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Mount Pleasant Operation

A JOINT VENTURE WITH JCDA Japan Coal Development Australia

Appendix I

Greenhouse Gas Assessment and Mitigation Plan

Modification 8

Resource Strategies

EXECUTIVE SUMMARY

Overview

This Greenhouse Gas Assessment and Mitigation Plan (Greenhouse Gas Assessment) has been prepared to accompany a proposed modification to the Mount Pleasant Operation Development Consent DA 92/97 (the Modification) in accordance with Part 4 of the NSW *Environmental Planning and Assessment Act 1979*. It assesses the likely greenhouse gas emissions of the Modification, including consideration of Commonwealth and NSW climate change policy settings, guidelines and programs, and presents MACH's plan for Mount Pleasant Operation greenhouse gas mitigation and adaptation, reflective of the status of the Modification.

The Mount Pleasant Operation is a major operating open cut coal mine and associated infrastructure, located approximately 3 kilometres north-west of Muswellbrook in the Upper Hunter Valley of New South Wales (NSW)

The Mount Pleasant Operation produces thermal coal using open cut mining methods and has an approved operational capacity of up to 10.5 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal until 22 December 2026 under Development Consent DA 92/97 (as modified).

The Modification would include the following key changes to the approved Mount Pleasant Operation under Development Consent DA 92/97:

- a six year extension of permitted (ROM coal) mining operations to 31 December 2032; and
- an increase in the approved ROM coal extraction rate from 10.5 Mtpa to 12.5 Mtpa.

Greenhouse Gas Calculations

The Mount Pleasant Operation's total Scope 1 emissions incorporating the Modification (approximately 1.81 million tonnes [Mt] carbon dioxide equivalent [CO_2-e]) can largely be categorised and sub-categorised into the following sectors using the Intergovernmental Panel on Climate Change Sectors as applied within Australia's national emission projections:

- **Stationary Energy (Excluding Electricity Generation) – Mining** (approximately 43.8 %)
  (i.e. off-road mobile equipment diesel consumption associated with mining operations)
- **Fugitives – Open Cut Coal Mines** (approximately 47.7 %)
  (i.e. fugitive gaseous emissions that are liberated during mining from the exposed coal seams).
- **Land Use, Land Use Change and Forestry** (approximately 6.8 %)
  (i.e. emissions associated with progressive land clearing in advance of mining).
- **Industrial Processes and Product Use** (approximately 1.7 %)
  (i.e. emissions associated with the use of explosives and other materials).

Total Scope 2 emissions incorporating the Modification (approximately 0.103 Mt CO_2-e) are a category of indirect emissions that account for greenhouse gas emissions associated with the generation of purchased electricity consumed by the entity.

Total Scope 3 emissions incorporating the Modification (approximately 137.58 Mt CO_2-e) would largely be categorised as:

- **Category 4 – Upstream Transportation and Distribution** (approximately 0.1 %)
  (i.e. transport of purchased liquid fuel, hydrocarbons and electricity)
- **Category 9 – Downstream Transportation and Distribution** (approximately 3.0 %)
  (i.e. transport of coal to third-parties)
- **Category 11 – Use of Sold Products** (approximately 96.9 %)
  (i.e. end use of product coal)

Assessment

The majority of Mount Pleasant Operation Scope 1 emissions arise from fugitive emissions associated with open cut mining activities and diesel consumption from equipment such as haul trucks, excavators and dozers. The estimated Scope 1 greenhouse gas emissions intensity for the Mount Pleasant Operation incorporating the Modification has been estimated to be approximately 0.021 tonnes (t) CO_2-e per t ROM coal and relative to other current ROM coal Emission Intensity Determinations, would rank approximately 10th lowest (excluding the existing Mount Pleasant Operation) out of approximately 68 facilities in Australia (based on historical data determinations).

MACH has considered the relative performance of various NSW economic sectors against the NSW interim emission reduction targets. This comparison reveals that the resources sector is the only emitting sector which had an average reported emission reduction rate of approximately 2% per annum between 2005 and 2022, consistent with the average decline rate required to meet the NSW net zero target between 2005 and 2030. The observed reduction in reported resource sector emissions between 2005 and 2022 occurred prior to the introduction of the reformed Safeguard Mechanism in 2023, which will act to drive further industry net emission reductions[1].

The proportion of Scope 1 emissions from the Modification Scenario compared to projected NSW emissions under the 'Current Policy' scenario indicates the Modification would account for approximately 0.385% of total projected NSW Scope 1 emissions, around 1.237% of NSW fugitive emissions and approximately 0.990% of NSW emissions from stationary energy sources in 2030.

It is noted that ROM coal production at the Mount Pleasant Operation is scheduled to cease by 2032. Consequently, the mine would be in the closure stage and would not materially contribute to Commonwealth or State emissions reduction targets in 2035.

Notwithstanding, MACH has considered the potential for climate change impacts to arise from the incremental greenhouse gas emissions of the Modification, and considers that if the Modification does not proceed it is likely there would be no associated reduction in the global combustion of coal. Assuming, nevertheless that all of the Modification estimated Scope 1, 2 and 3 emissions were globally additive, the Modification's incremental contribution to temperature change would be so small that no meaningful additional environmental implications could be considered to arise at the locality level.

MACH has evaluated greenhouse gas abatement opportunities and developed a Three-Year Action Plan to advance its evaluation and implementation of reasonable and feasible greenhouse gas mitigation measures. MACH would prepare a Climate Change Mitigation and Adaptation Plan and conduct regular reviews of greenhouse gas mitigation measures that could reasonably be applied at the Mount Pleasant Operation, should the Modification be approved.

[1] The first year of the reformed Safeguard Mechanism (financial year 2024) resulted in net facility emissions dropping approximately 7% (lower than financial year 2023) and preliminary financial year 2025 data also indicates a further 6% net reduction.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

1 INTRODUCTION

The Mount Pleasant Operation is a major operating open cut coal mine and associated infrastructure, located approximately 3 kilometres (km) north-west of Muswellbrook in the Upper Hunter Valley of New South Wales (NSW) (Figure 1).

MACH Mount Pleasant Operation Pty Ltd (MACH) is the manager of the Mount Pleasant Operation as agent for and on behalf of the unincorporated Mount Pleasant Joint Venture between MACH Energy Australia Pty Ltd (MACH Energy) (95 percent [%] owner) and J.C.D. Australia Pty Ltd (5% owner)[2].

MACH acquired the Mount Pleasant Operation from Coal & Allied on 4 August 2016. MACH commenced mining operations in late 2017, in accordance with Development Consent DA 92/97 (NSW Approval) and Approval EPBC 2011/5795 (Commonwealth Approval).

This Greenhouse Gas Assessment and Mitigation Plan (Greenhouse Gas Assessment) has been prepared to accompany a proposed modification to the Mount Pleasant Operation Development Consent DA 92/97 (the Modification) in accordance with Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). It assesses the likely greenhouse gas emissions of the Modification, including consideration of Commonwealth and NSW climate change policy settings, guidelines and programs, and presents MACH's plan for Mount Pleasant Operation greenhouse gas mitigation and adaptation, reflective of the status of the Modification.

This Greenhouse Gas Assessment was prepared in accordance with the NSW *Guide for Large Emitters – Guidance on how to prepare a greenhouse gas assessment as part of NSW environmental planning processes* (the Guide) (NSW Environment Protection Authority [NSW EPA], 2025a).

1.1 THE MOUNT PLEASANT OPERATION

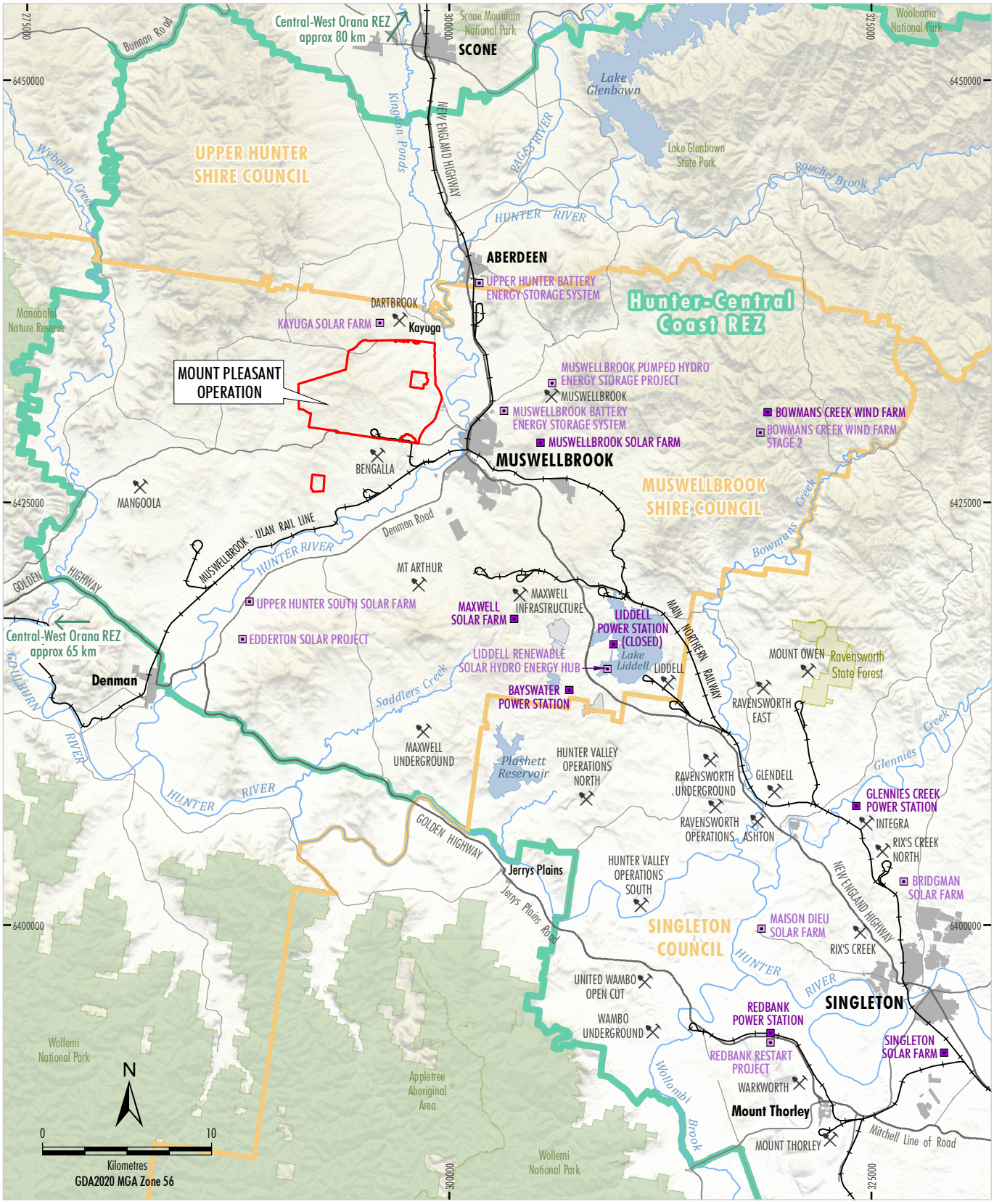
The Mount Pleasant Operation produces thermal coal using open cut mining methods and has an approved operational capacity of up to 10.5 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal until 22 December 2026 under Development Consent DA 92/97 (as modified).

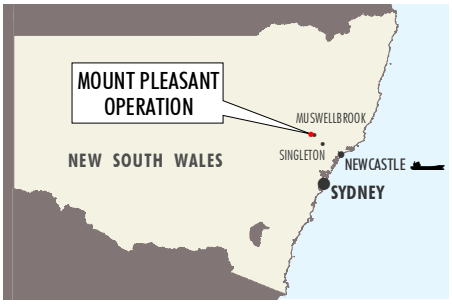
The approved mine includes a Coal Handling and Preparation Plant (CHPP) and a rail loop and spur, conveyor and load-out facility connecting the mine to the Muswellbrook–Ulan Rail Line.

Other major components include:

- multiple open cuts;
- out-of-pit waste rock emplacements;
- Mine Infrastructure Area;
- water management infrastructure;
- ROM and product coal stockpiles; and
- Fines Emplacement Area.

[2] MACH Mount Pleasant Operation Pty Ltd and the unincorporated Mount Pleasant Joint Venture are herein referred to as MACH.





LEGEND

- Mining Operation
- Existing/Approved Major Energy Generation Site
- Proposed Major Energy Generation Site
- Railway
- National Parks and Wildlife Estate
- State Forest/Reserve
- Local Government Boundary
- Hunter-Central Coast Renewable Enery Zone (REZ)
- Mining Lease Boundary (Mount Pleasant Operation)

Source: NSW Spatial Services (2025); EnergyCo (2024)

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MOUNT PLEASANT OPERATION

Location of the Mount Pleasant Operation

Figure 1

1.2 MOUNT PLEASANT OPTIMISATION PROJECT

In 2020, MACH lodged a Development Application and accompanying Environmental Impact Statement for the Mount Pleasant Optimisation Project for assessment under the EP&A Act.

The Optimisation Project involves extraction of additional coal reserves within the Mount Pleasant Operation Mining Leases and an increase in the rate of coal extraction to 21 Mtpa ROM. The Mount Pleasant Optimisation Project would extract some 444 million tonnes (Mt) of run-of-mine (ROM) coal.

1.2.1 NSW Approval Status

On 6 September 2022, the NSW Independent Planning Commission (IPC) approved the Development Application for the Mount Pleasant Optimisation Project (SSD 10418), in accordance with Part 4 of the EP&A Act.

The Denman, Aberdeen, Muswellbrook and Scone Healthy Environment Group Inc (DAMSHEG) applied for a judicial review of the IPC's decision in the NSW Land and Environment Court (LEC). The LEC dismissed the judicial review application on all grounds in August 2024.

DAMSHEG subsequently commenced a proceeding in the NSW Court of Appeal, appealing against part of the LEC's judgment. On 24 July 2025, the NSW Court of Appeal upheld a single ground of appeal relied on by DAMSHEG and remitted the matter to the LEC for the LEC to determine whether to make orders pursuant to the *Land and Environment Court Act 1979* (NSW) which, if complied with, would validate the development consent granted by the IPC (Validating Orders).

MACH applied to the High Court for special leave to appeal against the NSW Court of Appeal's judgment to the extent that the NSW Court of Appeal upheld the relevant ground of appeal relied on by DAMSHEG. In December 2025, the High Court granted special leave. If MACH's appeal is ultimately successful, MACH will be able to continue to rely on Development Consent SSD 10418. Otherwise, MACH's ability to continue to rely on Development Consent SSD 10418 will depend on whether the LEC determines to make Validating Orders.

Where relevant, reference is made in this report to the total ROM coal extraction and annual projected greenhouse gas emissions of the Mount Pleasant Optimisation Project, as these emissions are already included in the NSW DCCEEW State greenhouse gas projections.

1.2.2 Commonwealth Approval Status

The action to increase open cut coal extraction to allow mining of additional coal reserves and increase processing operations at the Mount Pleasant Operation (being an action not already authorised by the Approval Decision EPBC 2011/5795) and additional land disturbance associated with a revised Northern Link Road alignment, was referred to the Commonwealth Minister in July 2020 (EPBC 2020/8735).

A delegate of the Commonwealth Minister determined on 26 August 2020 that the proposed action was a "controlled action" and therefore the action required approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The EPBC 2020/8735 action was approved with conditions by a delegate of the Commonwealth Minister on 24 September 2024.

1.3 OVERVIEW OF THE MODIFICATION

The Modification would include the following key changes to the approved Mount Pleasant Operation under Development Consent DA 92/97:

- a six year extension of permitted (ROM coal) mining operations to 31 December 2032; and
- an increase in the approved ROM coal extraction rate from 10.5 Mtpa to 12.5 Mtpa.

A comparison of the approximate currently planned pit progression at the end of 2026 and at the end of 2032 is provided on Figure 2. Indicative details as to production at the Mount Pleasant Operation over the course of the extended life of mining operations (should this Modification be approved) are provided in the main text of the Modification Report.

The Mount Pleasant Operation incorporating the Modification would extract an additional 68 Mt of ROM coal, relative to cessation of mining under Development Consent DA 92/97 in December 2026 at a ROM coal extraction rate of 10.5 Mtpa. However, total ROM coal extraction would remain well under the total of 197 Mt of ROM coal as originally approved under DA 92/97 in 1999.

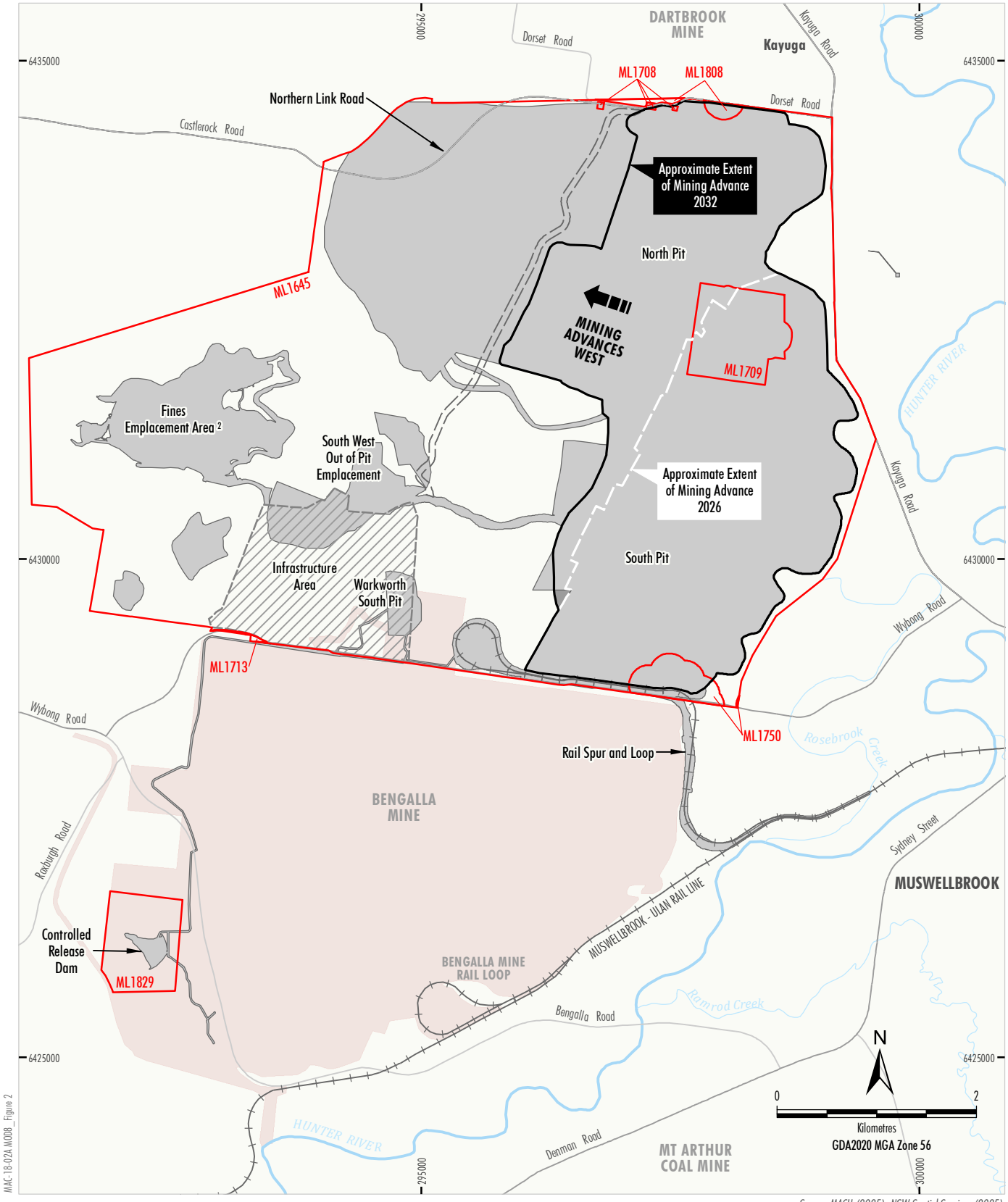
During the period of the Modification[3], operational employment would increase slightly to approximately 575 personnel, which represents an increase above the operational employment required to sustain 10.5 Mtpa.

The Modification would involve no material changes to existing:

- mining tenements;
- mining methods;
- primary site access;
- site electricity supply and distribution;
- mine infrastructure area;
- CHPP, coal stockpile and rail loading facilities;
- rehabilitation objectives and methods; and
- hours of operation and key on-site activities.

A detailed Modification description is provided in Section 3 of the Modification Report. A discussion of the history of Mount Pleasant Operations approvals, consideration of alternatives, and the justification for the Modification proceeding are also detailed in Sections 1, 2 and 7 of the Modification Report respectively.

[3] The period of the Modification is nominally 1 January 2026 to 31 December 2032, however as greenhouse gas emissions are reported in financial years (FY) to the Clean Energy Regulator (CER) the Greenhouse Gas Assessment conservatively assesses the Modification from commencement of FY2026.



Source: MACH (2025); NSW Spatial Services (2025); Department of Planning and Environment (2016)

LEGEND

- Mining Lease Boundary (Mount Pleasant Operation)
- Approved Surface Disturbance Plan - DA 92/97 [1]
- Services Corridor Being Developed Under SSD-10418 to be Used Under the Modification
- Extension of Open Cut Mining and Emplacement Area (Land Lawfully Disturbed under SSD-10418)
- Revised Infrastructure Area Envelope
- Bengalla Mine Approved Disturbance Boundary (SSD-5170)

[1] Excludes some incidental Project components such as water management infrastructure, access tracks, topsoil stockpiles, power supply, temporary offices, other ancillary works and construction disturbance.

[2] The general arrangement of the Fines Emplacement Area has been amended from the area shown in DA 92/97 to reflect as-built structures.

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MOUNT PLEASANT OPERATION

Overview of the Modification

Figure 2

1.4 GREENHOUSE GASES AND INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE SECTORS AND SUBSECTORS

1.4.1 Relevant Greenhouse Gases and Global Warming Potential

In the context of the Modification, the most relevant greenhouse gases are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O).

Greenhouse gas emissions are typically standardised by expression as a carbon dioxide equivalent (CO_2-e) based on their Global Warming Potential (GWP). The GWP is determined by the differing periods that greenhouse gases remain in the atmosphere and their relative absorption of outgoing infrared radiation. The GWP of CH_4 is 28 (i.e. one tonne [t] of CH_4 emissions has 28 times the potential to contribute to global warming than one t of CO_2 emissions), while the GWP of N_2O is 265 (Commonwealth Department of Climate Change, Energy, the Environment and Water [Commonwealth DCCEEW], 2025a).

