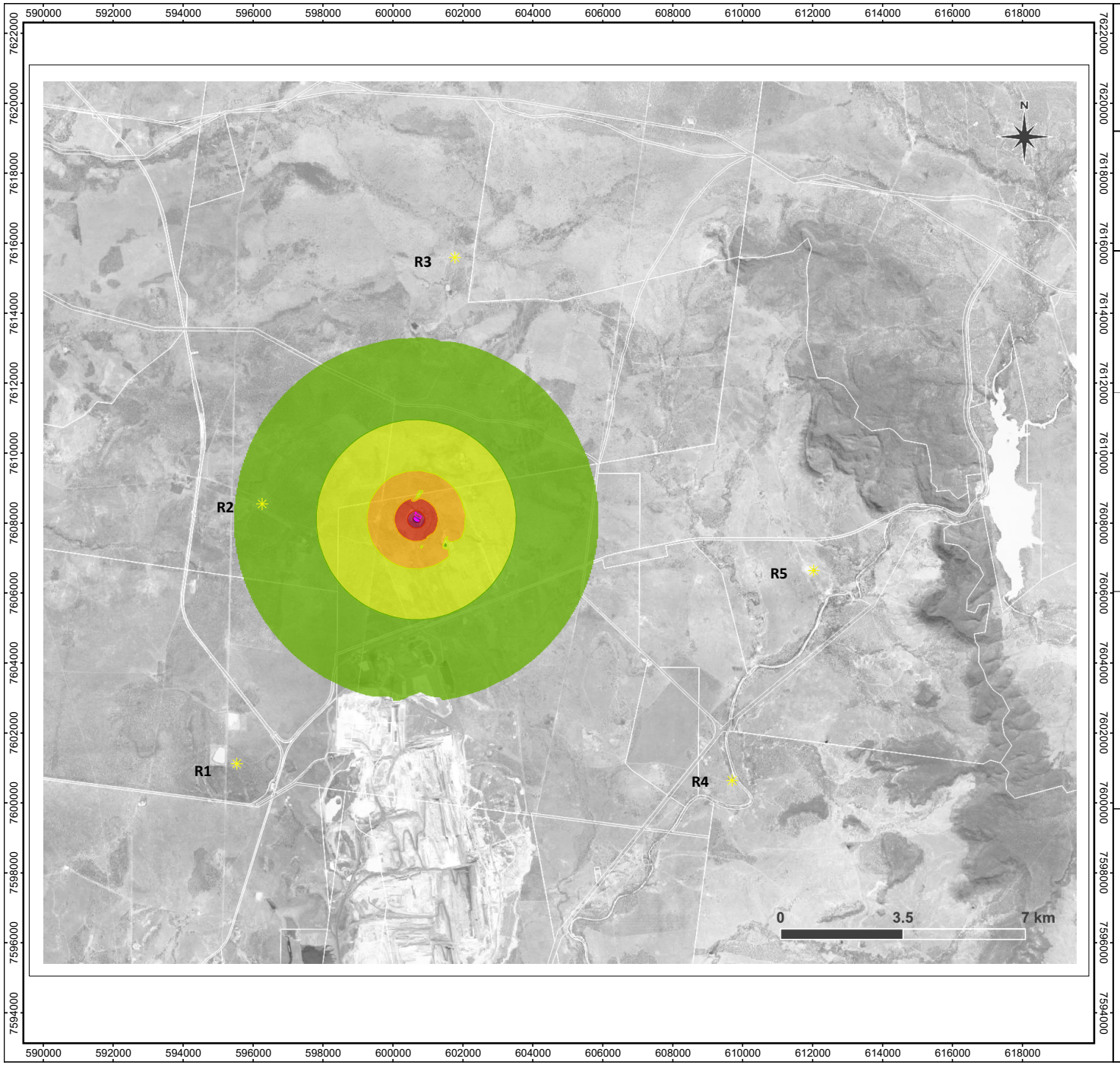
Signs and Symbols

- Point receiver
- Point source
- Line source
- Area source

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Moranbah LNG Plant
Project Number: 257401.5023