To simplify greenhouse gas accounting, the emissions of these greenhouse gases (typically estimated in t) are converted to tonnes of carbon dioxide equivalent (t CO_2-e) before being summed to determine total greenhouse gas emissions. This can be expressed as:

$$t\ CO_2\text{-}e = t\ CO_2 \times 1 + t\ CH_4 \times 28 + t\ N_2O \times 265$$

1.4.2 Greenhouse Gas Emission Scopes

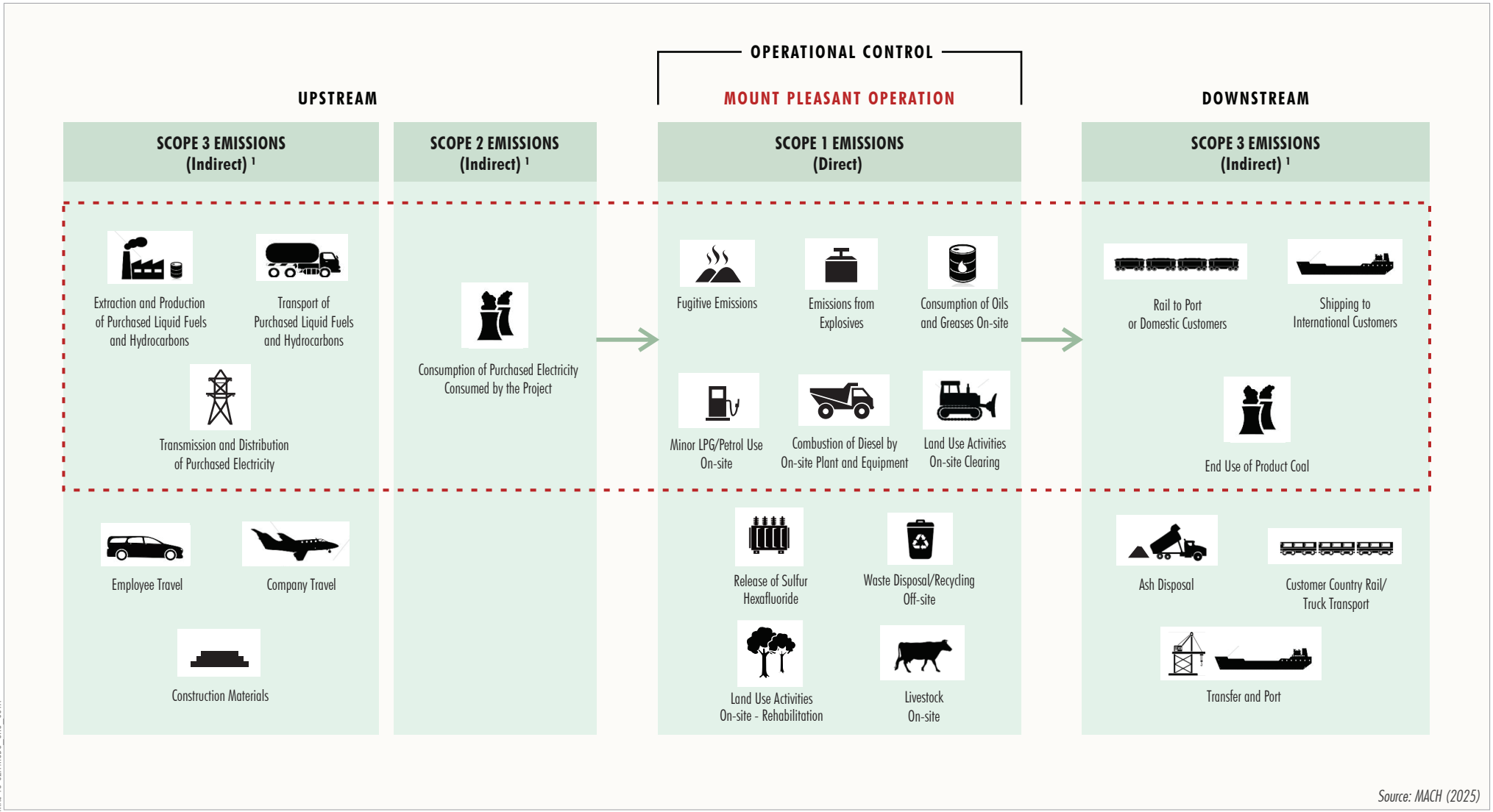
The Greenhouse Gas Protocol (GHG Protocol) (World Business Council for Sustainable Development and World Resources Institute [WBCSD and WRI], 2024) contains methodologies for calculating and assessing greenhouse gas emissions. As recognised in the definition of "GHG Protocol" in the Guide (NSW EPA, 2025a):

> *The GHG Protocol is a widely recognised and widely used accounting standard for measuring and managing greenhouse gas emissions. It provides guidelines and methodologies for organisations and governments to quantify and report their greenhouse gas emissions accurately and consistently. The GHG Protocol helps track emissions, set emission goals, and develop strategies to address climate change.*

The GHG Protocol covers the accounting and reporting of the seven greenhouse gases covered by the Kyoto Protocol, including the three greenhouse gases most relevant to the Modification as described above.

Under the GHG Protocol, an entity's operational boundaries are established by identifying emissions associated with its operations, categorising them as direct or indirect emissions, and identifying the scope of accounting and reporting for indirect emissions. Three 'Scopes' of emissions (Scopes 1, 2 and 3) are defined for greenhouse gas accounting and reporting purposes. This is explored further below.

A diagrammatic representation of the three greenhouse gas emission Scopes and key elements included in this Modification's greenhouse gas assessment is presented on Figure 3 and further described in the Mount Pleasant Operation Greenhouse Gas Calculation Report (Attachment A).



Source: MACH (2025)

MAC-18-02A-MOD8_GHG_001A

LEGEND
Assessment Boundary

[1] Scope 2 and 3 Emissions are Scope 1 Emissions for the businesses that generate them.

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Schematic Diagram
Greenhouse Gas Assessment Boundary

Figure 3

Scope 1 – Direct Greenhouse Gas Emissions

Direct greenhouse gas emissions are defined as emissions that occur from sources that are owned or controlled by the entity (WBCSD and WRI, 2024). Direct greenhouse gas emissions are emissions that are principally the result of the following types of activities undertaken by an entity:

- Generation of electricity, heat or steam – these emissions result from combustion of fuels in stationary sources (e.g. boilers, turbines and furnaces).
- Physical or chemical processing – most of these emissions result from the manufacture or processing of chemicals and materials (e.g. production of cement, ammonia and aluminium, or waste processing).
- Transportation of materials, products, waste, and employees – these emissions result from the combustion of fuels in mobile combustion sources (e.g. trucks, trains, ships, aeroplanes, cars, motorcycles and buses) owned/controlled by the entity.
- Fugitive emissions – these emissions result from intentional or unintentional releases (e.g. equipment leaks from joints, seals, and gaskets; CH_4 emissions from coal mines and venting; hydrofluorocarbon emissions during the use of air conditioning and refrigeration equipment; and CH_4 leakages from gas transport) (WBCSD and WRI, 2024).

The Mount Pleasant Operation's Scope 1 emissions (incorporating the Modification) can largely be categorised and sub-categorised into the following sectors using the Intergovernmental Panel on Climate Change (IPCC) Sectors as applied within Australia's national emission projections:

- **Stationary Energy (Excluding Electricity Generation) – Mining** (approximately 43.8 %)
  (i.e. off-road mobile equipment diesel consumption associated with mining operations)
- **Fugitives – Open Cut Coal Mines** (approximately 47.7 %)
  (i.e. fugitive gaseous emissions that are liberated during mining from the exposed coal seams).
- **Land Use, Land Use Change and Forestry** (approximately 6.8 %)
  (i.e. emissions associated with progressive land clearing in advance of mining).
- **Industrial Processes and Product Use** (approximately 1.7 %)
  (i.e. emissions associated with the use of explosives and other materials).

Consideration of Commonwealth and NSW projections for coal mining emissions in the Stationary Energy and Fugitive Sectors in Australia to 2035 and comparison to the projected emissions of the Modification are presented in Section 3.5.

Scope 2 – Electricity Indirect Greenhouse Gas Emissions

Scope 2 emissions are a category of indirect emissions that account for greenhouse gas emissions associated with the generation of purchased electricity consumed by the entity.

Purchased electricity is defined as electricity that is purchased or otherwise brought into the organisational boundary of the entity (WBCSD and WRI, 2024). Scope 2 emissions physically occur at the facility where the electricity is generated (WBCSD and WRI, 2024). Entities report the emissions associated with the generation of purchased electricity (consumed in equipment or operations owned or controlled by the entity) as Scope 2.

It is noted that Scope 2 emissions in NSW are declining with the progressive decarbonisation of electricity generation sector (Attachment A).

Scope 3 – Other Indirect Greenhouse Gas Emissions

Scope 3 emissions are indirect emissions other than scope 2 emissions that are generated in the wider economy, which are indirectly related to the activities of a facility and occur from sources not owned or controlled by that facility's business. The United States Environmental Protection Agency (United States EPA) (2024) helpfully defines Scope 3 emissions as follows:

> *Scope 3 emissions are the result of activities from assets not owned or controlled by the reporting organization, but that the organization indirectly affects in its value chain. An organization's value chain consists of both its upstream and downstream activities. Scope 3 emissions include all sources not within an organization's scope 1 and scope 2 boundary. The scope 3 emissions for one organization are the scope 1 and 2 emissions of another organization. Scope 3 emissions, also referred to as value chain emissions, often represent the majority of an organization's total greenhouse gas (GHG) emissions.*

Some examples of Scope 3 emissions provided in the GHG Protocol are those from the extraction and production of purchased materials, transportation of purchased fuels, and use of sold products and services (WBCSD and WRI, 2024).

The GHG Protocol notes that reporting Scope 3 emissions can result in double counting of emissions. For example, greenhouse gas emissions from the burning of coal to produce energy are attributed as Scope 3 emissions related to the mines approved to produce the coal, whereas they are the Scope 1 emissions of the businesses that burn the coal to generate electricity. Those emissions will also be the Scope 2 emissions of the businesses that purchase the electricity.

The Modification's key Scope 3 emissions would largely be categorised as:

- **Category 4 – Upstream Transportation and Distribution** (approximately 0.1 %)
  (i.e. transport of purchased liquid fuel, hydrocarbons and electricity)
- **Category 9 – Downstream Transportation and Distribution** (approximately 3.0 %)
  (i.e. transport of coal to third-parties)
- **Category 11 – Use of Sold Products** (approximately 96.9 %)
  (i.e. end use of product coal)

Todoroski Air Sciences (TAS) has estimated Scope 3 emissions associated with railing Modification coal to the Port of Newcastle, international shipping, as well as the combustion of product coal (Attachment A).

1.5 ASSESSMENT REQUIREMENTS

1.5.1 Environment Protection Authority Assessment Guidance

Under its Climate Change Policy and Action Plan, the NSW EPA is taking further action to help the NSW Government achieve its greenhouse gas emission reduction targets.

In January 2025, NSW EPA released the Guide, following a period of consultation from May to July 2024. The Guide requires proponents of major greenhouse gas emitting projects to assess emissions and mitigation opportunities, both in the short-term and long-term. The Guide sets out a description of NSW's emission reduction objectives, types of greenhouse gases, and the NSW EPA's suggested greenhouse gas assessment and mitigation requirements to be addressed in environmental impact statements and modification reports. The Guide also includes a description on how measures to avoid or reduce emissions should be identified and evaluated, including setting out the NSW greenhouse gas mitigation hierarchy.

MACH also notes that NSW guidance material continues to evolve, with the NSW EPA recently releasing a suite of draft documents for consultation relating to climate change requirements for Environment Protection Licence (EPL) holders, including:

- *Proposed Climate Change Licensee Requirements* (NSW EPA, 2025b);
- *Climate Change Mitigation and Adaptation Plans: Proposed Mitigation Requirements* (NSW EPA, 2025c); and
- *Proposed Greenhouse Gas Mitigation Guide for NSW Coal Mines* (Draft Coal Mine Mitigation Guide) (NSW EPA, 2025d).

Even though these consultation documents have not yet been finalised, this Greenhouse Gas Assessment has also taken the content of these documents into consideration.

1.5.2 Classification of the Modification for the Purposes of the Guide

Section 2.3 (Box 3) of the Guide provides guidance on how the Guide applies to modification proposals:

> ***Box 3. GHG assessment boundary for the modification proposals***
>
> *The GHG assessment boundary for the project defines which emission sources and activities are included and excluded in the assessment.*
>
> *For a modification proposal:*
>
> - *The assessment boundary must be defined to account for any emission increases or decreases at the premises related to the project. It must define which emission sources and activities are included in the assessment and which are excluded. This will allow the overall impact of the GHG emissions resulting from the modification to be assessed.*
> - *The 25,000 tonne CO_2-e threshold relates to additional GHG emissions expected to be emitted due to the modification of the licensed premises, not the entire premises. For example, if the existing premises emits more than 25,000 tonnes CO_2-e per annum, but the modification will not increase GHG emissions by an additional 25,000 tonnes CO_2-e per annum, then that modification would not be subject to the assessment requirements within this guide.*

The Modification is expected to generate Scope 1 and 2 greenhouse gas emissions exceeding 25,000 t CO_2-e per year (Section 3.4). Therefore, the Modification meets the assessment threshold outlined in the Guide.

Section 4.7 of the Guide also states that:

> *For projects with scope 1 and 2 emissions exceeding 100,000 t CO_2-e per year at any time over the operational life of the project, mitigation assessments must be verified by an independent expert review.*

Given the Modification's incremental emissions would exceed 100,000 t CO_2-e per year, an independent peer review of this Greenhouse Gas Assessment and particularly the Greenhouse Gas Abatement Evaluation and Three-Year Action Plan (Attachment B) has been undertaken by Loop Decarbonisation Services (Loop) and is presented in Attachment C.

2 LEGISLATIVE AND POLICY CONTEXT

2.1 GLOBAL

The international framework addressing greenhouse gas emissions, and the global response to climate change, commenced with adoption of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992.

The UNFCCC has close to global membership, with 198 Parties (UNFCCC, 2024a). While a number of negotiating sessions are held each year, the largest is the annual Conference of the Parties (UNFCCC, 2024a). Two of the most important progressions of the UNFCCC were at the third Conference of the Parties (in 1997) and the 21st Conference of the Parties (in 2015), with the adoption of the *Kyoto Protocol* and the *Paris Agreement*, respectively.

The *Kyoto Protocol* entered into force in 2005 and imposed limits on the greenhouse gas emissions of developed countries listed in Annex 1 to the UNFCCC, with an initial commitment period of 2008 to 2012 (UNFCCC, 2024b). The second commitment period of the Kyoto Protocol, which ended in 2020, was also its final one.

The goal of the *Paris Agreement* is to limit global temperature increases to well below 2 degrees Celsius (°C) above preindustrial levels (UNFCCC, 2024c). In order to achieve that goal, Parties aim to reach peak global emissions as soon as possible, "so as to achieve a balance between anthropogenic emissions by sources and removals by sinks in the second half of this century" (UNFCCC, 2024d).

The *Paris Agreement* does not specify how global emission reductions are to be achieved. It requires Parties to prepare, communicate and maintain nationally determined contributions (NDCs) and to pursue domestic measures to achieve them (UNFCCC, 2024d; UNFCCC, 2024e). The NDCs are to be communicated every five years, with each successive NDC to represent a progression beyond the previous NDC. A second round of NDCs was due to be submitted in 2025 and a further round is due in 2030 (UNFCCC, 2024e).

Scope 1 greenhouse gas emissions from the Modification, as well as any Scope 2 and 3 emissions related to the Modification that will be emitted in Australia, would be accounted for and managed in accordance with Australia's domestic law adopted to implement Australia's NDC. Greenhouse gas emissions produced by the end use of Modification coal in overseas jurisdictions would be accounted for and managed in accordance with the laws that have been adopted in those jurisdictions to implement their NDCs. The NDCs of key countries to which MACH currently exports coal and the key countries to which coal from the Modification is expected to be exported (expected export countries) are described in Section 4.5.1.

At the 24th Conference of the Parties to the UNFCCC (in 2018), the *Katowice Climate Package* was agreed. The *Katowice Climate Package* contains, among other things, detailed guidance on the features of NDCs and the information each country should provide to improve transparency regarding NDCs, as well as highlighting the need to ensure that double counting of greenhouse gas emissions is avoided (UNFCCC, 2024e).

At the 26th Conference of Parties (held in 2021), the *Glasgow Climate Pact* was reached. The *Glasgow Climate Pact* reaffirms the long-term global goal to hold the increase in global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels. The agreement also invites Parties to consider further actions to reduce non-CO_2 greenhouse gas emissions, including CH_4, by 2030 (UNFCCC, 2024a).

A country can be assisted to meet the emission targets provided for in its NDC by utilising the international trading (or crediting) mechanisms established by Article 6 of the *Paris Agreement*. The effect of Article 6 is that a country that overachieves against its NDC targets can gain greenhouse gas emission credits to sell to other countries, and, conversely, if it falls short, it can purchase international credits approved under the *Paris Agreement* to meet its NDC target.

2.2 NATIONAL

Australia's draft initial NDC in advance of the *Paris Agreement* communicated a greenhouse gas emission reduction target of 26% to 28% below 2005 levels by 2030 (Commonwealth Department of Industry and Science, 2015).

In 2022 the Commonwealth *Climate Change Act 2022* (Climate Act) was introduced to outline Australia's greenhouse gas emissions reduction targets. Section 10(1) of the Climate Act states:

> *(1) Australia's greenhouse gas emissions reduction targets are as follows:*
>
> *(a) reducing Australia's net greenhouse gas emissions to 43% below 2005 levels by 2030:*
>
> *…*
>
> *(b) reducing Australia's net greenhouse gas emissions to zero by 2050.*

Section 3 of the Climate Act defines the objects of the Act:

> *(aa) to advance an effective and progressive response to the urgent threat of climate change drawing on the best available scientific knowledge; and*
>
> *(a) to set out Australia's greenhouse gas emissions reduction targets which contribute to the global goals of:*
>
> *(i) holding the increase in the global average temperature to well below 2°C above pre-industrial levels; and*
>
> *(ii) pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels; and*
>
> *(b) to promote accountability and ambition by requiring the Minister to:*
>
> *(i) prepare annual climate change statements; and*
>
> *(ii) cause copies of those statements to be tabled in each House of the Parliament; and*
>
> *(c) to ensure that independent advice from the Climate Change Authority informs:*
>
> *(i) the preparation of annual climate change statements; and*
>
> *(ii) the greenhouse gas emissions reduction targets to be included in a new or adjusted nationally determined contribution.*

The Climate Act does not impose specific requirements on MACH to implement measures to reduce, avoid and monitor greenhouse gas emissions. Nevertheless, the Climate Act is considered and addressed in this Greenhouse Gas Assessment.

Australia's first NDC under the *Paris Agreement* was amended to commit to further reductions in emissions to achieve the national greenhouse gas target of 43% below 2005 levels by 2030, and reaffirmed the target to achieve net zero emissions by 2050 (Commonwealth Department of Industry, Science, Energy and Resources, 2022).

Australia's second NDC under the *Paris Agreement* has communicated a greenhouse gas emissions reduction target of 62-70% below 2005 levels by 2035. The Australian Government identified the following five priorities in achieving net zero by 2050 (Commonwealth DCCEEW, 2025b):

- clean electricity across the economy;
- lowering emissions through electrification and efficiency;
- expanding clean fuel use;
- accelerating new technologies; and
- net carbon removals

It is noted that ROM coal production at the Mount Pleasant Operation under DA 92/97 (inclusive of the proposed Modification) would cease prior to 2035 and therefore the site would not materially contribute to Australia's or New South Wales' 2035 emissions, when considering 2035 emission reduction targets (although it is acknowledged that the site would contribute to Australia's and New South Wales' emissions for the duration of mining operations conducted as part of the proposed Modification from 2026 to 2032 as well as in the period d to 2032 to 2035 during the decommissioning and rehabilitation phase).

2.2.1 Assessment

National Greenhouse Account Factors

Australia's National Greenhouse Accounts (NGAs) are prepared by the Commonwealth DCCEEW. The Commonwealth DCCEEW publishes the greenhouse gas emission factors used in preparing the NGAs. The *National Greenhouse Accounts Factors: 2025* (Commonwealth DCCEEW, 2025a) is the latest such publication and has been used to calculate the Modification emission projections (Attachment A).

2.2.2 Reporting

National Greenhouse and Energy Reporting Scheme

The Commonwealth *National Greenhouse and Energy Reporting Act 2007* (NGER Act) is a national framework for reporting greenhouse gas emissions, energy production and energy consumption by corporations. The greenhouse gas emissions and energy data reported under the NGER Act is used by the Commonwealth Government in compiling Australia's national greenhouse gas emission inventory to meet its reporting obligations under the UNFCCC.

Under the NGER Act, corporations that have operational control of facilities must report their greenhouse gas emissions and energy data if they meet the thresholds for reporting. The thresholds are:

a) emitting 25,000 t CO_2-e of greenhouse gas emissions or producing or consuming 100 terajoules (TJ) of energy (for an individual facility); or

b) emitting 50,000 t CO_2-e of greenhouse gas emissions or producing or consuming 200 TJ of energy (cumulatively for all facilities under the operational control of the corporation).

Reporting requirements of the NGER Act include both Scope 1 and Scope 2 emissions. To avoid the potential double counting of emissions, the NGER Act does not cover Scope 3 emissions.

The Mount Pleasant Operation has triggered the reporting requirements of the NGER Act, and MACH reports on its greenhouse gas emissions each financial year under its entity MACH Australia Holdings Pty Ltd (which is the relevant "controlling corporation" for the purposes of reporting under the NGER Act).

MACH would continue to comply with its reporting obligations under the NGER Act, should the Modification be approved.

2.2.3 Mitigation

A range of legislation and policies, including the Safeguard Mechanism (which has legislative effect via the NGER Act), the Renewable Energy Target and the National Energy Productivity Plan have been implemented to help Australia meet its greenhouse gas commitments.

In October 2021, the previous Australian Government published *Australia's Long Term Emissions Reduction Plan* (Commonwealth Department of Industry, Science, Energy and Resources, 2021) (the Plan), which includes a range of policy initiatives to deliver net zero greenhouse gas emissions by 2050. The Plan is focused on reducing the cost of low emissions technologies whilst increasing their availability nationwide. As explained below, the current Australian Government has developed a Net Zero Plan that sets out the five decarbonisation priorities and the required enabling actions by Government and other actors.

The NGER Act introduced a single national reporting framework for the reporting and dissemination of corporations' greenhouse gas emissions and energy use.

The Safeguard Mechanism (underpinned by the Commonwealth *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015* [Safeguard Rule]) was established through the NGER Act and provides baseline emissions and offset requirements for applicable facilities that emit over 100,000 t CO_2-e per year, which currently includes the existing Mount Pleasant Operation and would extend to include the Modification, should it be approved.

The Safeguard Mechanism sets a baseline level of emissions for facilities. If a facility exceeds its baseline level, it is required to surrender to the CER Australian Carbon Credit Units (ACCUs) (or following recent reforms, Safeguard Mechanism Credit units [SMCs]) equivalent to the exceedance.

In 2023, the Commonwealth Government introduced reforms to facilitate greater abatement and offset requirements for Safeguard Mechanism facilities (discussed further below).

Reformed Safeguard Mechanism

The Safeguard Mechanism Reforms (Commonwealth DCCEEW, 2024a) introduced an amendment to the NGER Act and other legislation (i.e. the Climate Act) to establish the framework to give effect to key elements of the reforms, such as introducing a requirement for facilities to achieve greenhouse abatement via annual downward adjustment of baseline levels.

There are three main types of Safeguard facility baselines:

- Standard (which applies to the Mount Pleasant Operation facility);
- Landfill; and
- Sectoral (i.e. electricity generators).

Standard baselines are determined based on the amount of product each facility produces in a financial year.

The reforms apply a decline rate to a facility's baseline so that baselines are reduced predictably and progressively over time (initially 4.9% per annum until the end of FY 2030) on a proportionate trajectory consistent with achieving Australia's emission reduction targets of 43% below 2005 levels by 2030, and net zero by 2050 (Commonwealth DCCEEW, 2024a) in combination with other greenhouse gas reduction measures in the economy.

At the end of each year, the Mount Pleasant Operation facility's baseline will therefore be calculated via its:

- production quantities;
- the emissions-intensity values for each product it produces; and
- the decline rate.

It is noted that the target of 43% reduction by 2030 is tied to 2005 emission levels. Table 1 below summarises the Safeguard Mechanism baseline decline rate which has been calculated with sufficient headroom allowance for higher than expected growth at new and existing Safeguard facilities (Commonwealth DCCEEW, 2024a).

Table 1
Safeguard Mechanism Baseline Decline Rate – 2023-30

Financial year	Baseline Decline rate	Emission reduction contribution
2023–24	4.9%	95.1%
2024–25	4.9%	90.2%
2025–26	4.9%	85.3%
2026–27	4.9%	80.4%
2027–28	4.9%	75.5%
2028–29	4.9%	70.6%
2029–30	4.9%	65.7%
2030–ongoing	3.285%*	-

Source: CER (2025a).

* The decline rate indicated in the above table for 2030 onwards is indicative. From 2030, decline rates will be set in 5-year blocks to be consistent with NDC also released in 5-year intervals by the Commonwealth DCCEEW. Accordingly, post-2030 decline rates are expected to vary depending on the future emissions reduction targets adopted by the Australian Government.

MACH notes that the Commonwealth Climate Change Authority's (CCA) more recent advice to the Commonwealth Government on targets for the 2035 NDC (CCA, 2025) indicates that Safeguard Mechanism decline rates may be further tightened from 2030:

> *Australia's existing policies – anchored by national emissions reduction legislation, sectoral initiatives and funding programs – provide a strong platform for progress. But achieving an ambitious target, sharing the benefits fairly, and prospering in the process, will require an enhanced policy response. The settings in some key measures – such as the Safeguard Mechanism… need to be extended.*
> …
> *Extending the Safeguard Mechanism's decline rate out to 2035 could reduce emissions from industry and resources by almost a third. Importantly, the decline rate is additive— requiring facilities to reduce or offset more of their emissions each year*

Schedule 1 of the Safeguard Rule defines a range of products produced at Safeguard facilities. For each product, Schedule 1 sets out one or more metrics (each of which is a production variable), the units relevant to those production variables and the circumstances in which they are applicable to the particular Safeguard facility. This includes the assignment of a default emission intensity for each production variable. A facility's baseline is therefore adjusted annually based on actual site production metrics.

The predominant production variable for the Mount Pleasant Operation is production of **ROM Coal**. Historically the Mount Pleasant Operation has also generated some electricity from diesel during on-site construction. However, the **Electricity Generation** production variable is not anticipated to be material during the life of the Modification. A third production variable (**Mine Rehabilitation**) does not yet apply to the Mount Pleasant Operation, as it only applies to final rehabilitation activities. The **Mine Rehabilitation** production variable would apply at the cessation of mining.

While it is acknowledged that the **Mine Rehabilitation** production variable would begin to apply in the latter stages of the Mount Pleasant Operation's life (i.e. after ROM Coal production ceases), the vast majority of Scope 1 emissions from the site would arise from the **ROM Coal** production variable. On this basis, no specific comparison has been made in this Greenhouse Gas Assessment to the **Mine Rehabilitation** production variable decline rate. It is anticipated that development and regular updates to the Climate Change Mitigation and Adaptation Plan (CCMAP) would address this production variable when site closure is a more imminent activity.

MACH also notes that **ROM Coal** is listed in Schedule 2 of the Safeguard Rule as a 'trade exposed production variable'. However, a conservative approach has been adopted herein to assessing greenhouse gas emissions such that no adjustment has been made for trade-exposed production (despite the fact that the Modification's ROM coal production may be trade-exposed and that MACH may seek a determination to that effect from the CER in due course should the Modification be approved).

Because of the high diversity of existing emission intensities in the coal sector, a hybrid approach was adopted for existing coal mines. In this case, the **ROM Coal** Safeguard emissions intensity is calculated by progressively decreasing the proportion of site-specific emissions intensity, which has the effect of achieving a 50% application of the default ROM coal production variable by FY30.

Pursuant to transitional arrangements under the Safeguard Rule, the default ROM coal production variable has been set at 0.0653 tonnes of carbon dioxide equivalent per tonne of run-of-mine coal (t CO_2-e / t ROM coal).

In accordance with Subdivision C of the Safeguard Rule, an emitter may apply to the CER for an emissions intensity determination (EID). MACH initially applied to the CER for an EID while it was still reporting estimated fugitive emissions estimated using Method 1. However, following the move to a higher-order NGER reporting method for fugitive emissions (i.e. Method 2), the **ROM Coal** EID was revised by the CER to 0.0178 t CO_2-e / t ROM coal in the first quarter of 2025, which is significantly lower than the default value of 0.0653 (CER, 2025b).

Similarly, MACH applied for an **Electricity Generation** EID which was determined to be 0.7021 t CO_2-e per megawatt-hour. It is noted that incidental electricity generation on-site is only associated with powering lighting and other ancillary equipment at facilities that are inherently difficult to supply directly by overhead electricity transmission line, and/or regularly relocated (e.g. in-pit facilities). Fuel consumption for incidental electricity generation is very minor in comparison to diesel used for ROM coal production and has not been separately itemised in this assessment (however, it is a separate production variable).

Further consideration of the Modification emission estimates in comparison with key emissions reduction targets is provided in Section 3.5.

Sector Pathways Review

In the *Sector Pathways Review*, the Commonwealth CCA examined potential technology transition and emissions pathways in six key emission sectors to support Australia's transition to net zero emissions by 2050 (CCA, 2024a):

- electricity and energy;
- transport;
- industry and waste;
- agriculture and land;
- resources; and
- the built environment.

The CCA identified the range of emissions reductions that are achievable through the deployment of available and prospective technologies, and examined the relevant barriers, opportunities and enablers for each key sector. Part 1 of the *Sector Pathways Review* addresses the Resources sector, which incorporates Australian mining, oil and gas industries (CCA, 2024a).

Key findings of Part 1 of the Sector Pathways Review (Resources) of potential relevance to the Modification include (CCA, 2024a):

> *Decarbonisation of the* (Resources) *sector requires widespread electrification, and deployment of fugitive abatement technologies in oil, gas and coal mining operations.*
> *…*
> *Electrification can play a significant role in reducing emissions from fuel combustion in the sector. Electric mining haulage and equipment is at pilot scale, with widespread adoption expected after 2030.*
> *…*
> *Based on available technologies, several sources of emissions across the sector are expected to remain largely unabated while the activities continue. There are few opportunities to significantly reduce fugitive emissions from surface coal mines.*
> *…*
> *Barriers to electrification and deployment of fugitive abatement measures across the sector include high upfront capital costs, integration challenges within existing facilities and the lack of access to a sufficient firmed supply of renewable electricity.*
> *…*

Section R.2.2.2 (Emissions reduction levers for mining haulage and equipment) of the *Sector Pathways Review* identifies that combustion of diesel fuels in mining haulage and equipment accounts for approximately 14% of the Australian resources sector emissions (CCA, 2024a).

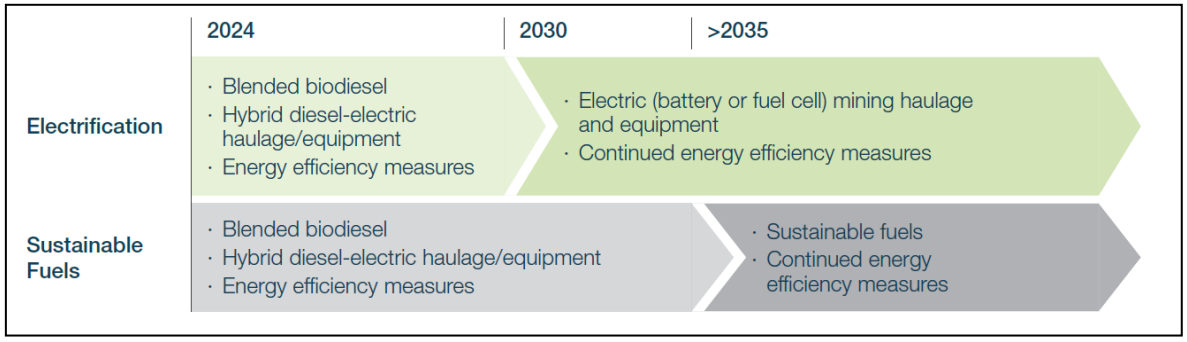
Key emission reduction levers for reducing emissions from mining haulage and equipment, summary readiness and potential barriers to adoption as identified by the CCA (2024a) are reproduced in Table 2.

Table 2
Key Mining Haulage and Equipment Emissions Reduction Levers

Emissions Reduction Levers		Readiness	Barriers of Adoption
Electrification of haulage and equipment	Battery and tethered electric trucks and mining equipment. Trolley assist systems where haul trucks are connected to an overhead cable to power the electric drive.	Demonstration	• low technology maturity; • high capital expenditure; • integration of the required supporting infrastructure to existing mines; • lack of supply of electric haulage and equipment; and • lack of supply of firmed renewable electricity.
Fuel cell electric trucks	Hydrogen fuel cell-powered haulage trucks and mining equipment.	Demonstration	• low technology maturity; • high capital expenditure; and • lack of supply of renewable hydrogen.
Sustainable fuels	Fuel switching to more lower carbon fuels such as biodiesel or renewable diesel.	Commercial	• high operational expenditure; and • lack of supply of sustainable fuels.

After: CCA (2024a).

Figure R.4 of the *Sector Pathways Review* provides a schematic diagram illustrating two key prospective alternative decarbonisation pathways for mining and haulage equipment, reproduced below as Figure 4.



After: CCA (2024a).

Figure 4
Prospective Decarbonisation Pathways for Mining and Haulage Equipment

MACH notes that the approved Mount Pleasant Operation and the Modification would cease coal production in 2032 and therefore decarbonisation pathways involving electrification or material emission reductions associated with sustainable fuels are unlikely to be highly relevant to the site in this timeframe. Notwithstanding this expectation, the Mount Pleasant Operation Abatement Evaluation and Three-Year Action Plan (Attachment B) provides further analysis of reasonable and feasible mitigation measures for the site.

The CCA also noted the following potential limitations with respect to the electrification pathway for mining and haulage equipment (CCA, 2024a):

> *A key prerequisite for mine site electrification is access to a sufficient supply of flexible but firmed electricity. Significantly higher electricity demand and increased variability of demand loads are expected as mines electrify. The ability to provide sufficient electricity, either from onsite generation or the grid, to support the electrification of mines has been identified as a key concern by industry.*
>
> *Electrification of a mine site also requires significant enabling infrastructure, including: charging stations, transmission lines and overhead power lines for trolley assist systems. The dynamic nature of some mining operations presents a challenge for the installation of such semi-permanent infrastructure due to continually evolving mine plans.*

The CCA also noted the following potential limitations with respect to the sustainable fuel pathway for mining and haulage equipment (CCA, 2024a):

> *Various mining companies have proposed the use of sustainable fuels as a long-term decarbonisation strategy due to their benefits as drop-in fuels and the operational flexibility they offer. However limited supply of sustainable fuels (and no current domestic supply chain) and expected competition from other sectors with limited alternatives, such as aviation, introduce uncertainty around the viability of this pathway to decarbonise mining haulage.*
> *…*
> *The authority observed there is an information gap relating to the future production, use and import of biofuels in Australia.*

Key emission reduction levers for reducing emissions from mining haulage and equipment, summary readiness and potential barriers to adoption as identified by the CCA (2024a) are considered in Attachment B.

Net Zero Plan

Australia's Net Zero Plan (Commonwealth DCCEEW, 2025c) sets the national policy framework for achieving net zero greenhouse gas emissions by 2050, supported by legislated interim targets under the Climate Change Act 2022. The Australian Government adopted the CCA's recommendation to reduce national emissions by 62–70% below 2005 levels by 2035, building on progress already made (emissions were 27% below 2005 levels in 2024 and 29% below in 2025). Australia's Net Zero Plan (Commonwealth DCCEEW, 2025c) outlines a coordinated, economy-wide pathway aligned with Australia's obligations under the *Paris Agreement*.

A core feature of Australia's Net Zero Plan (Commonwealth DCCEEW, 2025c) is its five decarbonisation priorities, which provide a strategic guide for emissions mitigation across the economy:

1. **Clean electricity across the economy** – Large-scale renewable energy expansion, firming (batteries, hydro, gas), transmission investment (Rewiring the Nation), offshore wind development, and long-term financing through the Clean Energy Finance Corporation's and Capacity Investment Scheme.
2. **Lowering emissions by electrification and efficiency** – Rapid electrification of transport, households and industrial processes, improved appliance and building performance standards, expanded energy ratings frameworks, and acceleration of circular economy outcomes.
3. **Expanding clean fuel use** – Development and deployment of renewable hydrogen, renewable diesel, sustainable aviation fuel and biomethane for hard-to-electrify sectors, supported by new domestic production incentives and waste-to-fuel pathways.

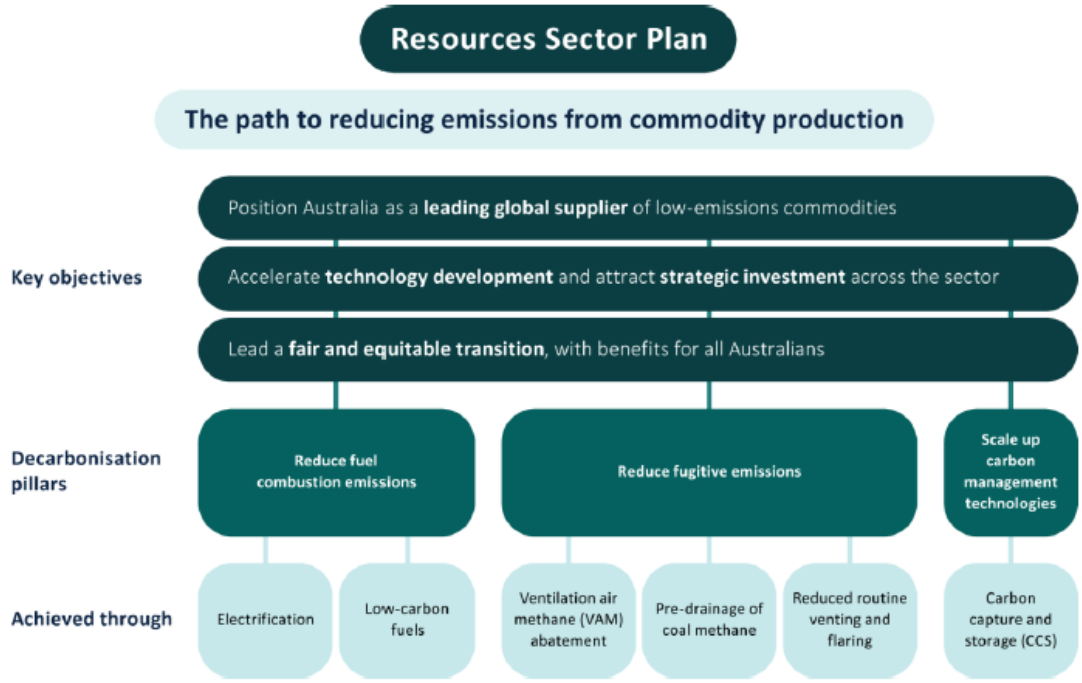
4. **Accelerating new technologies** – Increased Research and development, innovation and commercialisation support, including battery innovation, low-emissions metals, CH_4 measurement improvements and establishment of the $5 billion Net Zero Fund for industrial decarbonisation and energy efficiency.
5. **Net carbon removals scaled up** – Continued reliance on land-based sequestration (reforestation, plantations, savanna burning), together with emerging engineered removals (direct air capture, mineralisation) and improvements to the ACCU Scheme.

The Net Zero Plan (Commonwealth DCCEEW, 2025c) also provides sector-specific pathways for electricity, transport, industry, resources, agriculture and the built environment. These pathways recognise differing technological readiness and expected rates of decarbonisation. Further discussion on the Resource Sector Plan is provided below.

The Net Zero Plan (Commonwealth DCCEEW, 2025c) embeds a set–do–review–refine policy cycle, supported by annual climate statements to Parliament, independent assessments by the CCA and scheduled reviews of mechanisms such as the Safeguard Mechanism (2026–27).

Resources Sector Plan

The Commonwealth Department of Industry, Science and Resources (DISR) Resources Sector Plan (2025) outlines the national pathway for reducing emissions from the resources sector while maintaining Australia's role as a globally significant producer of minerals, metals and energy commodities (Figure 5). The Resources Sector Plan sits under Australia's Net Zero Plan framework and provides a high-level overview of expected transition trends, indicative decarbonisation timelines and the enabling conditions required for the sector to contribute to the national 2050 net zero target.



Source: Commonwealth DISR (2025).

Figure 5
DISR Resources Sector Plan

The Resources Sector Plan (Commonwealth DISR, 2025) outlines indicative decarbonisation actions expected to occur across the sector over the short, medium and longer term. These actions reflect anticipated technology development pathways, increasing electrification and fuel switching, and the progressive deployment of carbon management and fugitive abatement technologies. A summary of these indicative actions is provided in Table 3.

Table 3
Indicative Actions under the Resources Sector Plan

Milestone Year	Key Actions
To 2030	• Reduced routine venting and flaring from oil and gas facilities • New resources facilities designed for electric power, and improved energy efficiency where technically and commercially feasible • Demonstration and commercialisation of electrified haulage and equipment • Demonstration of coal VAM abatement technology in Australian mines • Expansion of Carbon Capture Storage (CCS)
To 2035	• Increased electrification and energy performance across the sector • Deployment of heavy electric vehicles and equipment, with greater penetration of low-carbon liquid fuels and renewable energy in remote regions • Scale-up of coal VAM abatement technology in Australian mines • Greater use of CH_4 pre-drainage in coal mines • Adoption of low-carbon fuels (liquid and gaseous) where electrification is not feasible • Use of CCS continues to grow
To 2050	• Widespread use of VAM abatement and pre-drainage technologies for coal mines • Continued use of low-carbon fuels • Continued use of CCS

After: (Commonwealth DISR, 2025)

2.2.4 Offsets

The Commonwealth CCA's (2024b) *Targets, Pathways and Progress* paper describes that some sectors have very hard-to-abate emissions and may be unable to achieve net zero, whereas the land sector already achieves net negative emissions by removing carbon from the atmosphere.

In the *Targets, Pathways and Progress* paper, the CCA (2024b) provides a description of Australia's approach to achieve net zero, which is to balance both continuing emissions and offsets or carbon sequestration in a manner that is economically responsible and reflective of the constraints and opportunities available to the various sectors of the Australian economy. Australia has also declared that it will utilise Article 6 of the *Paris Agreement* (international trading of emission allowances) to meet its mitigation targets.

The CCA also articulates that Australia's ambition is not to achieve zero emissions by 2050, it is rather to achieve net zero emissions by 2050 and articulates that Australia will continue to rely (as it has to date) to a large degree on the land sector to remove carbon from the atmosphere and offset emissions that continue to occur elsewhere in the economy.

The CCA (2025) in its advice to the Commonwealth Government on Australia's second NDC also notes the following with respect to the market-based mechanisms set out in the Safeguard Mechanism and associated carbon credit markets:

> *The Safeguard Mechanism and carbon credit arrangements provide a flexible, market-based approach to reducing the emissions intensity of Australia's largest industrial facilities, including manufacturing, mining, oil and gas production, and waste, with some coverage of domestic transport. These policies are designed to recognise the particular challenges faced by Australia's emissions-intensive trade-exposed industries, and to help strengthen their competitiveness as the world moves towards net zero emissions.*

The continuing role of offsets to 2050 was also highlighted in Australia's Net Zero Plan as one of the five decarbonisation priorities (Commonwealth DCCEEW, 2025c):

> *Carbon markets are part of a portfolio of measures that will help Australia achieve net zero emissions by 2050. …*
>
> *Demand for ACCUs is expected to increase over time, to support participants in compliance and voluntary markets to achieve their emissions reduction goals. …*
>
> *The Australian Government will continue to improve the ACCU scheme so it contributes to Australia's net zero transition through:*
>
> 1. *Improving scheme governance, reinforcing integrity and transparency*
> 2. *Bringing forward high-integrity supply*
> 3. *Facilitating interoperability with the Nature Repair Market*
> 4. *Strengthening synergies between carbon removals and other land uses*

2.3 STATE

2.3.1 Legislation and Policies

NSW Government

The NSW Government released the *NSW Climate Change Policy Framework* (NSW Office of Environment and Heritage, 2016), which identified NSW's long-term objective of achieving net zero emissions by 2050.

NSW Climate and Energy Action published the *Net Zero Plan Stage 1: 2020 – 2030* (NSW Department of Planning, Infrastructure and Environment [NSW DPIE], 2020) (the Stage 1 Net Zero Plan) in March 2020, which describes how, over the decade to 2030, the NSW Government intends to work towards its objective of achieving net zero emissions by 2050, and an objective to reduce emissions by 70% by 2035, compared to 2005 levels. For example, the Stage 1 Net Zero Plan supports a range of initiatives which includes reducing emissions from the mining and use of coal. In this regard, the Stage 1 Net Zero Plan specifically identifies the Coal Innovation Program (noting that investment in this Program is underway) and relevantly states:

> *New South Wales' $36 billion mining sector is one of our biggest economic contributors, supplying both domestic and export markets with high quality, competitive resources. Mining will continue to be an important part of the economy into the future and it is important that the State's action on climate change does not undermine those businesses and the jobs and communities they support.*

The Stage 1 Net Zero Plan has been supported by *Net Zero Plan Stage 1: 2020 – 2030 implementation update*, which address the policies under the Stage 1 Net Zero Plan as well as emissions reduction projections for NSW (NSW DPIE, 2021). The NSW Government has subsequently enshrined in legislation whole-of-government climate action in the *Climate Change (Net Zero Future) Act 2023* (Net Zero Future Act).

The Net Zero Future Act legislates:

- guiding principles for action to address climate change that consider the impacts, opportunities and need for action in NSW;
- emissions reduction targets for NSW, comprising:
  - net 50% reduction on 2005 levels by 2030;
  - net 70% reduction on 2005 levels by 2035; and
  - net zero by 2050.
- an objective for NSW to be more resilient to a changing climate; and
- establishing an independent, expert Net Zero Commission (NZC) to monitor, review, report on and advise on progress towards these targets.

Further, the NSW Government has specified in a briefing note entitled *Scope of the NSW state-wide net zero by 2050 target* that NSW's greenhouse gas emission targets under the Net Zero Future Act are specifically limited to direct Scope 1 emissions (and direct removals of greenhouse gases) in NSW (Office of Energy and Climate Change, 2023):

> *The State's net emissions for the purposes of the 2050 target do not include indirect emissions.*[2]
>
> [2] *Examples of "indirect" emissions include scope 2 emissions, scope 3 emissions, and consumption-based emissions*.

It is noted that ROM coal production at the Mount Pleasant Operation under DA 92/97 (inclusive of the proposed Modification) would cease prior to 2035 and therefore the site would not materially contribute to New South Wales' 2035 emissions (although it is acknowledged that the site would contribute to Australia's and NSW' emissions for the duration of mining operations conducted as part of the proposed Modification from 2026 to 2032 as well as in the period d to 2032 to 2035 during the decommissioning and rehabilitation phase).