N

Figure

C.3

Night - Scenario N1

Date: 5/12/2025
Drawn By: Burak Ayva
Prepared For: Clean Energy Fuel

Free Field Noise Levels Leq(1 hour) dBA

Ground Contour Calculation Height = 1.8m

15 <	<=	25
25 <	<=	35
35 <	<=	45
45 <	<=	55
55 <	<=	65
65 <		

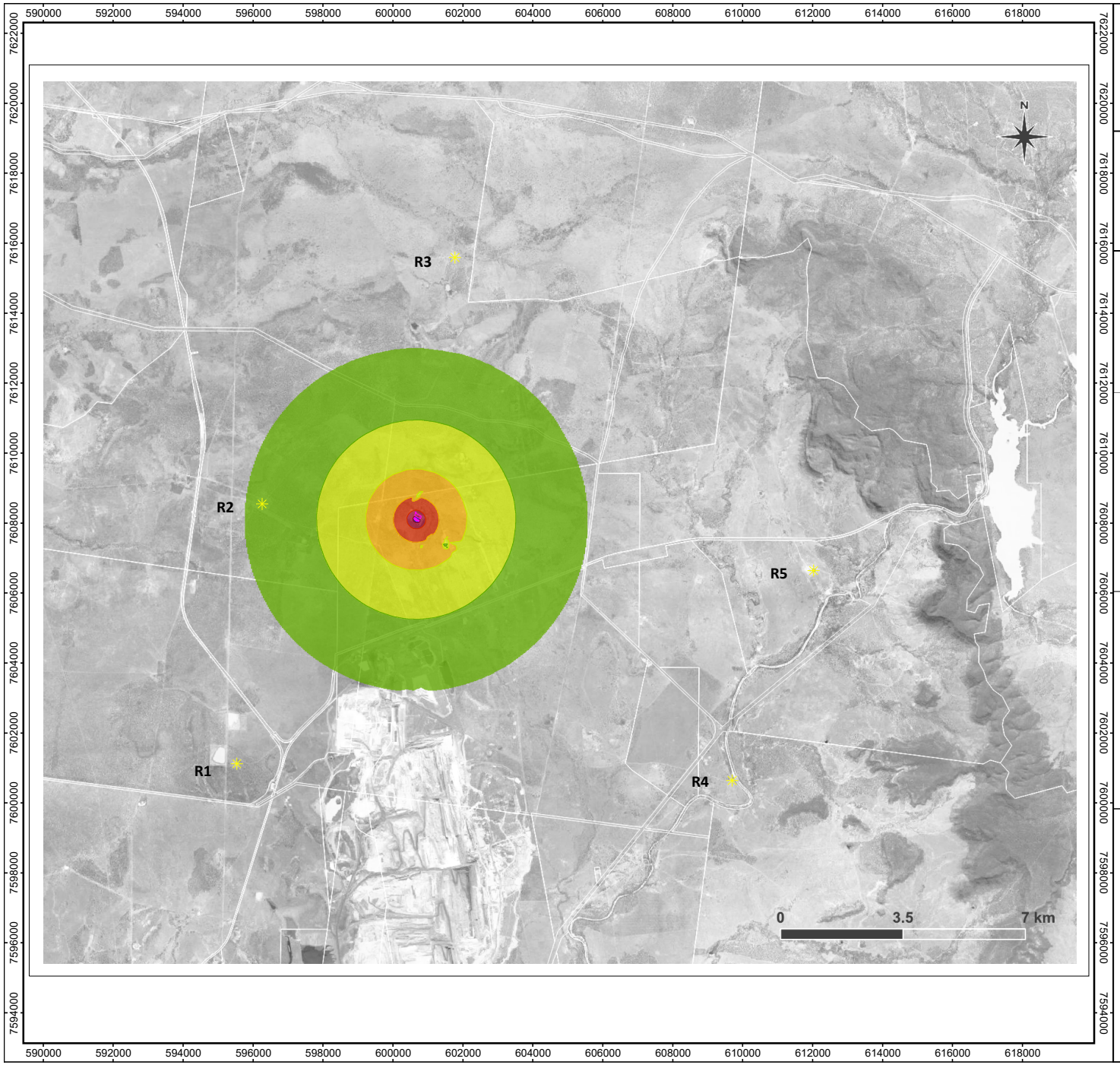
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Moranbah LNG Plant
Project Number: 257401.5023

N

Figure

C.4

Night - Scenario N2

Date: 5/12/2025
Drawn By: Burak Ayva
Prepared For: Clean Energy Fuel

Free Field Noise Levels Leq(1 hour) dBA

Ground Contour Calculation Height = 1.8m

15 <	<=	25
25 <	<=	35
35 <	<=	45
45 <	<=	55
55 <	<=	65
65 <		

Signs and Symbols

- Point receiver
- Point source
- Line source
- Area source

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