Neither the Net Zero Future Act nor any other relevant NSW policies impose specific requirements on the Modification to implement measures to reduce, avoid and monitor greenhouse gas emissions. Generally speaking, any specific requirements for the Modification to implement measures to reduce, avoid and monitor greenhouse gas emissions would likely be contained in any modified Development Consent granted under Part 4 of the EP&A Act for the Modification, consistent with the current approach for the Mount Pleasant Operation. Development Consent DA 92/97 imposes requirements on MACH with respect to greenhouse gas management at the Mount Pleasant Operation.

The requirements under Part 4 of the EP&A Act would also likely be augmented by further requirements imposed by the NSW EPA under the *Protection of the Environment Operations Act 1997* (POEO Act), as it intends to also impose requirements upon holders of Environment Protection Licences (NSW EPA 2025b; 2025c; 2025d) (further explanation below).

It is noted that this Greenhouse Gas Assessment does not identify all documents which comprise the suite of NSW policies, programs and guidelines concerning greenhouse gas emissions. For example, other potentially relevant documents in this regard may include the 2020 NSW Energy Package Memorandum of Understanding between the Commonwealth and NSW Governments, which relevantly had the aim of achieving emissions reductions. It is also noted that additional NSW policies, programs or guidelines may potentially be released prior to the determination of the Modification. The consent authority may identify and take into account any further NSW policies, programs or guidelines concerning greenhouse gas emissions as it sees fit in determining the application of the proposed Modification.

Table 4 provides the Guiding Principles and Objectives of the Net Zero Future Act and indicates that MACH generally concurs with the application of these guiding principles to development in the State.

NSW Environment Protection Authority

The NSW EPA's *Climate Change Policy* (NSW EPA, 2023a) outlines the NSW EPA's role in environmental regulation in NSW and how the NSW EPA is expanding its focus to explicitly regulate the causes and consequences of climate change.

As identified in the NSW EPA's *Climate Change Policy* (page 15), section 6 of the *Protection of the Environment Administration Act 1991* (POEA Act) outlines the NSW EPA's statutory objectives to protect the environment and human health. These objectives include:

- to protect, restore and enhance the quality of the environment in NSW, having regard to the need to maintain ecologically sustainable development; and
- to reduce the risks to human health and prevent the degradation of the environment.

The NSW EPA also notes, on page 15, that these objectives "extend to protecting the environment and human health from climate change". It further notes that the NSW EPA is required to consider these statutory objectives when exercising licensing functions under the POEO Act. The POEO Act is the key piece of environment protection legislation administered by the NSW EPA, with the Mount Pleasant Operation constituting a "scheduled activity" under Schedule 1 of the POEO Act which requires licensing by the NSW EPA under an environment protection licence. MACH currently holds EPL 20850 for the Mount Pleasant Operation and would seek any variations required to cover the Modification should it be approved.

Section 9 of the POEA Act imposes a statutory duty on the NSW EPA to develop environmental quality objectives, guidelines and policies to ensure environment protection. This includes protection of the environment from climate change. In this regard, the NSW EPA's *Climate Change Policy* identifies, on page 15, that its main purpose is to address both:

- the NSW EPA's statutory objectives to protect, restore and enhance the quality of the environment in NSW, and to reduce the risks to human health and prevent the degradation of the environment, under section 6(1) of the POEA Act; and
- the NSW EPA's statutory duty to develop environmental quality objectives, guidelines and policies to ensure environment protection from climate change under section 9(1)(a) of the POEA Act.

The delivery of the NSW EPA's *Climate Change Policy* is through an accompanying plan (i.e. the *Climate Change Action Plan 2023–26* [NSW EPA, 2023b]) that sets out specific actions the NSW EPA will take over the next three years and the stronger regulatory action taken over the medium to longer term to support the NSW Government's climate change commitments and policies.

Climate Change Licensee Requirements

In 2025, the NSW EPA released for public consultation a package of three documents that collectively outline the EPA's proposed approach to regulating and supporting greenhouse gas mitigation and climate change adaptation across licensed premises in NSW. The package includes the *Proposed Climate Change Licensee Requirements*, *Climate Change Mitigation and Adaptation Plans: Proposed Mitigation Requirements* and the *Proposed Greenhouse Gas Mitigation Guide for NSW Coal Mines* (Proposed Mitigation Guide) (NSW EPA, 2025b; 2025c, 2025d).

It is noted these documents have not been finalised and are subject to change following consultation.

Table 4
Guiding Principles and Objectives of the Net Zero Future Act

NSW Guiding Principles and Objectives	MACH's Position
There is a critical need to act to address climate change, which is a serious threat to the social, economic and environmental wellbeing of New South Wales.	✓
Action to address climate change should be taken as early as possible to minimise the cost and adverse impacts of climate change.	✓
Action to address climate change should be taken in a way that— *(a) is fiscally responsible, and* *(b) promotes sustainable economic growth, and* *(c) considers the economic risks of delaying action to address climate change, and* *(d) considers the impact on rural, regional, and remote communities in New South Wales.*	✓
Action to address climate change should be consistent with the right to a clean, healthy and sustainable environment.	✓
Action to address climate change should be consistent with the principles of ecologically sustainable development described in the Protection of the Environment Administration Act 1991, section 6(2).	✓
Action to address climate change should involve appropriate consultation with affected persons, communities and stakeholders.	✓
Action to address climate change should take into account the following— *(a) the knowledge and perspectives of Aboriginal communities,* *(b) the best available science,* *(c) the knowledge of rural, regional and remote communities in New South Wales,* *(d) the need to support local communities, including Aboriginal communities, who may be affected by the action, including by—* *(i) considering the impact on local employment and industries, and* *(ii) diversifying local economies, and* *(iii) encouraging local procurement, and* *(iv) optimising job creation and employment transition opportunities, and* *(v) considering the impact on the amenity of local communities,* *(e) the need for education and skills diversification,* *(f) the need to ensure essential utilities and infrastructure are provided, including energy, water, telecommunications and transport,* *(g) the impact of the action on consumer costs in New South Wales, including energy costs,* *(h) the need to reduce the risk climate change poses to human health,* *(i) equity and social justice impacts on socially disadvantaged groups and economically vulnerable regions,* *(j) the need to reduce the risk climate change poses to the survival of all species.*	✓
Action to address climate change should take into account the impact on animals.	✓
The Government of New South Wales is responsible for— *(a) urgently developing and implementing strategies, policies and programs to address climate change, and* *(b) ensuring the Government of New South Wales pursues best practice in addressing climate change.*	N/A
*The **adaptation objective** is that New South Wales is more resilient to a changing climate.*	✓
The Premier and the Minister must ensure New South Wales achieves the target by 30 June 2050 to reduce net greenhouse gas emissions in New South Wales to zero.	N/A

After: Part 2 of the Net Zero Future Act.

Proposed Climate Change Licensee Requirements

The *Proposed Climate Change Licensee Requirements* (NSW EPA, 2025b) outlines the NSW EPA's proposed regulatory approach to introducing climate-related requirements under the POEO Act. The framework would apply to approximately 200 licensed premises (including the Mount Pleasant Operation) that emit over 25,000 t CO_2-e (Scope 1 and 2) per year.
The proposed requirements comprise five key elements:

- Annual climate change emissions reporting to the NSW EPA.
- Preparation and implementation of CCMAP.
- Specific mitigation actions for large emitters.
- Standardised emissions measurement and monitoring.
- Potential introduction of greenhouse gas licence limits.

These measures are intended to improve transparency, align state and Commonwealth reporting, and ensure licensees contribute to NSW's decarbonisation trajectory.

Climate Change Mitigation and Adaptation Plans: Proposed Mitigation Requirements

The *Climate Change Mitigation and Adaptation Plans: Proposed Mitigation Requirements* (NSW EPA, 2025c) specifies the proposed requirements for developing and maintaining CCMAPs, which would become a central compliance tool under the NSW EPA's climate framework. Licensees emitting over 25,000 tonnes CO_2-e (Scope 1 and 2) per annum would be required to prepare, publish, and update a CCMAP every three years, setting out:

- current and projected emissions over a ten-year horizon;
- planned mitigation measures; and
- emission reduction goals consistent with NSW targets.

Initially, the requirements focus on the mitigation component, with adaptation components to be introduced in later phases.

Proposed Greenhouse Gas Mitigation Guide for NSW Coal Mines

Developed as the first sector-specific guidance under the NSW EPA's climate change program, the Proposed Mitigation Guide provides state-specific expectations for reducing greenhouse gas emissions from coal mining operations. It complements the CCMAP framework and the Guide, setting out the NSW EPA's proposed expectations for fugitive CH_4 and diesel-related emissions. The NSW EPA's key proposed mitigation measures and implementation dates as set out in the Proposed Mitigation Guide are as follows:

- CH_4 management[4]:
  - By 2027 – Installation of gas drainage and destruction systems (e.g. flaring or utilisation) at underground mines emitting >25,000 t CO_2-e/year.
  - By 2030 – Installation of ventilation air CH_4 abatement systems at underground mines emitting >100,000 t CO_2-e/year, subject to safety considerations.
- Diesel emission reductions:
  - By 2030 – at least 5% of fuel used to be a low-carbon alternative to fossil diesel.

[4] The NSW EPA is seeking feedback on whether this requirement should apply to both underground and surface coal mines

- By 2035 – at least 10% low-carbon fuel uptake.
- By 2040 – at least 25% low-carbon fuel uptake and 75% of large mining machinery and vehicles to be zero-emission.
- By 2050 – at least 25% low-carbon fuel uptake and 100% of large mining machinery and vehicles to be zero-emission.

It is noted that the NSW EPA is seeking to have the above requirements apply to all relevant sites, unless sites have sought and obtained an exemption from the EPA.

Exemptions to these proposed mitigation requirements can be sought with sufficient supporting assessment (NSW EPA, 2025d):

> *The EPA recognises that the NSW coal mining sector is complex, with a range of mine types, geological characteristics, mine configurations, mining techniques and regulatory requirements. Coal mining companies are best placed to consider, in detail, whether the various mitigation measures described in this mitigation guide are feasible for their operation.*
>
> *If a mining company determines it is not feasible to implement a mitigation measure, it will be able to seek to be exempt from that requirement. This will need to be supported by documentation that demonstrates the measure is not feasible at the site, by providing a pre-feasibility assessment that is independently verified.*
>
> *If a mine intends to implement a mitigation measure but cannot do so in the timeline set by the EPA, then it can apply to the EPA for an extension …*

Based on its understanding of the current state of development of zero-emission equipment and the current supply and cost of low-carbon fuels, MACH is of the view that these proposed requirements would not be reasonable and feasible at the Mount Pleasant Operation during the life of the Modification. Notwithstanding this view, MACH has undertaken a greenhouse gas abatement evaluation and developed a Three-Year Action Plan for the Mount Pleasant Operation where MACH would collect relevant data and undertake trials where identified to be reasonable and feasible (Attachment B).

2.3.2 Reporting

NSW Government/Net Zero Commission

Under the Net Zero Future Act the NSW Government has established a NZC in 2024. The NZC has a number of responsibilities under the Net Zero Future Act, including providing annual reporting to the Government on NSW's progress towards the State's greenhouse gas emission reduction primary targets (and interim targets), and adaptation to climate change.

2024 Annual Report – Net Zero Commission

The NZC prepared its first annual report in 2024 (NZC, 2024). In this initial report the NZC calculated that the NSW Resources Sector accounted for 12% of net State emissions. The Resources Sector is one of the lower emitting sectors in NSW, according to data presented by the NZC (NZC, 2024):

- **Electricity Sector** (largest contributor) – contributes some **40%** of NSW emissions and this sector's emissions have reduced some **28%** since 2005.
- **Transport Sector** (2nd largest contributor) – contributes some **22%** of NSW emissions and this sector's emissions have reduced some **1%** since 2005.
- **Agriculture Sector** (3rd largest contributor) – contributes some **20%** of NSW emissions and this sector's emissions have reduced some **5%** since 2005.
- **Industry and Waste Sector** (4th largest contributor) – contributes some **18%** of NSW emissions and this sector's emissions have reduced some **26%** since 2005.

- **Resources Sector** (5th largest contributor) – contributes some **12%** of NSW emissions and this sector's emissions have reduced some **34%** since 2005.
- **Built Environment Sector** (6th largest contributor) – contributes some **7%** of NSW emissions and this sector's emissions have increased some **92%** since 2005.
- **Land Sector** (negative emissions) – the only sector with negative emissions (**-19%**), with acceleration of emissions abatement in this NSW sector being observed since 2005.

Further consideration of NSW sectoral emissions performance is provided in Section 3.5.

New South Wales Environment Protection Authority

The NSW EPA reports progress against its climate change action plan in its NSW EPA Annual Report and will review its climate change policy and action plan in 2026, in line with the reporting cycles for the NSW EPA's strategic planning and NSW State of the Environment reports.

As described in Section 2.3.1, the NSW EPA will be introducing various environmental reporting requirements such as CCMAPs for EPL holders to disclose anticipated greenhouse gas emissions, mitigation measures and climate change adaptation plans.

2.3.3 Mitigation and Adaptation

NSW Government

Major emissions reductions initiatives in NSW to reduce greenhouse gas emissions include the:

- NSW Electricity Infrastructure Roadmap, which will deliver a modern energy system for the State and unlock investment in renewable energy;
- NSW Net Zero Industry and Innovation Program, which will help reduce emissions from NSW's industrial sector and invest in new clean technologies for the future;
- NSW Electric Vehicle Strategy, which will accelerate the uptake of electric vehicles;
- NSW Hydrogen Strategy, which will support the growth of a hydrogen industry;
- NSW Waste and Sustainable Materials Strategy, which will reduce emissions through better waste and materials management; and
- NSW Primary Industries Productivity and Abatement Program, which will drive sustainable land management, boost productivity and help reduce emissions.

In a Ministerial Statement regarding the Net Zero Plan Stage 1: 2020-2030 implementation updates, the NSW Government stated (NSW Government, 2024):

> *While acknowledging that sectors of the NSW economy will decarbonise at different rates, the Government's policy is that all sectors need to ratchet down their emissions to meet NSW's legislated targets and the targets that will be established for 2040 and 2045.*
>
> *Some sectors require long lead-times to secure emissions reductions. The Government's policy is that entities involved in assessment and decision-making processes under the planning system – including the NSW Department of Planning, Infrastructure and Housing (DPHI) and the Independent Planning Commission (IPC) – should consider NSW's emissions-reduction targets and, to the extent relevant, the Climate Change Act's guiding principles when examining new developments.*

NSW's emissions reduction targets are considered in this assessment (Section 3.5).

NSW Environment Protection Authority

The NSW EPA's *Climate Change Action Plan 2023-26* (NSW EPA, 2023b) includes an action to progressively place greenhouse gas limits on new or existing licenced facilities, informed by emission targets to be identified for key industries and implemented in consideration of reporting under the NGER Act (i.e. to reduce duplication of reporting).

The NSW EPA has three current major greenhouse gas/climate change focus areas (NSW EPA, 2024):

1. ***Inform and plan:***
    - *work with industry, government and experts to improve the evidence base on regulating climate change;*
    - *embed climate change into planning and regulatory decisions;*
    - *support licensees to prepare, implement and report on climate change mitigation and adaptation management plans; and*
    - *work with Aboriginal people and our Environment Youth Advisory Council to improve the EPA's evolving climate change response.*
2. ***Mitigate:***
    - *establish cost-effective emission reduction targets for key industry sectors;*
    - *provide industry with best-practice guidelines to support it to reduce its emissions; and*
    - *phase in greenhouse gas emission limits on licences for key industry sectors.*
3. ***Adapt:***
    - *develop resilience programs and best-practice adaptation guidance; and*
    - *harness citizen science and develop and implement community education programs.*

It is noted that these focus areas are also reflected in the NSW EPA's recent publications.

Greenhouse Gas Mitigation at New South Wales Coal Mines Literature Review and Industry Scan

EMM Consulting Pty Limited (EMM) (2025) was commissioned by the NSW EPA to undertake a literature review and industry scan to provide technical information for the NSW EPA to consider in the development of the Proposed Mitigation Guide.

The literature review covered international guidance and measures relating to the mitigation of greenhouse gas emissions from coal mines. The industry scan involved consultation with coal mining companies in NSW to better understand what the coal sector is currently doing to mitigate emissions, to identify the most important factors that influence mine operator decision-making, and to identify potential case studies.

MACH has considered the literature review undertaken by EMM (2025) as a source of contemporary advice available for NSW coal mines in the development of the Greenhouse Gas Abatement Evaluation and Three-Year Action Plan (Attachment B). Moreover, MACH has not limited its consideration of potential abatement opportunities to those listed in EMM's (2025) literature review

Further information is provided in Attachment B.

New South Wales Greenhouse Gas Emissions Projections 2024 – Method Paper

The NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) has projected future trends in greenhouse gas emissions and the *NSW greenhouse gas emissions projections 2024 - Methods Paper* (NSW DCCEEW, 2025a) summarises NSW emissions trends and describes the assumptions and methodologies applied in preparing NSW's projections.

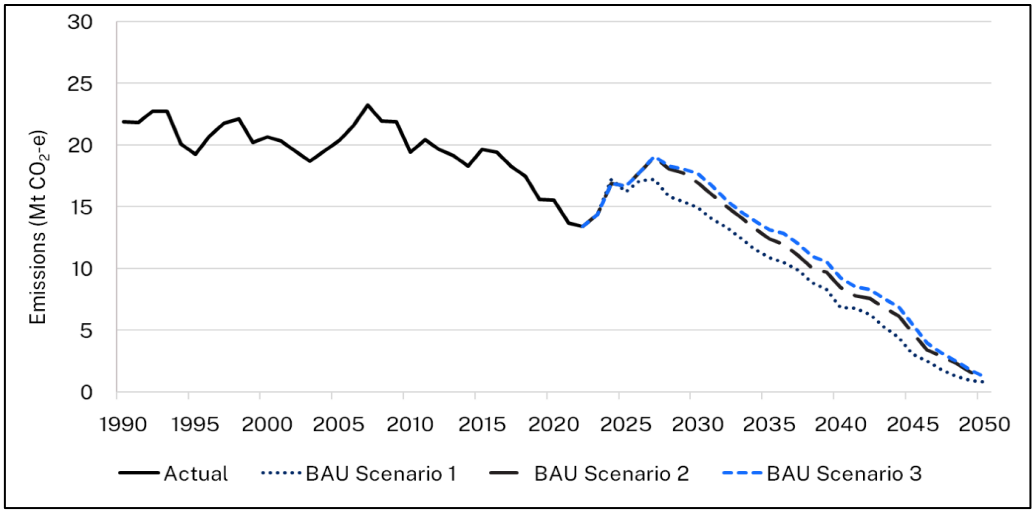
In completing its greenhouse gas sectoral projections, NSW DCCEEW has made assumptions regarding the potential availability and adoption of alternative technologies to diesel powered mining equipment, as follows (NSW DCCEEW, 2025a):

> *Open-cut mines operating post-2042 are assumed to replace non-road diesel equipment with clean technology starting in 2032. The abatement to be achieved post-2030 by replacing diesel-powered mobile plant and equipment was modelled on a mine-by-mine basis accounting for the extent of emissions projected for the mine and the forecast remaining mine life.*

It is noted that ROM coal production under DA 92/97 at the Mount Pleasant Operation (inclusive of the Modification) would cease in 2032. Consideration of the technical readiness and commercial readiness of alternative diesel replacement technologies, the likely timing of alternative technologies being available in relation to the Modification is provided in Attachment B. NSW DCCEEW has also included projection updates for various future ROM coal production scenarios including:

- *Scenario 1 – production forecasts for all currently approved coal mine operations only*
- *Scenario 2 – Scenario 1 plus production forecasts for all coal mine modification and state significant development (SSD) applications that are currently under assessment with the Department of Planning, Housing and Infrastructure (DPHI)*
- *Scenario 3 – Scenario 2 plus production forecasts for all coal mine modification and SSD proposals for which scoping reports have been submitted to the DPHI.*

It should be noted that Scenario 1 includes the Mount Pleasant Optimisation Project as approved under SSD 10418, which includes operations continuing to 2048 at rates of up to 21 Mtpa ROM coal (as opposed to 2032 and up to 12.5Mtpa ROM coal as proposed by the Modification). Figure 21, replicated as Figure 6 below, shows that the projected emissions under all three scenarios would decline rapidly from the late 2020s and approach new zero by 2050.



After: NSW DCCEEW, 2025a
Note: BAU = Business-as-usual

Figure 6
NSW Scope 1 Emissions for Coal Mining Showing Inventory Estimates (1990–2022) and Business-As-Usual Emissions Projections for 3 Scenarios Developed for the 2024 Update

2.3.4 Offsets

The NSW Government has many climate policies and programs that interact with, or rely upon, a market for carbon offsets. In its submission to the Independent Review of ACCUs (NSW Government, 2022), the NSW Government stated:

> ***NSW relies on ACCUs for many of its policies***
>
> *The NSW Government relies on Australian Carbon Credit Units (ACCUs) being robust and trusted by the community and has an interest in ensuring that confidence in the domestic carbon market is restored. …*
>
> *Key NSW policies and programs relevant for the ACCU market include:*
>
> - *the Primary Industries Productivity and Abatement Program (PIPAP), which supports NSW farmers and land managers to optimise productivity, reduce emissions, access carbon markets and seize new market opportunities. …*
> - *the Vehicle Emissions Offset Scheme, which will provide consumers with the opportunity to offset their CO_2 emissions at the point of registration renewal. The NSW Government will be purchasing ACCUs on behalf of consumers who have chosen to offset their vehicle emissions*
> - *the National Parks and Wildlife Service, under the Carbon Positive by 2028 plan, will generate revenue for park management through the sale of premium carbon credits (ACCUs with biodiversity co-benefits)*
> - *programs that work with stakeholders who purchase ACCUs or other carbon credits as part of their decarbonisation pathways, such as the Net Zero Industry and Innovation Program and the Business Decarbonisation Support Program*
> - *NSW Government agencies who currently or may in the future purchase ACCUs to offset their emissions*
> - *…*

In addition, the NSW Government also advocates for carbon farming in NSW (NSW Government, 2025):

> *Carbon farming is an essential part of taking action on climate change. Storing carbon in plants and soil is one of the most cost-effective means of removing carbon from the atmosphere. This removal will be needed alongside emissions reduction activities to avoid the most severe impacts of climate change.*

In its 2024 emission projections report, the NSW DCCEEW also provided the following context for Safeguard Mechanism facilities (NSW DCCEEW, 2025a):

> *The Australian Government's reform of the Safeguard Mechanism requires significant emission reductions across multiple sectors, designed to help deliver a proportional share of Australia's 2030 climate target. Industrial facilities will need to meet their Safeguard Mechanism declining emissions baseline obligations through a combination of onsite reduction and surrender of Australian carbon credit units (ACCUs) or Safeguard Mechanism credits (SMCs) (Commonwealth DCCEEW 2023a).*
>
> *How each facility in New South Wales will meet their obligations is not known at this stage. However, there are onsite abatement potential assumptions across multiple sectors in NSW's emissions projections.*

The NZC also states the following with respect to offsets and the NSW resources sector (NZC, 2024):

> *The Safeguard Mechanism aims to incentivise the most cost-effective abatement activities by requiring facilities to keep emissions below their baseline, while facilities that remain below their baseline can sell credits to others. Facilities that do not meet requirements can purchase offsets in the form of Australian Carbon Credit Units or Safeguard Mechanism Credits. The Safeguard Mechanism sets a baseline decline rate of 4.9 per cent per year until 2030. However, prevailing and expected price levels in credit markets may not be sufficient to incentivise some options to reduce emissions, and some emitting mines are not covered in the Safeguard Mechanism because their emissions are below the inclusion threshold.*

The Mount Pleasant Operation is a Safeguard facility. MACH also notes that the Safeguard Mechanism is due for review in 2026/2027 and may be further adjusted post-2030 to reflect Australia's second NDC (Section 2.2.3).

2.4 CORPORATE

2.4.1 MACH Greenhouse Gas Policy Statement

Until recently, MACH held only one major greenhouse gas-generating mining asset (i.e. the Mount Pleasant Operation) in Australia. However, MACH's parent company has recently acquired (the previously ASX-listed) REX Minerals which has multiple development projects in Australia and overseas, including the Hillside Project in South Australia.

MACH has recently reviewed its likely greenhouse gas reporting and greenhouse gas mitigation obligations in Australia, and the progress of the NSW Resources Sector in emissions reduction since 2005 (Section 3.5) when considering NSW's emission reduction targets. Following this review, and consideration of its corporate priorities, MACH's Greenhouse Gas Policy of relevance to the Mount Pleasant Operation is as follows:

> *MACH Energy Australia Pty Ltd is committed to achieving net zero Scope 1 and Scope 2 emissions from its operations by 2050, and complying with progressively declining interim net emission reduction targets as may be applicable to its operations under the Safeguard Mechanism and associated Commonwealth legislation.*

2.4.2 Mitigation

A wide range of reasonable and feasible existing mitigation measures are already in place at the Mount Pleasant Operation. These mitigation measures are discussed briefly below, with further detail provided in the Attachment B.

Avoid

Mobile Fleet and Plant Maintenance

MACH and its contractors maintain major fleet items in good operating order through original equipment manufacturer (OEM) recommended servicing, targeted maintenance to extend equipment life, and use of condition-based data (e.g. remote fuel-use and performance monitoring) to identify inefficiencies early. These measures minimise unnecessary fuel burn from underperforming equipment.

Body Selection and Optimisation

Truck body configurations are selected and optimised to maximise payload efficiency (e.g. light-weighted trays, combo bodies), avoiding excess fuel consumption by enabling higher payloads per trip.

Mobile Fleet Operation

Operational practices focus on avoiding unnecessary diesel use, including maximising payloads, reducing idling, optimising truck routes and sequencing, minimising off-haulage travel, and scheduling operator breaks to reduce non-productive machine hours. Ongoing operator training reinforces efficient loading, tipping and material placement.

Vegetation Clearing

A Vegetation Clearance Protocol limits native vegetation disturbance to the approved footprint and restricts clearing to what is required for the next 12 months of operations. Targeted surveys, boundary marking and salvage measures minimise disturbance of existing vegetation and protect carbon sinks. Progressive rehabilitation further supports early vegetation recovery.

Reduce

Mine Planning and Operational Efficiency

Mine design and scheduling actively reduce fuel intensity through optimised pit and dump sequencing, shorter haul distances, efficient haul road design, in-pit dumping, reduced queuing, and streamlined loading/unloading configurations. Cross-pit bridges and ROM-level-integrated dispatch systems are being implemented to cut unnecessary truck hours, idle time and back-hauls.

Fleet Planning and Monitoring

Real-time fleet data, idle-time management tools, service meter unit erosion tracking, circuit-based workflows, fuel-monitoring improvements (e.g. smart-tag Radio Frequency Identification [RFID] rollout) and predictive maintenance programs reduce non-productive fuel burn. Daily pre-start checks, and OEM-compliant maintenance help maintain fuel efficiency across the fleet.

Scope 2 Energy Efficiency

Electricity is monitored site-wide, supported by a 99 kilowatt solar installation and various small-scale solar systems. MACH has investigated larger renewable options (e.g. floating solar, a 50 megawatt solar farm), but these were not economically viable at the time of assessment.

Substitute

Mobile Fleet Procurement and Planning

Procurement decisions prioritise fuel-efficient and lower-emission machinery where reasonable and feasible. MACH's 2025 procurement review assessed lifecycle, emissions and fuel-burn performance of major fleet models, identifying Tier 4 power platforms as the preferred future engines. A watching brief is maintained on emerging repower and emission reduction technologies for alignment with future fleet replacement cycles.

Fixed Plant Procurement and Planning

New or replacement electrical equipment is selected with consideration of energy efficiency.

Fuel-Efficient Light Vehicles

Fuel efficiency is considered in procurement of site light vehicles.

Offset

Safeguard Mechanism Compliance

Where emissions cannot be reasonably and feasibly avoided or reduced, MACH surrenders ACCUs or SMCs to manage residual emissions and comply with the Mount Pleasant Operation's Safeguard baseline obligations.

Progressive Rehabilitation

Rehabilitation of disturbed areas occurs as soon as practicable (typically within six months), with temporary stabilisation measures applied where needed. Rehabilitation restores vegetation and soil carbon sinks, offsetting a portion of land-clearing emissions. MACH is also required to establish 1,000 hectares of White Box–Yellow Box–Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community in accordance with its Commonwealth approval (EPBC 2011/5795).

2.4.3 Adaptation

MACH has prepared a draft CCMAP that has been lodged with the NSW Department of Planning, Housing and Infrastructure. MACH would conduct regular reviews of the CCMAP and reasonable and feasible greenhouse gas mitigation measures that could be applied at the Mount Pleasant Operation, should the Modification be approved (Section 4.6).

NSW EPA is yet to develop adaptation guidance on identifying and addressing climate-change risks and managing environmental impacts from climate related hazards. MACH would address any applicable requirements relating to these matters in the CCMAP as appropriate.

2.4.4 Offsets

The adoption of carbon offsets (i.e. ACCUs or SMCs in this context) may in some cases be the most reasonable and feasible opportunity to address difficult to abate emissions in the short-to-medium-term at any material scale. MACH expects to continue to rely on carbon credits to meet the majority of its Safeguard Mechanism obligations for the foreseeable future (Section 3.7).

MACH notes that Australia's Net Zero Plan (CCA, 2025) states the following with respect to medium term ACCU availability:

> *Demand for ACCUs is expected to increase over time, to support participants in compliance and voluntary markets to achieve their emissions reduction goals. The Australian Government is considering its future role as a direct purchaser of abatement, in light of the Safeguard reforms and the evolving role of the ACCU scheme.*
>
> *Supply is currently strong. Around 19 million ACCUs were issued in 2024; this is projected to grow to 31 million in 2035. Australia's Emissions Projections 2024 estimate the supply of new ACCUs, alongside existing holdings within the market, will be sufficient to meet projected demand out to 2035.*

Under the Modification the Mount Pleasant Operation would cease ROM coal production in 2032, which suggests that sufficient ACCUs are likely to be available to MACH as may be needed in this period.

Further discussion on anticipated offset liabilities for the Modification is provided in Section 3.7.

3 GREENHOUSE GAS EMISSIONS ASSESSMENT AND MITIGATION PLAN

3.1 ASSESSMENT BOUNDARY

The Greenhouse Gas Assessment for the Modification adopts a practical boundary, encompassing key Scope 1, Scope 2, and Scope 3 emission sources (Figure 3). This approach prioritises material emissions from the proposed mining activity, while also evaluating whether these emissions would occur if the Modification were not implemented.

Greenhouse gas emission scope boundaries for the Modification are discussed in Section 1.4. A summary of key potential greenhouse gas emissions sources considered for the Modification is provided in Table 5 and illustrated schematically on Figure 3.

Table 5
Summary of Key Potential Greenhouse Gas Emission Sources

Component	Direct Emissions	Indirect Emissions	
	Scope 1	Scope 2	Scope 3
Diesel consumption (including during decommissioning and construction activities)	Emissions from the combustion of diesel.	N/A	Upstream third-party emissions attributable to the extraction, production and transport of diesel consumed.
Oil and grease consumption (including during decommissioning and construction activities)	Emissions from the combustion of oil and grease.	N/A	Upstream third-party emissions attributable to the extraction, production and transport of oil and grease consumed.
Land (vegetation) clearing*	Release of stored carbon in vegetation.	N/A	N/A
Explosives	Emissions from the use of Explosives.	N/A	N/A
Fugitive	Fugitive emissions resulting from the extraction of coal.	N/A	N/A
Electricity consumption for the processing of ROM coal and other on-site uses	N/A	Emissions from the consumption of purchased electricity used during the processing of ROM coal.	Upstream third-party emissions from the extraction, production and transport of fuel burned for the generation of electricity consumed, and the electricity lost in delivery in the transmission and distribution network.
Product coal transport	N/A	N/A	Downstream third-party emissions from the combustion of diesel used during domestic rail transport and shipping.
Combustion of product coal	N/A	N/A	Downstream third-party emissions from the combustion of product coal from the Mount Pleasant Operation.

* Conservatively does not include reduction in emissions associated with revegetation of Mount Pleasant Operation landform during and following rehabilitation.

3.1.1 Scope 1 Emissions

For the Mount Pleasant Operation, as an open cut mining operation, the majority of Scope 1 emissions arise from fugitive emissions associated with mining activities and diesel consumption from equipment such as haul trucks, excavators and dozers. Smaller Scope 1 sources within the assessment boundary include carbon sink loss from land clearing and emissions from explosives. Emissions from liquid petroleum gas, petrol, oil and grease have also been conservatively included, although these sources are negligible relative to diesel consumption (Attachment A).

Emission reductions from on-site rehabilitation activities or offsetting along with any incidental release of sulfur hexafluoride from high-voltage electrical equipment, livestock on-site and waste disposal have been excluded from the assessment boundary.

3.1.2 Scope 2 Emissions

Scope 2 emissions arise from the consumption of purchased electricity used in equipment or operations owned or controlled by the entity. These emissions, classified as indirect, are generated off-site at power plants or other facilities supplying the electricity and are attributed to the entity based on its energy usage. For the Mount Pleasant Operation, Scope 2 emissions primarily arise from electricity consumption at the CHPP, lighting, mining machinery, and other surface and service infrastructure. These emissions are included within the assessment boundary.

3.1.3 Scope 3 Emissions

Scope 3 emissions potentially incorporate a very wide range of sources that are both upstream and downstream of the Modification (Figure 3).

Upstream Scope 3 emissions, including extraction, production and transport of purchased liquid fuels and hydrocarbons along with transmission and distribution of purchased electricity have been included in the assessment boundary but are minimal when compared to downstream Scope 3 sources. Other upstream Scope 3 emissions including employee and company travel, construction materials and new mobile equipment have not been included.

Downstream Scope 3 emissions are highly variable, influenced by factors such as the destination country, transportation methods, handling processes, and the efficiency of coal use. The assessment boundary for downstream Scope 3 emissions includes railing product coal to the port of Newcastle, international shipping, combustion of product coal and upstream distribution of liquid fuel, hydrocarbons and electricity. Other downstream sources, such as customer country rail/truck transport, and port operations, are excluded due to their negligible contribution and highly varied nature.

3.1.4 Modification Stages

The Greenhouse Gas Assessment boundary must account for emissions from all relevant stages of a project lifecycle. As outlined in the Guide, the assessment should address greenhouse gas emissions associated with each applicable stage, including:

- construction, including demolition, land clearing and excavation;
- operation;
- decommissioning;
- closure; and
- post-closure activities, such as remediation and rehabilitation (where relevant).

The Modification includes the construction of Mine Water Dam 2 and raises to the existing Fines Emplacement Area. Activities associated with the construction stage have been separately itemised in the Greenhouse Gas Calculation Report (Attachment A). Similarly, decommissioning activities have also been separately itemised.

Decommissioning, closure, and post-closure activities would remain generally consistent with the Approved Development Consent DA 92/97.

3.2 GREENHOUSE GAS EMISSIONS ESTIMATION METHODOLOGY AND SCENARIOS

Mount Pleasant Operation's direct and indirect greenhouse gas emissions have been estimated by TAS (Attachment A) using published emission factors from the NGA Factors (Commonwealth DCCEEW, 2025a), where possible.

Where NGA Factors were not available (e.g. for rail and ship transport), greenhouse gas emissions have been estimated using emission factors published by the UK Department for Environment, Food and Rural Affairs (DEFRA) in *Greenhouse Gas Reporting: Conversion Factors 2024* and supplemented by relevant guidance for land clearing and explosives (Transport Authorities Greenhouse Group, 2013; Department of Climate Change, 2008).

The energy contents, emission factors and activity data used to estimate the greenhouse gas emissions for the following scenarios are detailed in Attachment A:

- **Baseline Scenario** – continuation of operations at the approved ROM coal extraction rate of 10.5 Mtpa to December 2026, consistent with the currently approved Development Consent DA 92/97. This is referred to as the 'business-as-usual' scenario in the Guide (NSW EPA, 2025a).
- **Modification Scenario** - operation at a ROM coal extraction rate of up to 12.5 Mtpa to December 2032, consistent with the proposed Modification to Development Consent DA 92/97. This is referred to as the 'modified-business' scenario in the Guide (NSW EPA, 2025a).
- **Modification Only Scenario** – the incremental increase in emissions due to the Modification (i.e. the difference in emissions between the Baseline Scenario and the Modification Scenario). This is referred to as the 'project-only' scenario in the Guide (NSW EPA, 2025a).

Emission factors for electricity usage were obtained from Australia's emissions projections 2025 (Commonwealth DCCEEW, 2025d). These emission factors are based on projections for the decarbonisation of the NSW electricity grid over time.

The energy contents, emission factors and activity data used to estimate the greenhouse gas emissions are detailed in Attachment A.

3.2.1 Fugitive Emissions Methodology

The fugitive emissions estimates in the Greenhouse Gas Assessment are based on the Fugitive Emissions Study undertaken for the Mount Pleasant Coal Operations by CoalBed Energy Consultants Pty Limited (CoalBed) (CoalBed, 2023) and estimates of the annual extraction from ROM coal based upon relative depth from the surface.

The Fugitive Emissions Study has been prepared in accordance with the requirements of Method 2 as outlined in the:

- *National Greenhouse and Energy Reporting Regulations 2007*;
- *National Greenhouse and Energy Reporting (Measurement) Determination* 2008; and
- *Guidelines for the Implementation of NGER Method 2 or 3 for Open Cut Coal Mine Fugitive GHG Emissions Reporting (C20005)* (Australian Coal Association Research Program [ACARP], 2011) (ACARP Guideline).

Twelve borehole sites were used to provide fugitive emission gas sampling data including two 'type' boreholes and nine 'validation' boreholes as per the definition in the ACARP Guidelines (CoalBed, 2023). Data across all twelve borehole sites confirmed a single distinct gas domain where low gas concentration dominated by CO_2 is present to a depth of approximately 100m followed up by an increase in gas content and transition to CH_4 at 350m (CoalBed, 2023) (Table 6).

CoalBed concluded that the sample sufficiency and uncertainty was found to be adequate for the Mount Pleasant Operation gas domain and that no supplementary drilling is required (CoalBed, 2023).

Table 6
Summary of Gas Content at the Mount Pleasant Operation

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
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[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Source: (CoalBed, 2023)

A summary of fugitive gas released based on relative depth from the surface for the Baseline Scenario and the Modification Scenario is provided in Table 7 and 8 respectively. Comparison of Tables 6 and 7 illustrates that the Modification would not involve mining some of the deeper coal seams that are authorised for extraction under SSD 10418.

3.2.2 Land Clearing Methodology

As land clearing is not covered under National Greenhouse and Energy Reporting or the NGA Factors (Commonwealth DCCEEW, 2025a), the methodology in Appendix E of the *Greenhouse Gas Assessment Workbook for Road Projects* (Transport Authorities Greenhouse Group, 2013) was adopted to derive emission intensity values for woodland and derived native grassland (DNG) clearing.

Table 7
Summary of Estimated Fugitive Emissions for the Modification Scenario at Depth Intervals from the Surface (t CO_2-e)

Depth Interval	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	FY 2033
0 to 25 m	1,867	1,914	874	1,658	1,897	1,933	864	-
25 to 50 m	21,627	18,329	17,068	12,951	8,357	15,132	18,635	-
50 to 75 m	15,265	11,886	12,820	10,286	11,173	18,636	8,174	-
75 to 100 m	21,767	22,581	29,534	22,625	14,418	17,075	11,866	3,302
100 to 125 m	26,959	31,847	28,205	45,445	35,391	19,672	13,930	13,858
125 to 150 m	5,379	15,877	10,678	25,632	63,549	29,595	2,040	9,585
150 to 175 m	-	8,225	8,359	407	14,111	10,187	2,509	3,435
175 to 200 m	-	-	-	5,990	14,229	9,616	-	-
Total	**92,864**	**110,660**	**107,539**	**124,996**	**163,124**	**121,847**	**58,017**	**30,180**

Note: Highlighted cells include emissions 20 m below pit floor.

Table 8
Summary of Estimated Fugitive Emissions for the Baseline Scenario at Depth Intervals from the Surface (t CO_2-e)

Depth Interval	FY 2026	FY 2027
0 to 25 m	1,406	303
25 to 50 m	16,948	5,125
50 to 75 m	15,709	13,437
75 to 100 m	24,526	11,039
100 to 125 m	11,347	2,074
125 to 150 m	4,106	1,348
Total	**74,043**	**33,327**

Note: Highlighted cells include emissions 20 m below pit floor.

Potential maximum biomass class mapping in the *Greenhouse Gas Assessment Workbook for Road Projects* places the Modification within a potential maximum biomass class of 4. Accordingly, woodland disturbance was assigned an emission factor of 521 tonnes of carbon dioxide equivalent per hectare (t CO_2-e/ha), based on PCT alignment with Vegetation Classes C (open forest), consistent with Table 2 of Appendix E of the *Greenhouse Gas Assessment Workbook for Road Projects* (replicated below as Table 9). DNG disturbance was assigned an emission factor of 110 t CO_2-e/ha, corresponding to Vegetation Class I (grassland).

Table 9
Vegetation Class Emission Factors (t CO_2-e/ha)

	Potential Maximum Biomass Class						
Vegetation Class	**1**	**2**	**3**	**4**	**5**	**6**	**7**
A	-	-	237	384	532	594	768
B	-	-	237	401	554	618	-
C	77	209	307	521	718	-	-
D	77	209	307	-	-	-	-
E	80	217	316	-	-	-	-
F	106	287	-	-	-	-	-
G	113	-	-	-	-	-	-
H	115	309	-	-	-	-	-
I	110	110	110	110	110	110	110

After: (Transport Authorities Greenhouse Group, 2013)
Note: Highlighted cells were adopted for the Modification estimates.

3.3 MITIGATION MEASURES

MACH has recently undertaken a Scope 1 and Scope 2 greenhouse gas abatement evaluation when completing an update to its Air Quality and Greenhouse Gas Management Plan (AQGHGMP) under SSD 10418, inclusive of identifying a series of actions to be pursued over the next three years to gather additional information and implement additional actions to reduce greenhouse gas emissions where reasonable and feasible at the Mount Pleasant Operation. MACH has subsequently amended the greenhouse gas abatement evaluation to reflect the context of the proposed Modification to Development Consent DA 92/97 (Attachment B), and has also replicated the three-year action plan, as these actions are potentially transferrable to the Modification.

Table 10 presents a summary of the Mount Pleasant Operation three-year action plan (Attachment B). Note that while the three-year action plan commits to various data collection, trials and operational improvements, the greenhouse gas calculations prepared by TAS (Attachment A) conservatively exclude any potential emission reductions that may be achieved. Further detail on the greenhouse gas emission context for the Mount Pleasant Operation and the evaluation of potential abatement measures is provided in Attachment B.

3.3.1 Independent Expert Review Outcome

Loop conducted an independent peer review of the Greenhouse Gas Abatement Evaluation and Three-Year Action Plan (Attachment B). Loop considered the methodology for identifying greenhouse gas mitigation measures, alignment with relevant Commonwealth and NSW climate change policies and guidance, consideration of current and emerging abatement technologies and the scope of proposed mitigation actions. The peer review concluded the Greenhouse Gas Abatement Evaluation and Three-Year Action Plan (Attachment B) was comprehensive, technically sound, and aligned with best-practice and regulatory expectations (Attachment C).

Table 10
Mount Pleasant Operation Three-Year Action Plan – Greenhouse Gas Scopes 1 and 2

Measure	2026	2027	2028	Rationale
RFID and Operational Efficiency Training Package				
Fuel RFID Rollout	• Complete rollout of RFID system (Stage 2). • Test system and educate operators and supervisors on the availability of new detailed fuel usage data.	• Integrate additional RFID fuel data use in monthly operational performance reviews. • Investigate any aberrations in site fuel usage that warrant further investigation and can act as potential training opportunities.	• Extend RFID data granularity for future analysis. • Integrate use of additional RFID fuel data in training aspects of Operational Efficiency Package.	Builds upon existing efficiency and fuel usage data systems to provide better granularity and feedback.
Operational Efficiency Package	• Collate all relevant operational procedures and techniques and identify gaps and improvements. • Prepare Operational Efficiency Training Package.	• Complete rollout of new Operational Efficiency Training Package (Stage 1).	• Integrate use of additional RFID fuel consumption data in Operational Efficiency Training Package with operators (Stage 2).	Builds upon existing efficiency programmes to formalise and build upon existing procedures.
Alternative Fuels				
Premium Diesel (MPO-Diesel-11/25-1)	• Conduct cost and efficiency review.	• Consider site-specific trial of selected premium diesel product if evidence supports benefit.	• Prepare cost–benefit analysis if trial is positive. • Determine potential feasibility.	Moderate trial opportunity, low-risk implementation and potential to modestly reduce fuel consumption.
Renewable Diesel (MPO-Diesel-11/25-3)	• Secure supply options. • Develop trial protocol. • Evaluate OEM warranty alignment.	• Conduct controlled on-site trial on select fleet assets. • Complete operational assessment.	• Review potential feasibility and price reduction required to consider partial implementation (e.g. 5%).	Future drop-in compatibility up to 100%, pending domestic supply growth and significant price improvement.
Biodiesel (MPO-Diesel-11/25-4)	• Monitor for State and National policy and OEM warranty changes.		• Determine whether more detailed reconsideration of biodiesel is warranted.	Limited long-term suitability for mining fleet at high blend-rates.

Table 10 (Continued)
Mount Pleasant Operation Three-Year Action Plan – Greenhouse Gas Scopes 1 and 2

Measure	2026	2027	2028	Rationale
Dual Fuel - Partial Methane Substitution (MPO-Diesel-11/25-7)	• Complete Fugitive Investigation Programme (including the Yabby Programme) to inform potential supply quantities and methane content.			Early-stage site-specific investigations, very high technical uncertainty.
Fugitive Emissions				
Methane - Coal Seam Pre-Drainage and/or Energy Generation (MPO-Fugitive-11/25-1)	• Complete fugitive borehole investigation programme. • Collate data, model gas reservoir characteristics and identify potentially applicable gas drainage technologies.	• Conduct an initial concept assessment for on-site fugitive gas extraction (for destruction or utilisation).	• Determine potential feasibility of destruction or utilisation options in consideration of Safeguard Obligations.	Early-stage site specific investigations, high technical and regulatory uncertainty.
Hybrid and Electric Drive Major Equipment				
Hybrid (Diesel-Battery-Electric) Haul Trucks (MPO-Diesel-11/25-9)	• Develop concept and identify preferred supplier for hybrid (retrofit) haul truck trial. • Conduct risk assessments and refine trial parameters, trial period and objectives.	• Install and test hybrid equipment to confirm compatibility with site conditions. • Conduct controlled trial on a minimum of two major haul trucks (Stage 1).	• Analyse trial results. • Identify learnings, opportunities and limitations, consider potential for Stage 2 trial extension.	Hybrid diesel/electric equipment has potential to materially reduce fuel consumption and improve cycle times.
Hybrid (Diesel-Kinetic Storage-Electric) Loaders (MPO-Diesel-11/25-8)	• Consult with OEMs on capital, operating and fuel consumption data on alternative loader configurations (including hybrid technologies).	• Conduct a procurement evaluation of hybrid vs conventional loaders based on life-of-plant financial and productivity analysis.	• Determine potential feasibility of adoption of hybrid loaders in consideration of the site loader replacement schedule.	
Dozers – Diesel Electric Drive (MPO-Diesel-11/25-19)^	• Consult with OEMs on capital, operating and fuel consumption data on diesel-electric drive and conventional dozer configurations.	• Conduct a procurement evaluation of electric drive vs conventional mechanical drive dozers based on life-of-plant financial and productivity analysis.	• Determine potential feasibility of adoption of diesel-electric drive dozers in consideration of the site loader replacement schedule.	Diesel/electric drive dozers have potential to materially reduce fuel consumption and improve cycle times.

Table 10 (Continued)
Mount Pleasant Operation Three-Year Action Plan – Greenhouse Gas Scopes 1 and 2

Measure	2026	2027	2028	Rationale
Zero Emissions Technology				
Tethered Equipment Study*	• Consult with OEMs on capital, operating and electricity consumption data on electrical tethered excavators and/or drills.	• Evaluate site electrical supply and distribution requirements to support tethered excavators and/or drills and any key constraints to adoption.	• Determine potential feasibility of adoption of tethered excavators and/or drills in consideration of any site constraints and procurement requirements.	Major tethered equipment will become zero-emission as the electricity grid is progressively decarbonised.
Site Electricity Supply				
Site Electricity Supply – Carbon-Neutral Contract (MPO-Electricity-11/25-2)	• Consult with current electricity supplier on options to reduce emission intensity under the current supply agreement (to 2027).	• Obtain alternative Power Purchase Agreement (PPA) or Large-scale Generation Certificates (LGC) pricing data from alternative electricity suppliers. • Determine whether it would be reasonable and feasible to reduce Scope 2 emissions associated with the site electricity supply (agreement extension or alternative supplier).	• Implement extended or new site electricity supply agreement or PPA.	As the electricity grid is progressively decarbonised, Scope 2 emissions will fall naturally. MACH is obliged to minimise Scope 2 emissions by using electricity generated by renewable or carbon neutral sources where reasonable and feasible.
Additional By Activity Electricity Consumption Data Collection	• Install additional metering to identify key electricity usage activities centres on-site.	• Review additional data on key usage centres, consumption fluctuations and identify any potential efficiency opportunities.	• Commence targeted efficiency programme.	Reduce Scope 2 emissions and electricity consumption.

^ While no new dozer purchases are currently proposed under the Modification approval timeframe (i.e. to 2032), this measure has been retained as MACH will continue to progress outcomes of the Abatement Evaluation and Three-Year Action Plan prepared for the Mount Pleasant Operation AQGGMP under SSD 10418 until it is confirmed which consent pathway applies.

* This measure reflects longer-term zero-emissions planning under SSD 10418. As the Modification would cease coal production in 2032, It is very unlikely that pursuing tethered equipment would be a reasonable and feasible mitigation measure.

3.4 GREENHOUSE GAS ASSESSMENT

Annual Scope 1 and 2 greenhouse gas emissions estimated by TAS (2025) for the Modification Only scenario is summarised in Table 11. The threshold for large emitters of 25,000 t CO_2-e (or 0.025 Mt of carbon dioxide equivalent [Mt CO_2-e]) is projected to be exceeded by the Modification (highlighted in bold).

Table 11
Summary of Estimated Scope 1 and 2 Emissions for Modification Only Scenario per Financial Year

Financial Year	Scope 1 and 2 Emissions (t CO_2-e/year)
FY26	**52,107**
FY27	**178,639**
FY28	**263,958**
FY29	**289,173**
FY30	**320,932**
FY31	**228,718**
FY32	**117,067**
FY33^	**46,349**
FY34^	13,934
FY35^	2,826
FY36^	1,413

Source: TAS (2025).
^ Decommissioning years.

The greenhouse gas emissions estimated by TAS (Attachment A) for each scenario are summarised in Table 12. The total estimated Scope 1 and 2 greenhouse gas emissions for the Modification Scenario, disaggregated by key source, is detailed in Attachment A and summarised in Figure 7.

Table 12
Summary of Estimated Emissions per Scope for All Scenarios

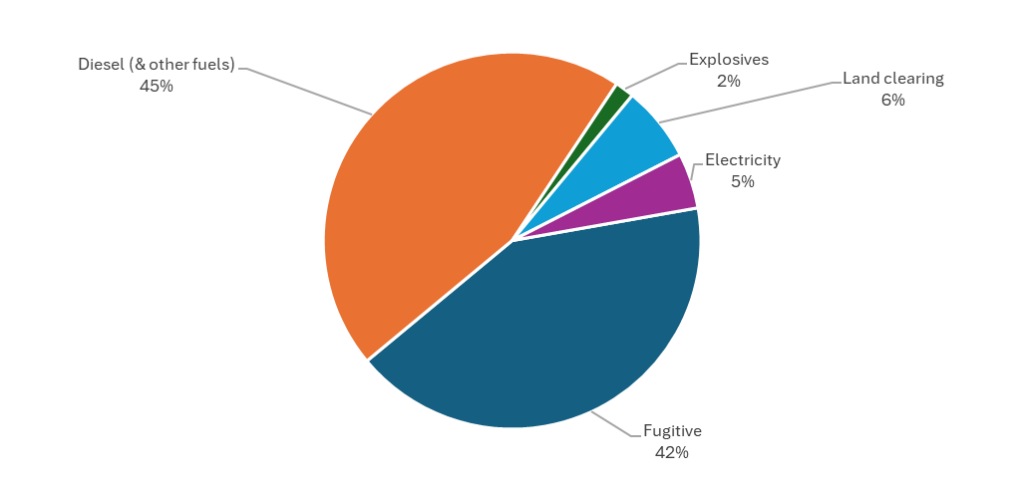
Period	Scenario	Scope 1 (Mt CO_2-e)	Scope 2 (Mt CO_2-e)	Scope 3 (Mt CO_2-e)
Annual Average*	Baseline Scenario	0.15	0.018	13.08
	Modification Scenario	0.22	0.013	17.20
	Modification Only Scenario	0.18	0.008	13.93
Total	Baseline Scenario	0.36	0.036	26.17
	Modification Scenario	1.81	0.103	137.58
	Modification Only Scenario	1.45	0.067	111.41

Source: TAS (2025).
* Excludes decommissioning phase

Mount Pleasant Operation Safeguard Mechanism Baseline

The Mount Pleasant Operation's Safeguard Mechanism baseline value may change over time in accordance with the provisions of the NGER Act and the applicable rules and regulations. Notwithstanding possible variation to the baseline value, it is anticipated that MACH's implementation of various mitigation measures to minimise the overall generation of greenhouse gas emissions from the Modification (Attachment B) would result in greenhouse gas emissions being maintained within any varied Safeguard Mechanism baseline emissions value. Alternatively, MACH would be required to retire ACCUs or SMCs for any exceedance of the baseline.

Discussion of the greenhouse gas emission intensity of the Modification for each scenario and details of the Mount Pleasant Operation's relative greenhouse gas contribution at a global, national and state level is provided in 3.5.



Source: TAS (2025).

Figure 7
Summary of Scope 1 and 2 Emissions for the Modification Scenario

3.4.1 Greenhouse Gas Emissions Intensity

Baseline Scenario

The estimated Scope 1 and 2 greenhouse gas emissions intensities for the Baseline Scenario are estimated to be approximately 0.019 and 0.0022 t CO_2-e / t ROM coal, respectively (Attachment A).

Modification Scenario

The estimated Scope 1 and 2 greenhouse gas emissions intensities for the Modified Mount Pleasant Operation Scenario are estimated to be approximately 0.021 and 0.0011 t CO_2-e / t ROM coal, respectively (Attachment A).

The increase in estimated Scope 1 emissions per tonne of ROM coal factor for the Modification Scenario compared to the Baseline Scenario is due to the increase in fugitive emissions and liquid fuels consumed in the later years of mining. Conversely the estimated Scope 2 emissions per tonne of ROM coal factor for the Modification Scenario reduces compared to the Baseline Scenario with the projected decarbonisation of the NSW electricity grid.

3.5 MODIFICATION ALIGNMENT WITH KEY EMISSION REDUCTION TARGETS

3.5.1 Scope 1 Emissions

National

Due to the historically low emissions intensity of production at the Mount Pleasant Operation, the existing EID for ROM coal is 0.0178 t CO2-e / t ROM (CER, 2025b). This ranks the Mount Pleasant Operation as having the 8th lowest emissions intensity among approximately 68 Australian coal mining facilities with published EIDs (Figure 8).

The emissions intensity at Mount Pleasant Operation is significantly lower than the industry default value of 0.0653 t CO2-e / t ROM, as specified under the Safeguard Rule.

Under the Modification Scenario, the Mount Pleasant Operation emissions intensity would remain well below the Safeguard Mechanism default ROM coal production variable (0.0653 t CO2-e / t ROM), and relative to other current Australian ROM coal EIDs, would rank approximately 10th lowest (excluding the existing Mount Pleasant Operation) out of approximately 68 facilities (based on historical data determinations) (Figure 8).

As described in Section 2, Australia's first NDC committed to achieve the national greenhouse gas target of 43% below 2005 levels by 2030, and Australia's second NDC has a greenhouse gas emissions reduction target of 62-70% below 2005 levels by 2035.

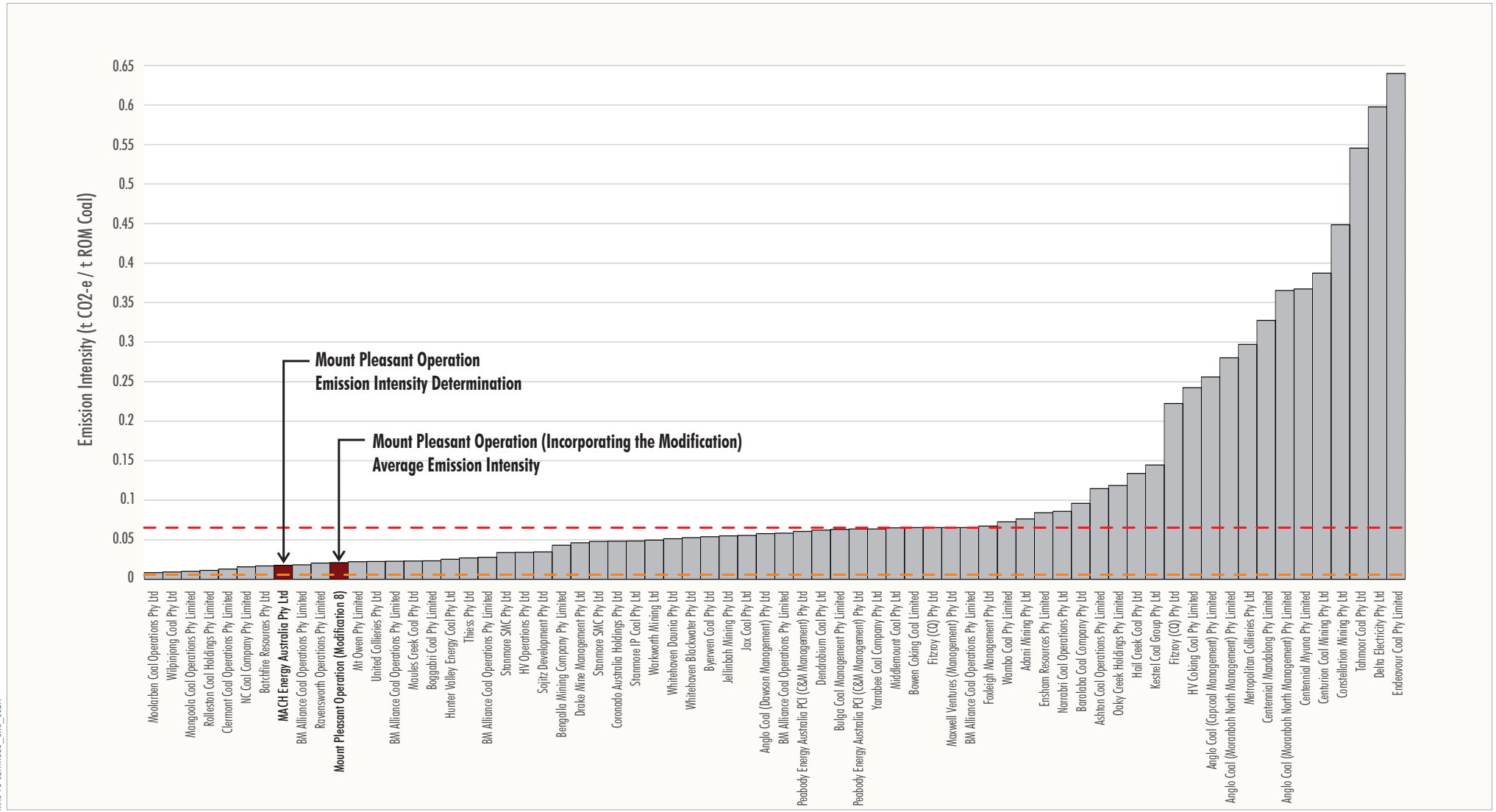
MACH notes that the CCA's recent advice to the Commonwealth Government on targets for the 2035 NDC (CCA, 2025) indicates that Safeguard Mechanism decline rates may be further tightened from 2030:

> *Australia's existing policies – anchored by national emissions reduction legislation, sectoral initiatives and funding programs – provide a strong platform for progress. But achieving an ambitious target, sharing the benefits fairly, and prospering in the process, will require an enhanced policy response. The settings in some key measures – such as the Safeguard Mechanism… need to be extended.*
> …
> *Extending the Safeguard Mechanism's decline rate out to 2035 could reduce emissions from industry and resources by almost a third. Importantly, the decline rate is additive— requiring facilities to reduce or offset more of their emissions each year*

Large facilities under the NGER Act therefore have declining emissions baselines to 2050, reflective of proportionately reducing net greenhouse gas emissions below 2005 levels of 43% by 2030, and potentially adjusted to reflect 62-70% by 2035 and net zero by 2050.

Due to the methodology used to calculate baseline emission intensity (i.e. the gradual transition from a site-specific factor to the full industry average) for the Mount Pleasant Operation, the facility baseline is projected to increase over the short term, including during the Modification. This initial rising baseline trend highlights the low emissions intensity of Mount Pleasant Operation compared to the industry average of 0.0653 t CO_2-e / t ROM coal.

Figure 9 illustrates that based on current MACH projections it is anticipated the Mount Pleasant Operation would generate some SMCs over the Modification life, based on the current Safeguard Mechanism baseline decline rate. Further discussion on estimated SMCs and ACCUs that are generated/required over the life of the Mount Pleasant Operation incorporating the Modification is provided in Section 3.6.



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LEGEND

- Safeguard Mechanism Default Safeguard Emission Intensity
- Safeguard Mechanism Best Practice Emission Intensity

Source: After CER (2025b); TAS (2025)

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National Coal Mine Emissions Intensity Determinations and Estimated Modification Scenario Emission Intensity

Figure 8

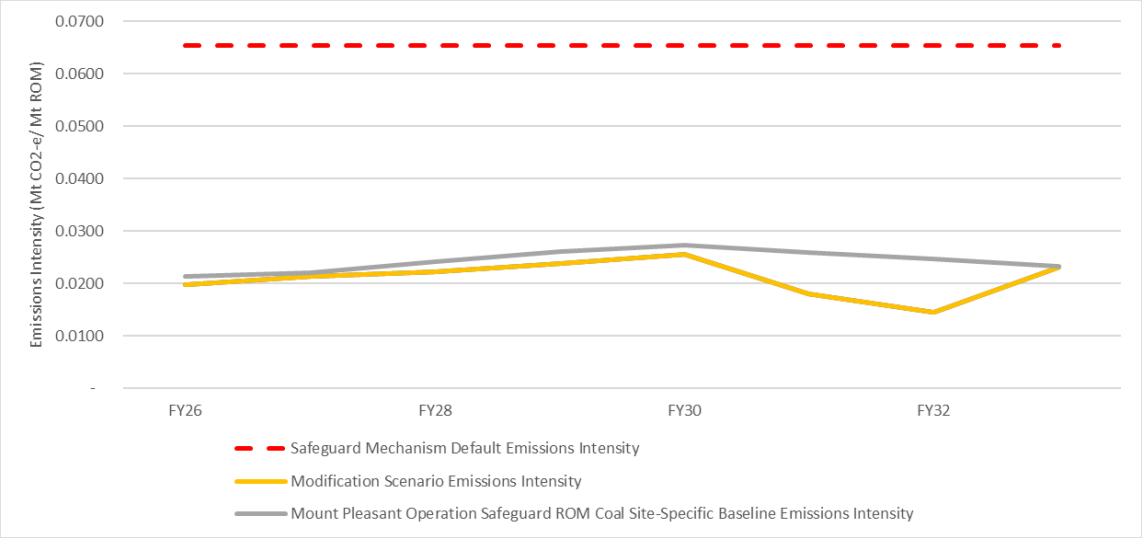


Figure 9
Mount Pleasant Operation Safeguard ROM Coal Site-Specific Baseline Emission Intensity and Estimated Modification Emissions Intensity

The proportion of Scope 1 emissions from the Modification and Modification Only Scenario compared to projected national emissions under the 'with additional measures' Scenario in 2030 is presented in Table 13. In 2030, the Modification Scenario would account for approximately 0.091% of total projected National Scope 1 emissions. As ROM coal production at the Mount Pleasant Operation is scheduled to cease coal production in 2032, the mine will not materially contribute to National Scope 1 emissions in 2035 (Table 13).

Table 13
Comparison of Modification to National Projections for 2030 and 2035

Year	National Projection (Mt CO_2-e)	Modification Scenario		Modification Only Scenario	
		Estimated Emissions (Mt CO_2-e)	Proportion of Emissions	Estimated Emissions (Mt CO_2-e)	Proportion of Emissions
Total Projected Australia Scope 1 Emissions for 'with additional measures' Scenario (Mt CO_2-e) (Commonwealth DCCEEW, 2025e)					
2030	351.4	0.320	0.091%	0.315	0.090%
2035	301.3	0.003	0.001%	0.003	0.001%

Source: TAS (2025).

State

NSW's net emission reduction targets as legislated in the Net Zero Future Act are as follows (Section 2.3):

- net 50% reduction on 2005 levels by 2030;
- net 70% reduction on 2005 levels by 2035; and
- net zero by 2050.

These targets can be represented graphically as shown on Figure 10. The Net Zero Future Act emission reduction targets established by NSW for 2030 and 2035 are more ambitious than the Commonwealth targets as set out in Australia's first NDC. However, when considered over the whole of the relevant periods between 2005 and 2030 (2% per annum), 2030 and 2035 (4% per annum) and 2035 and 2050 (2% per annum) the annual emission reduction rates are generally comparable to, or lower than, the reformed Safeguard Mechanism decline rates (Table 1).

It is also noted that Australia's second NDC has committed to an upper emission reduction target of 70% by 2035, which indicates increasing alignment between State and National emission reduction targets.

The relative performance of various NSW economic sectors excluding the significant influence of the land sector was assessed against the NSW interim emission reduction targets (Figure 11). This comparison reveals that the resources sector is the only emitting sector which had an average reported emission reduction rate of approximately 2% per annum, consistent with the average decline rate required to meet the NSW net zero target between 2005 and 2030.

The observed reduction in reported resource sector emissions between 2005 and 2022 occurred prior to the introduction of the reformed Safeguard Mechanism in 2023, which will act to drive further industry net emission reductions[5]. The Safeguard Mechanism decline rates have been derived to allow for future growth at both existing and new Safeguard facilities (Commonwealth DCCEEW, 2024b). Based on the above, the Safeguard Mechanism emission decline rates are more ambitious than the average rate of emissions decline that is required between 2005 and 2030 to achieve the NSW interim 2030 target of 50%.

The Scope 1 emissions intensity at Mount Pleasant Operation is significantly lower than the industry default value of 0.0653 t CO_2-e / t ROM, as specified under the Safeguard Rule. This low emissions intensity is attributable to both relatively low fugitive emissions and modest waste rock strip ratios characteristic of operations at the Mount Pleasant Operation.

Under the Modification Scenario the Mount Pleasant Operation emissions intensity would remain well below the Safeguard Mechanism default ROM coal production variable (0.0653 t CO_2-e / t ROM), and relative to other current NSW ROM coal EIDs, would rank approximately 5th lowest (excluding the existing Mount Pleasant Operation) out of approximately 26 facilities (based on historical data determinations) (Figure 12).

It is noted that the Modification would cease ROM coal production prior to 2035 (i.e. it would cease ROM coal production in 2032). Given that the Mount Pleasant Operation current and proposed emission intensities are well below the industry average, ongoing coal production from the Modification would make a meaningful contribution to NSW emission reduction targets relative to production at higher emission intensity mines (Figure 12).

MACH understands that emissions from the Mount Pleasant Operation operating at rates of up to 21 Mtpa of ROM coal under SSD 10418 out to 2048 are already accounted for in the projections by the NSW DCCEEW. The Modification production up to 12.5Mtpa ROM coal to 2032 under Development Consent DA 92/97 would therefore be well within the current NSW modelling projections.

The anticipated impact of the Safeguard Mechanism on NSW coal mining emissions was provided by recent projections prepared by the Climate and Atmospheric Science, Science and Insights Division of the NSW DCCEEW (NSW DCCEEW, 2025b). These projections, which were prepared in 2025, are reproduced on Figure 13.

[5] The first year of the reformed Safeguard Mechanism (FY 2024) resulted in net facility emissions dropping approximately 7% (lower than FY 2023) and preliminary FY 2025 data also indicates a further 6% net reduction (Commonwealth DCCEEW, 2025f).

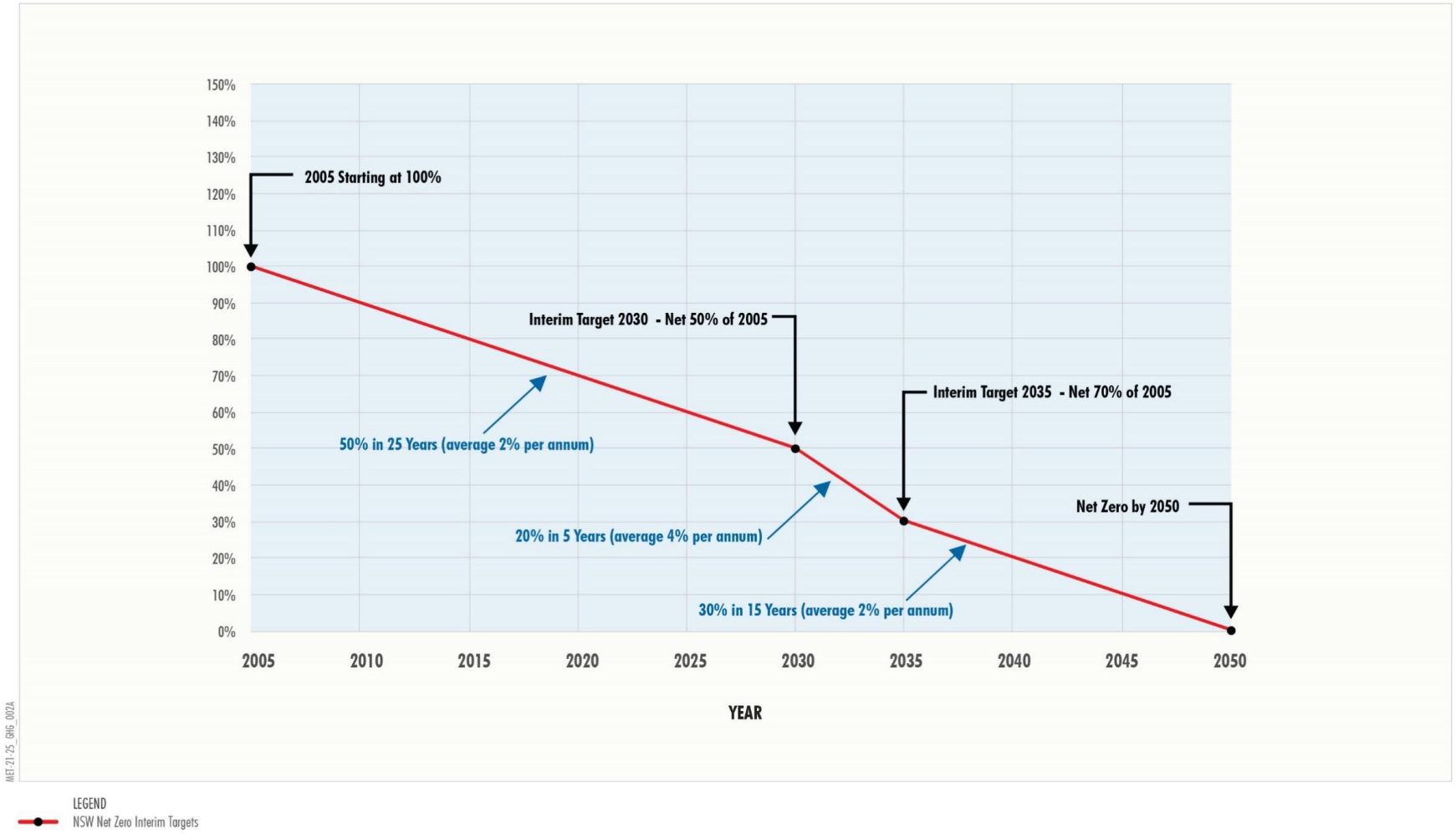
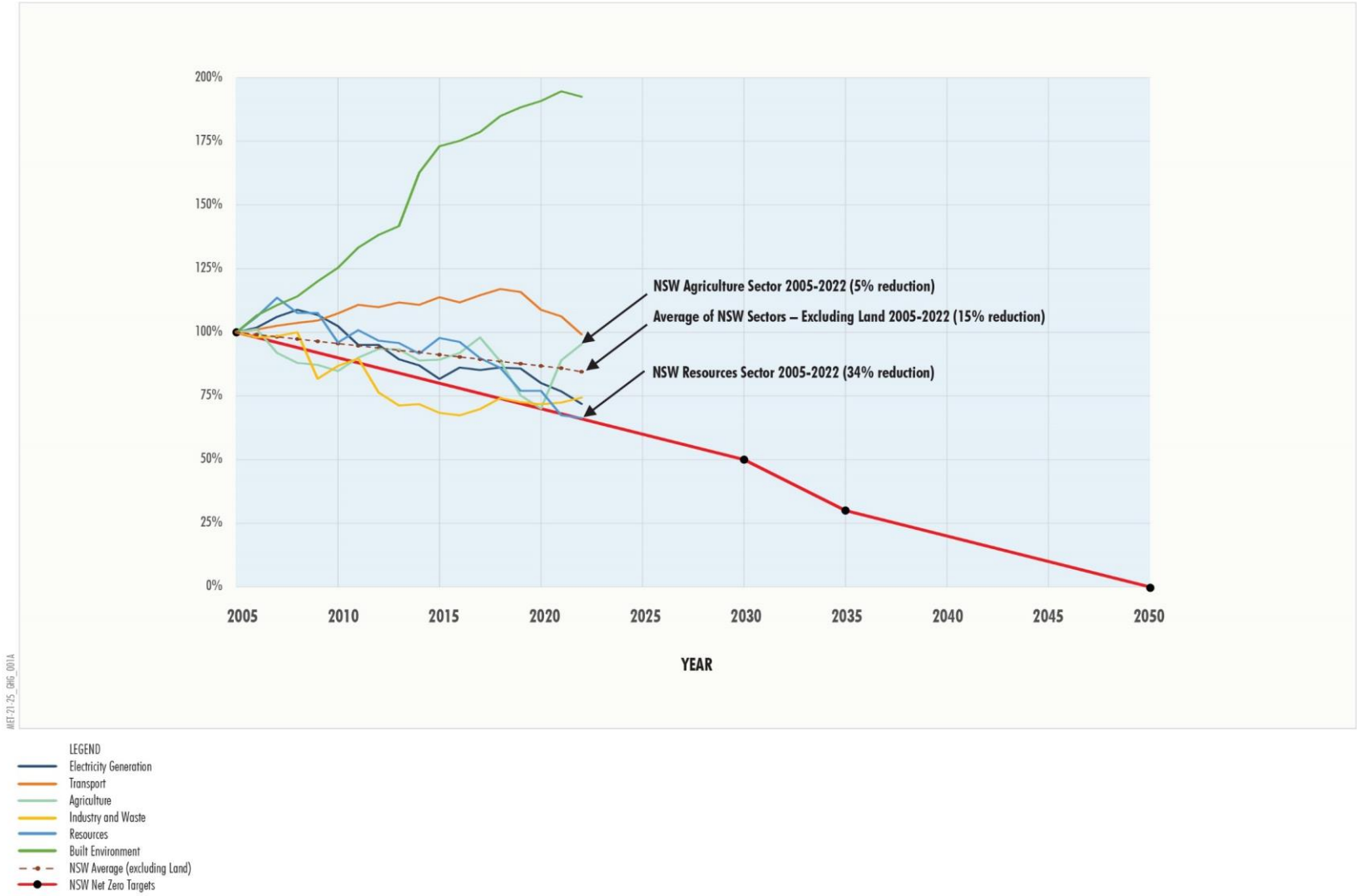
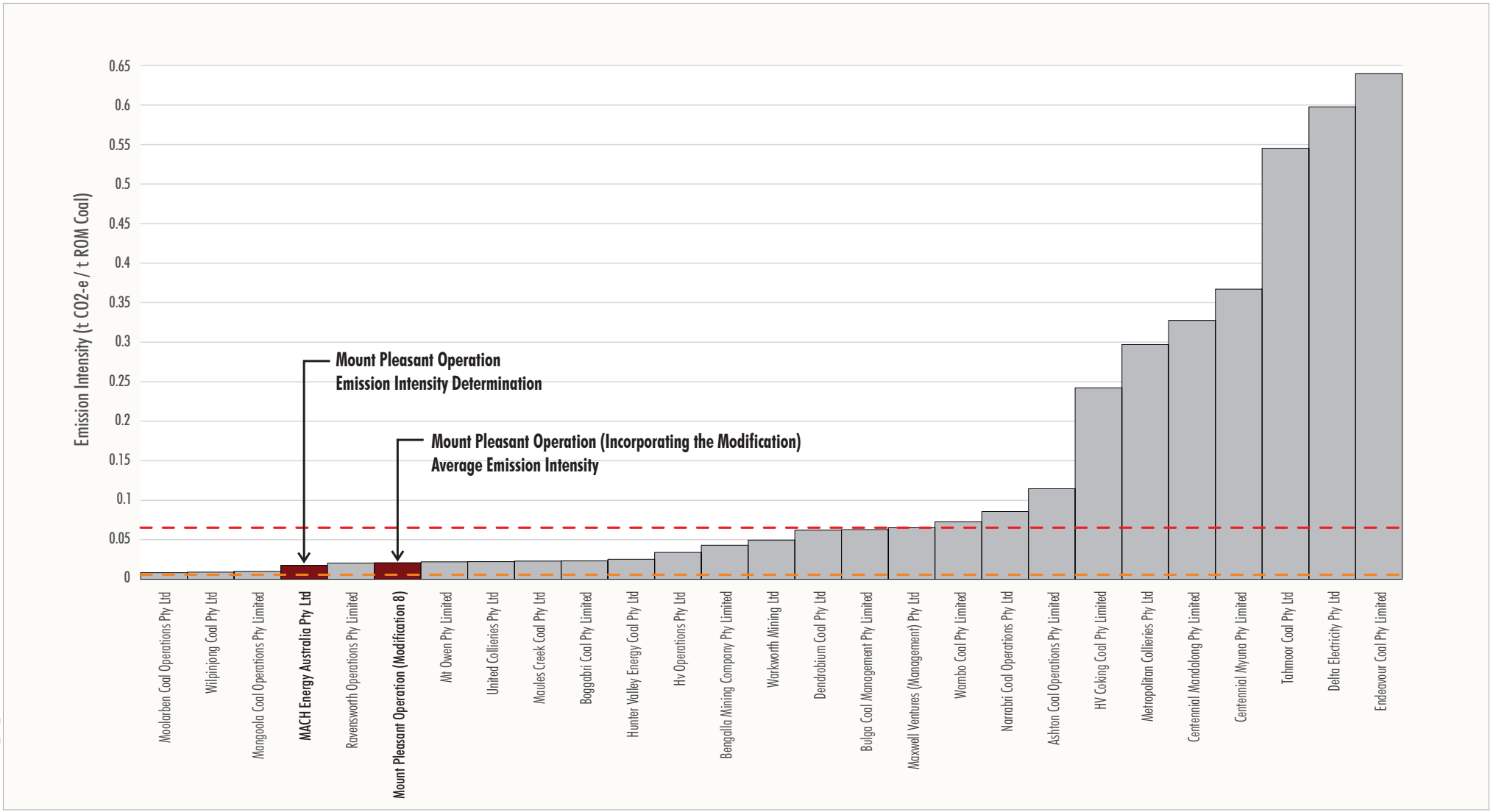


Figure 10
NSW Net Zero Interim Targets as Annual Average Net Reduction Rates



Source: NZC (2024).

Figure 11
NSW Sectoral Performance 2005-2022 (Excluding Land Sector) – Compared to NSW Net Zero Targets



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LEGEND

- Safeguard Mechanism Default Safeguard Emission Intensity
- Safeguard Mechanism Best Practice Emission Intensity

Source: After CER (2025b); TAS (2025)

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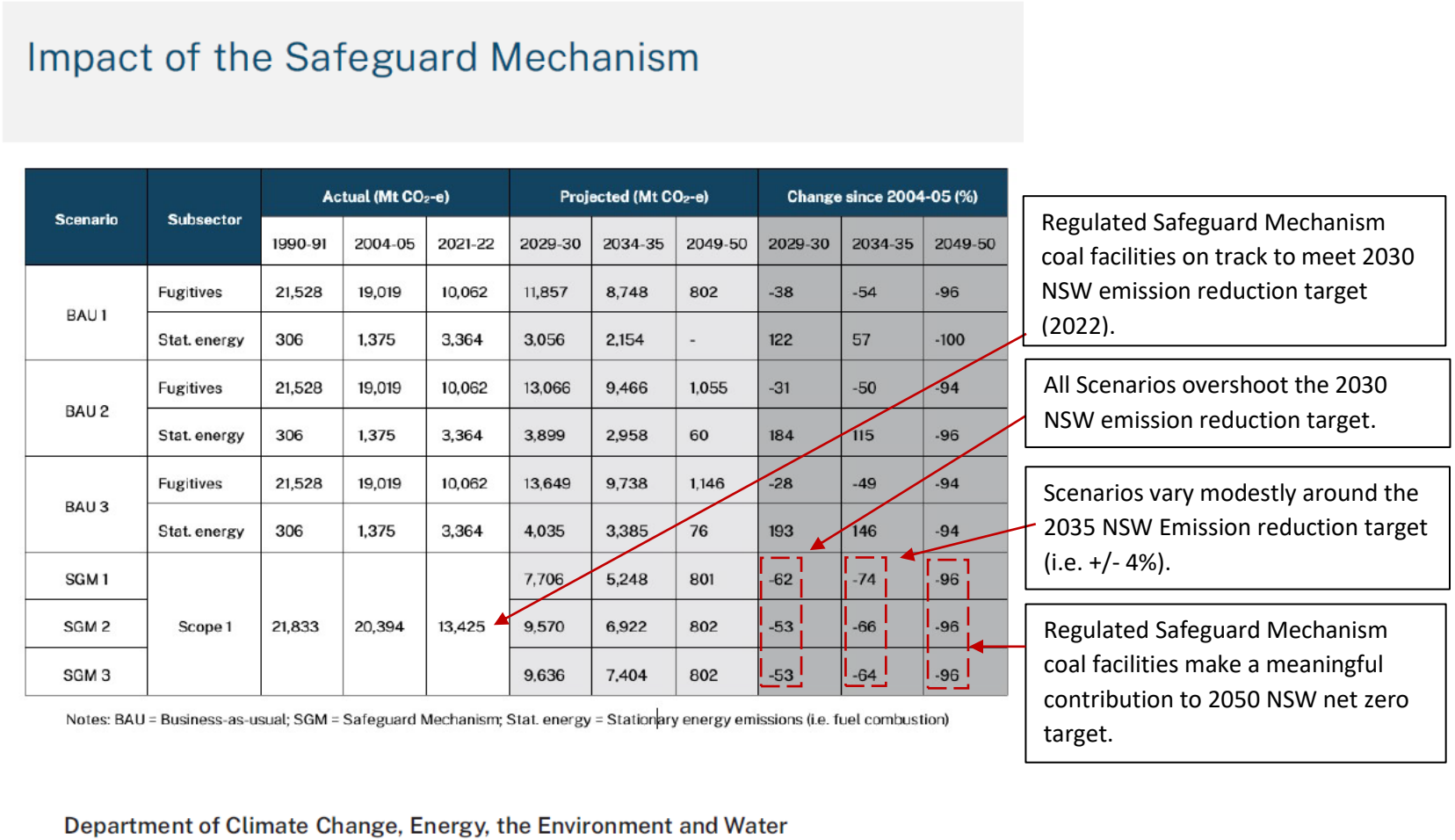
NSW Coal Mine Emissions Intensity Determinations
and Estimated Modification Scenario Emission Intensity

Figure 12



Impact of the Safeguard Mechanism

Scenario	Subsector	Actual (Mt CO_2-e)			Projected (Mt CO_2-e)			Change since 2004-05 (%)		
		1990-91	2004-05	2021-22	2029-30	2034-35	2049-50	2029-30	2034-35	2049-50
BAU 1	Fugitives	21,528	19,019	10,062	11,857	8,748	802	-38	-54	-96
	Stat. energy	306	1,375	3,364	3,056	2,154	-	122	57	-100
BAU 2	Fugitives	21,528	19,019	10,062	13,066	9,466	1,055	-31	-50	-94
	Stat. energy	306	1,375	3,364	3,899	2,958	60	184	115	-96
BAU 3	Fugitives	21,528	19,019	10,062	13,649	9,738	1,146	-28	-49	-94
	Stat. energy	306	1,375	3,364	4,035	3,385	76	193	146	-94
SGM 1	Scope 1	21,833	20,394	13,425	7,706	5,248	801	-62	-74	-96
SGM 2					9,570	6,922	802	-53	-66	-96
SGM 3					9,636	7,404	802	-53	-64	-96

Notes: BAU = Business-as-usual; SGM = Safeguard Mechanism; Stat. energy = Stationary energy emissions (i.e. fuel combustion)

Department of Climate Change, Energy, the Environment and Water

Regulated Safeguard Mechanism coal facilities on track to meet 2030 NSW emission reduction target (2022).

All Scenarios overshoot the 2030 NSW emission reduction target.

Scenarios vary modestly around the 2035 NSW Emission reduction target (i.e. +/- 4%).

Regulated Safeguard Mechanism coal facilities make a meaningful contribution to 2050 NSW net zero target.

Source: NSW DCCEEW (2025b).

Figure 13

Actual Scope 1 Emission Reduction from 2005-2022 and NSW DCCEEW Projected 2030, 2035 and 2050 Projections for Regulated Coal Facilities

The NSW DCCEEW (2025b) projections reproduced on Figure 13 indicate that the reformed Safeguard Mechanism would (as a percentage of 2005 emissions) likely result in net NSW coal mine emissions *overachieving* relative to the 2030 NSW emission reduction target and making very significant progress towards both the net 2035 and 2050 NSW reduction targets for coal mining in the State.

NSW DCCEEW projections indicate 2035 outcomes potentially varying between a modest underachievement or overachievement (approximately +/- 4%) of the NSW State targets with the reformed Safeguard Mechanism, depending upon the number of new coal developments that are approved (where Scenario 1 represents currently approved operations and Scenario 2 and Scenario 3 represent additional scenarios with mining proposals currently in the approvals process) (Figure 13).

In this context, the NSW Resources sector existing reported emissions reductions since 2005 (Figure 11), plus the Commonwealth Safeguard Reforms ratcheting down Safeguard facility baselines, is projected by NSW DCCEEW to result in the NSW coal sector largely achieving the NSW legislated economy wide net emission targets for 2030, 2035 and 2050.

MACH notes that the Commonwealth Safeguard Mechanism may also be amended over the period to 2050, and Safeguard Mechanism baseline decline rates could potentially be adjusted in response to the release of Australia's successive progressive NDCs that are required to be submitted every 5 years. On this basis, MACH is of the opinion that Mount Pleasant Operation's proposed compliance with the Commonwealth Safeguard Mechanism over the life of the Modification will result in the mine making a meaningful contribution to achieving the State's emission reduction target for 2030; as for the 2035 target, mining operations under the Modification would cease prior to that date.

The Mount Pleasant Operation, under the Modification Scenario, is projected to generate average annual Scope 1 and 2 greenhouse gas emissions of 0.24 Mt CO_2-e, while the Modification Only Scenario would result in an average 0.19 Mt CO_2-e per year (Attachment A). In the context of broader emissions profiles, these contributions are minor, representing 0.207% and 0.163% of New South Wales' total 2023 greenhouse gas emissions, respectively (Attachment A).

The Net Zero Emissions Dashboard provides NSW emissions projections for three scenarios:

- BAU scenario – this scenario accounts for major factors impacting NSW emissions including past state policies but excludes the impact of actions under the Net Zero Plan and related Government policies and programs.
- Program/policy abatement as originally designed scenario – this scenario takes the BAU scenario and adjusts the emissions trajectory to align with NSW emissions reduction targets of 50% below 2005 levels by 2030, 70% below 2005 levels by 2035 and Net Zero by 2050 as set out in the Net Zero Future Act.
- Program/policy abatement as currently tracking scenario ('Current Policy' scenario) – this scenario adjusts the as designed scenario to reflect increased uncertainties in expected emissions reductions under certain programs and policies.

The proportion of Scope 1 emissions from the Modification and Modification Only Scenario compared to projected NSW emissions under the 'Current Policy' scenario in 2030 is presented in Table 14. In this year, the Modification Scenario would account for approximately 0.385% of total projected Scope 1 emissions. It would contribute around 1.237% of fugitive emissions from NSW and approximately 0.990% of emissions from NSW stationary energy sources (Attachment A).

As ROM coal production at the Mount Pleasant Operation is scheduled to cease by 2032, the mine will not materially contribute to NSW Scope 1 emissions in 2035 as the site would be in the post-mining operations stage (i.e. decommissioning and rehabilitation / mine closure).

Table 14
Comparison of Modification to NSW Projections for 2030 and 2035

Year	NSW Projection (Mt CO_2-e)	Modification Scenario		Modification Only Scenario	
		Estimated Emissions (Mt CO_2-e)	Proportion of Emissions	Estimated Emissions (Mt CO_2-e)	Proportion of Emissions
Total Projected NSW Scope 1 Emissions for 'Current Policy' Scenario (Mt CO_2-e) (NSW DCCEEW, 2025c)					
2030	83.0	0.320	0.385%	0.315	0.380%
2035	57.4	0.003	0.005%	0.003	0.005%
Projected Scope 1 NSW Fugitive Emissions for Coal Mining for 'Current Policy' Scenario (Mt CO_2-e) (NSW DCCEEW, 2025c)					
2030	13.2	0.163	1.237%	0.163	1.237%
2035	7.6	-	-	-	-
Total Projected NSW Scope 1 Stationary Energy Emissions for 'Current Policy' Scenario (Mt CO_2-e) (NSW DCCEEW, 2025c)					
2030	13.1	0.130	0.990%	0.125	0.956%
2035	10.4	0.003	0.027%	0.003	0.027%

Source: TAS (2025).

3.5.2 Scope 2 Emissions

Indirect emissions arising from the consumption of electricity at the Mount Pleasant Operation have been estimated for each Modification scenario and are a small proportion of total Scope 1 and Scope 2 emissions (i.e. 5% of the Modification Scenario [Figure 7]).

Extensive National and State initiatives are already in place to progressively decarbonise the electricity generation sector's Scope 1 emissions which are reflected in the decreasing predicted Scope 2 emissions in the period to 2032 (Attachment A).

MACH will continue to consider reasonable and feasible opportunities to reduce its Scope 2 emissions at the Mount Pleasant Operation that may be complementary to its core business (Table 10).

3.5.3 Scope 3 Emissions

The estimated greenhouse gas emissions of the Modification can be considered in the context of global greenhouse gas emissions associated with anthropogenic sources.

Emissions from power generation (including the combustion of coal and gas), transport (e.g. automobiles, aeroplanes and ships), agriculture for food production and industrial processes all contribute to global emissions.

To gain an understanding of the Modification in the context of the global coal market and global greenhouse gas emissions, the Modification's annual coal production volume can be compared to the current global coal demand and the greenhouse gas emissions associated with third-party use of the Modification's product coal can be compared to total estimated anthropogenic greenhouse gas emissions. The International Energy Agency (IEA) estimates the global coal demand in 2023 to be approximately 8,688 Mt of coal (IEA, 2025). The proposed peak annual financial year production rate of the Modification of approximately 8.6 Mt of product coal represents approximately 0.099% of the current estimated annual global coal demand.

Comparison of the Modification Scenario annual average Scope 1 and 2 emissions during mining (approximately 0.24 Mt CO_2-e per annum on average [Table 12]) to total anthropogenic greenhouse gas emissions globally (excluding land use change) in 2024 of approximately 57,700 Mt CO_2-e (United Nations Environment Programme, 2025) indicates that the Scope 1, 2 emissions would contribute approximately 0.0004% in the context of cumulative global emissions.

Similarly, comparison of the Modification Scenario annual average Scope 1, 2 and 3 emissions during mining (approximately 17.43 Mt CO_2-e per annum on average [Table 12]) to the total anthropogenic greenhouse gas emissions globally (excluding land use change) in 2024 indicate the Modification would contribute approximately 0.03% in the context of cumulative global emissions.

Both of these calculations conservatively assume that the Modification Scenario coal will be wholly additive to the global amount of coal used over the relevant period, where as there is at least a possibility, if not a probability, that any non-supply of coal from a given source may be substituted, in whole or in part, by other coal suppliers in the market serving the international demand for coal.

3.6 MODIFICATION NET EMISSION GOALS

Consistent with MACH's adopted Greenhouse Gas Policy (Section 2.4), the adopted net emission goals for the Modification are reflective of predicted Modification net emission reduction targets under the Commonwealth Safeguard Mechanism.

Compliance with the Commonwealth Safeguard Mechanism Safeguard emission reduction decline rates would result in the Mount Pleasant Operation making a meaningful contribution to the emissions reduction objectives of the State (Section 3.5).

The Safeguard Mechanism is an emissions-intensity based emission reduction system (i.e. fluctuations in annual production at any individual Facility also alter the baseline for that Safeguard facility), whereas the Guide requires a Facility to present forward-looking numerical emission reduction targets.

Numerical net emission targets consistent with Safeguard Mechanism obligations are presented below. However, it is noted that actual Safeguard Mechanism obligations would vary with production and therefore these targets are only indicative. Net Scope 1 emission reduction goals for the Modification based on this methodology are shown graphically as Figure 14 and tabulated in Table 15.

MACH would continue to meet its annual compliance obligations under the Safeguard Mechanism by retiring ACCUs or SMCs for exceedances in any given year consistent with CER requirements. Offsets are discussed further in Section 3.7.

Table 15
Indicative Modification Annual Scope 1 Net Emissions and Emissions Intensity Target

Financial Year	ROM Coal (t)	Anticipated Annual Scope 1 Gross Emissions (t CO_2-e)	Anticipated Annual Scope 1 Gross Emission Intensity (t CO_2-e/ t ROM)	Annual Net Emission Intensity Safeguard Forecast (t CO_2-e/ t ROM)	Anticipated Annual Net Safeguard Baseline Forecast (t CO_2-e)
FY2026	12,500,000	246,767	0.020	0.021	265,763
FY2027	12,500,000	267,410	0.021	0.022	274,365
FY2028	12,500,000	277,599	0.022	0.024	302,472
FY2029	12,500,000	297,036	0.024	0.026	324,760
FY2030	12,500,000	319,553	0.026	0.027	341,229
FY2031	12,500,000	223,959	0.018	0.026	324,168
FY2032	7,910,426	114,056	0.014	0.025	194,347
FY2033	1,981,178	45,679	0.023	0.023	45,970

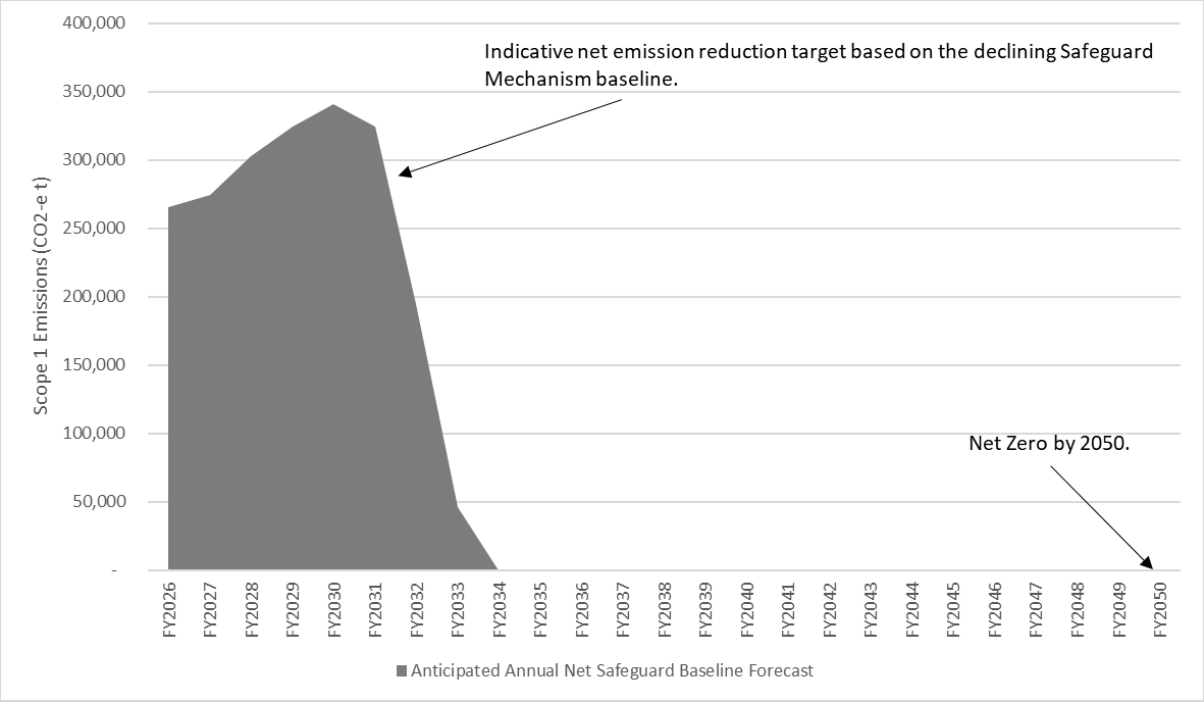


Figure 14
Mount Pleasant Operation Indicative Net Scope 1 Emission Targets (ROM Coal Production)

3.7 APPLICATION OF GREENHOUSE GAS OFFSETS

Table 16 provides a conservative estimate of the potential carbon credit or carbon offset requirements of the Mount Pleasant Operation (incorporating the Modification) in the absence of any further reasonable and feasible emission reductions being adopted for the Mount Pleasant Operation.

While this initial estimate of Safeguard Mechanism offset status is likely to be conservative (i.e. as it does not incorporate any allowance for the anticipated development of a low-carbon fuel production industry in Australia [Commonwealth DCCEEW 2025c], the implementation of any hybrid or zero-emission plant and equipment, or any fugitive emissions mitigation), this allows the presentation of a maximum-case scenario for anticipated carbon offset requirements.

Over the life of the Mount Pleasant Operation, this estimate indicates generation of approximately 280,000 t of SMCs. Under the Modification it is anticipated that no offset liabilities (e.g. requiring the retirement of ACCUs) would be incurred over the life of the mine (Table 16).

Table 16
Annual Modification ACCU/SMC Predictions in the Absence of Additional Reasonable and Feasible Measures

Financial Year	Generated Carbon Liabilities (t)	Generated SMCs (t)
FY2026	-	18,996
FY2027	-	6,955
FY2028	-	24,873
FY2029	-	27,724
FY2030	-	21,676
FY2031	-	100,208
FY2032	-	80,292
FY2033	-	292
Total	**-**	**281,016**

3.8 EMISSIONS DATA MANAGEMENT

MACH is required to maintain and report greenhouse gas emission in accordance with the requirements of the Commonwealth NGERs Act, which is based on Financial Year reporting. MACH would continue to collect, collate and store data on greenhouse gas emissions consistent with the NGERs Act.

Where practical, in order to avoid unnecessary duplication MACH would also utilise NGERs data to satisfy reporting requirements under NSW Legislation. For example, where Calendar Year reporting is required (e.g. Annual Reviews required under the EP&A Act) NGERs monthly data records will be used to assemble annual Calendar Year greenhouse gas emission estimates.

3.9 ADAPTIVE MANAGEMENT

Condition 23 of Schedule 3 of Development Consent DA 92/97 requires the development of an AQGHGMP. The current AQGHGMP was approved by DPHI in November 2024.

Should the Modification be approved, MACH anticipates that the Development Consent conditions for DA 92/97 would be updated to reflect contemporary NSW EPA guidance on the content of a CCMAP, including:

- measures to avoid and reduce Mount Pleasant Operation greenhouse gas emissions applying the NSW EPA's mitigation hierarchy (avoid, reduce, substitute and offset);
- strategies to offset excess greenhouse gas emissions (as required);
- description of the monitoring and reporting on greenhouse gas emissions performance, including performance benchmarking and NGERs reporting obligations; and
- a timetable for periodic review of the CCMAP and associated proposed mitigation, reporting and the overarching greenhouse gas management goals of MACH.

MACH anticipates developing a new CCMAP in consultation with the NSW EPA following approval of the Modification.

4 POTENTIAL IMPACTS OF CLIMATE CHANGE

The Mount Pleasant Operation would continue to incorporate reasonable and feasible greenhouse gas mitigation measures (Section 3.3) and would make a relatively minor contribution to Australian and NSW greenhouse gas inventories (Section 3.5). On this basis, approval of the Modification is expected to have no material impact on State and National greenhouse gas reduction targets, while delivering significant economic and employment benefits to NSW.

Consideration of the potential implications of climate change involves complex interactions between climatic, biophysical, social, economic, institutional and technological processes.

Although scientific understanding of climate change has improved, projections are still subject to a wide range of uncertainties such as (Commonwealth Scientific and Industrial Research Organisation [CSIRO] and Bureau of Meteorology [BoM], 2015):

> *…scenario uncertainty, due to the uncertain future emissions and concentrations of greenhouse gases and aerosols; response uncertainty, resulting from limitations in our understanding of the climate system and its representation in climate models; and natural variability, the uncertainty stemming from unperturbed variability in the climate system.*

Given that the Modification would cease ROM coal production prior to 2035, potential climate change impacts are only considered within the 'near term' (i.e. up to 2050 or earlier) as the Modification would not materially contribute to global emissions past this term.

4.1 CLIMATE CHANGE PROJECTIONS GLOBALLY

The IPCC has completed a number of comprehensive assessments of potential climate change, which include projections for the 'near-term' (for the period 2021 to 2040). 'Near-term' projections from the *Working Group 1 Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (IPCC, 2021) indicate global mean surface temperatures are likely to increase by 0.4 to 1.1°C based on the range of all climate scenarios and relative to the reference period of 1995 to 2014.

Climate projections suggest that many changes in the climate system are likely to become larger in direct relation to increasing incremental global warming, with a warmer climate likely to intensify very wet and very dry weather and climatic events and seasons, noting the frequency is dependent on location (IPCC, 2021).

Extreme climatic events (e.g. hot extremes [including heatwaves], heavy rainfall events and droughts) are projected to be more frequent if global warming reaches 1.5°C above pre-industrial levels, and even more frequent if global temperatures are raised to 2°C above pre-industrial levels for some regions (IPCC, 2021).

Climate Change 2022: Impacts, Adaptation and Vulnerability – key potential impacts

The IPCC (2022) states that if global warming reaches 1.5°C above pre-industrial levels in the near-term, unavoidable increases in multiple climate hazards would occur and present multiple risks to ecosystems and humans including increased frequency, severity and duration of extreme weather events.

Beyond 2040 and depending on the level of global warming, climate change will lead to numerous risks to natural and human systems, with the magnitude and rate of this strongly dependent on near-term mitigation and adaptation actions (IPCC, 2022). Multiple climate hazards are also projected to occur simultaneously, and multiple climatic and non-climatic risks will interact, resulting in compounding overall risk and risks cascading across sectors and regions (IPCC, 2022).

4.2 CLIMATE CHANGE PROJECTIONS FOR AUSTRALIA

Climate Change in Australia

Dowdy et al. (2015), as part of the *Climate Change in Australia* study, present regionally focused climate projections for Australia in the 'near-term' period (2020 to 2039), based on global climate model simulations and emissions scenarios developed by the IPCC. The Mount Pleasant Operation is located within the study's East Coast South Sub-cluster.

Table 17 presents three Representative Concentration Pathways (RCPs) projections for annual average rainfall in the East Coast South sub-cluster of Eastern Australia for the 2020-2039 scenario (relative to 1995). Rainfall projections for the East Coast South sub-cluster indicate a modest overall decline in annual average rainfall across all emissions scenarios for the 2020-2039 scenario, ranging from -1% to -3% (Table 17).

Table 17
Climate Change Projections for the East Coast South Sub-cluster, Eastern Australia – Percentage Change in Rainfall (relative to 1995)

Period	2020-2039		
	RCP2.6	RCP4.5	RCP8.5
Summer	+1%	+1%	+2%
Autumn	-2%	-3%	-3%
Winter	-2%	-5%	-8%
Spring	-3%	-1%	-3%
Annual	-2%	-3%	-1%

Source: After Dowdy et al. (2015).
RCP2.6: Emissions scenario assuming strong mitigation measures that rapidly decline CO_2 concentration at about 420 parts per million (ppm) by 2100.
RSP4.5: Emissions scenario assuming a reduction in emissions that stabilises CO_2 concentration at about 540 ppm by 2100.
RSP8.5: Emissions scenario assuming an increase in emissions leading to a CO_2 concentration of about 940 ppm by 2100.

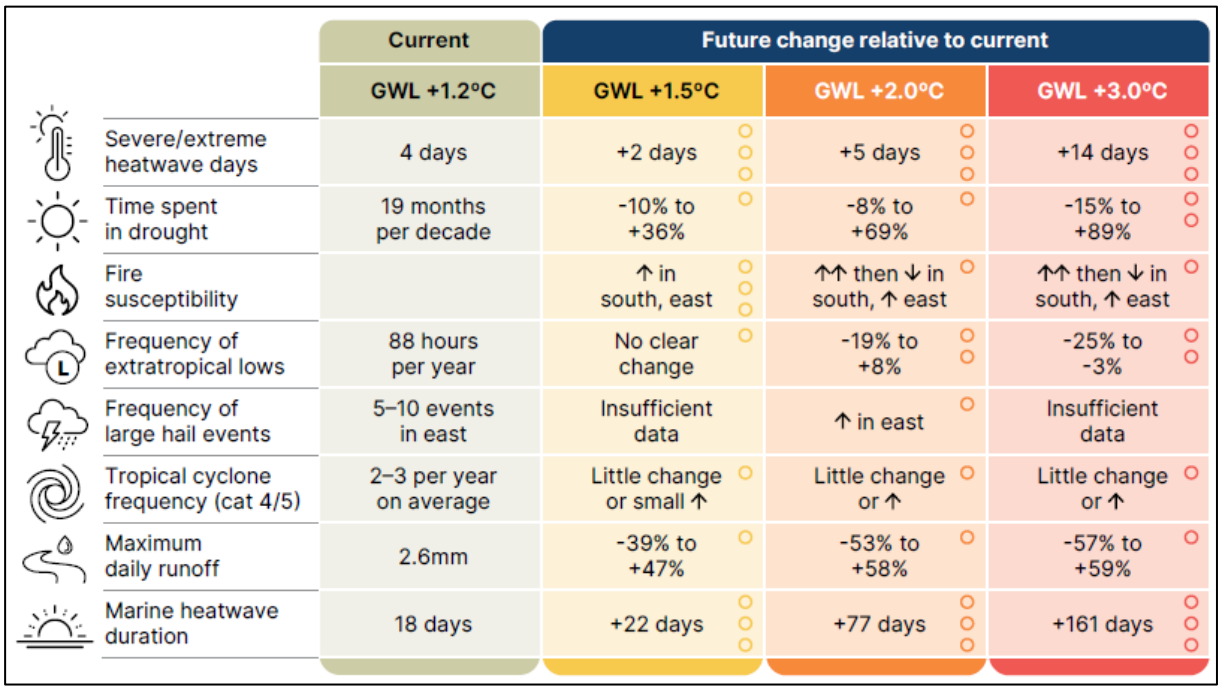
Other key projections for 2020–2039 from *Climate Change in Australia* include a rise in average temperatures of around 0.4 to 1.3°C above 1995 levels, with only small differences between emission scenarios (Dowdy et al., 2015). Little change is expected in average wind speeds, solar radiation, or relative humidity across all scenarios for 2020–2039 (Dowdy *et al*., 2015).

Australia's National Climate Risk Assessment

Australia's National Climate Risk Assessment (Australian Climate Service, 2025) outlines the current and projected climate risks facing Australia.

Unlike traditional climate assessments that examine a range of future emissions scenarios such as the Shared Socioeconomic Pathways (SSPs) or RCPs, this assessment evaluates risks based on specific global warming levels, identifying the likely impacts if those temperature thresholds are reached. Global warming levels assessed include the *Sixth Assessment Report* (IPCC, 2021) estimate of current global warming (approximately +1.2°C), and other potential levels, +1.5°C, +2.0°C and +3.0°C.

Figure 15 (reproduced from Figure 6 of *Australia's National Climate Risk Assessment* [Australian Climate Service, 2025]) summarises how key climate hazards across Australia are projected to change under varying global warming levels. Confidence ratings are also provided for each projection, where three circles indicate high confidence, and one circle indicates low confidence. It should be noted that regional climate projections, discussed below, present more varied predictions than national averages due to their modelling at regional scales (Australian Climate Service, 2025).



	Current	Future change relative to current		
	GWL +1.2°C	GWL +1.5°C	GWL +2.0°C	GWL +3.0°C
Severe/extreme heatwave days	4 days	+2 days ○○○	+5 days ○○○	+14 days ○○○
Time spent in drought	19 months per decade	-10% to +36% ○	-8% to +69% ○	-15% to +89% ○○
Fire susceptibility		↑ in south, east ○○○	↑↑ then ↓ in south, ↑ east ○	↑↑ then ↓ in south, ↑ east ○
Frequency of extratropical lows	88 hours per year	No clear change ○	-19% to +8% ○○	-25% to -3% ○○
Frequency of large hail events	5–10 events in east	Insufficient data	↑ in east ○	Insufficient data
Tropical cyclone frequency (cat 4/5)	2–3 per year on average	Little change or small ↑ ○	Little change or ↑ ○	Little change or ↑ ○
Maximum daily runoff	2.6mm	-39% to +47% ○	-53% to +58% ○	-57% to +59% ○
Marine heatwave duration	18 days	+22 days ○○○	+77 days ○○○	+161 days ○○○

Source: Australian Climate Service (2025).

Figure 15
Summary Of Hazards Projected to Change Across Australia for Each Global Warming Level Compared with the Current Climate

4.3 CLIMATE CHANGE PROJECTIONS FOR NEW SOUTH WALES

The Mount Pleasant Operation is located within the Hunter Region (which covers approximately 26,100 square kilometres) of the AdaptNSW Project domain of the Interactive Climate Change Projections Map. AdaptNSW projections are based on the NSW and Australian Regional Climate Modelling 2.0 (NARCliM2.0) data which provides projections using the SSPs from the *Sixth Assessment Report* (IPCC, 2021).

A summary of the basis of the IPCC SSP projections adopted for NARCliM2.0 is provided below:

- SSP1-2.6 (low-emissions) – represents a scenario of net-zero global emissions from 2050 and global warming below 2.0 degrees Celsius (°C) above 1850-1900 levels.
- SSP3-7.0 (high-emissions) – represents a scenario where no additional climate policies are adopted and global emissions in 2100 are roughly double current levels.

The IPCC SSP projections adopted for NARCliM2.0 are not related to any specific development (including the Modification), instead they reflect future global greenhouse gas emissions and temperature scenarios. All emissions scenarios developed by the IPCC include coal as part of the global primary energy mix during the life of the Project (i.e. to 2035) and continuing through to at least 2050.

Changes to annual rainfall are predicted to vary across the Hunter Region, with average rainfall projected to decrease annually with significant decrease projected during winter (AdaptNSW, 2025) (Table 18).

Table 18
Climate Change Projections for the Hunter Region, NSW – Percentage Change in Rainfall (Relative to the 1990-2009 Baseline)

Period	2020-2039	
	SSP1-2.6	SSP3-7.0
Summer	-4.7%	+6.0%
Autumn	-1.7%	+7.3%
Winter	-13.0%	-16.5%
Spring	-6.4%	+0.7%
Annual	-5.8%	-3.1%

Source: AdaptNSW (2025).

In addition to the projected changes in rainfall discussed above, Table 19 summarises anticipated variability of other near-term climate change parameters for the Hunter Region. These projections indicate that the region is expected to experience a modest increase in average temperatures and more frequent hot days, along with a reduction in cold nights and a slight increase in severe fire weather days.

Table 19
Climate Change Projections for the Hunter Region, NSW – Various Climate Parameters (Relative to the 1990-2009 Baseline)

Climate Change Projection Parameters	2020-2039	
	SSP1-2.6	SSP3-7.0
Mean Annual Temperature	+0.8°C	+0.8°C
Number of Hot Days (above 35°C) per Year	+4.1	+3.9
Number of Cold Nights (below 2°C) per Year	-5.0	-5.2
Number of Severe Fire Weather Days per Year	+0.4	+0.5

Source: AdaptNSW (2025).

It should be noted that the projections presented in Tables 18 and 19 represent the NARCliM2.0 model ensemble average across the 20-year period snapshot. The NARCliM2.0 model ensemble is made up of a combination of five global climate models and two regional climate models, giving a total of ten model combinations in total.

The potential variability in climate change projection parameters can be significant between each model. For example, the mean annual temperature in the Hunter region under SSP1-2.6 is anticipated to be +0.8°C (relative to the 1990-2009 baseline) (Table 19), while the potential maximum and minimum ranges from +1.2°C (+50% of the mean) to +0.4°C (-50% of the mean) (AdaptNSW, 2025).

This variation is notable given that the projections represent a near-term period (2020–2039), where modelling uncertainty is generally expected to be lower compared to longer-term horizons. Despite this, the range between model outputs is high, highlighting the inherent complexity of simulating regional climate processes and interactions.

Over the life of the Mount Pleasant Operation, it is anticipated that such climatic modelling for Australia, NSW and various regions will be updated many times as international greenhouse gas emissions projections are adjusted based on the degree of uptake of less carbon-intensive technology and as climate science continues to evolve.

4.4 CLIMATE CHANGE PROJECTIONS FOR THE LOCALITY

NARCliM2.0 provides climate projections with 4 km grid cells for all of NSW, ACT, Victoria and parts of South Australia, Queensland and the Northern Territory (AdaptNSW, 2024).

Climate projections at 4 km resolution are better able to capture the influence of local topography on atmospheric process that influence storms and extreme rainfall (AdaptNSW, 2024).

The additional available spatial resolution allows potential climate change effects on the locality to be refined from the broader Hunter Region (Section 4.3) to the immediate location of the Mount Pleasant Operation. The locality has been defined as the 8 NARCliM2.0 grid cells which encompass the Mount Pleasant Operation (approximately 32 km^2).

Table 20 presents the AdaptNSW climate change projections for the 2020–2039 period (relative to the 1990-2009 baseline) under both the low-emissions and high-emissions scenarios for the locality. To provide a conservative estimate, the climate projections presented in Table 20 for the locality are the maximum mean values across the selected grid cells. It is noted, however, that these are central predicted values and there is a range of modelled outcomes under the 10 models adopted by NARCliM2.0.

Table 20
Climate Change Projections for the Locality – Various Climate Parameters (Relative to the 1990-2009 Baseline)

Climate Change Projection Parameters	2020-2039	
	SSP1-2.6	SSP3-7.0
Mean Annual Temperature	+0.85°C	+0.85°C
Average Annual Rainfall	-6.24%	-3.41%
Number of Hot Days (above 35°C) per Year	+8.43	+8.91
Number of Cold Nights (below 2°C) per Year	-7.60	-7.61
Number of Severe Fire Weather Days per Year	+1.08	+1.31

Source: AdaptNSW (2025).

The IPCC SSP projections adopted for NARCliM2.0 are not related to any specific development (including the Modification), instead they reflect future global greenhouse gas emissions and temperature scenarios. All emissions scenarios developed by the IPCC include coal as part of the global primary energy mix during the life of the Modification (i.e. to 2032) and continuing through to at least 2050.

The IPCC has, however, found that there is a near linear relationship between cumulative emissions and global warming and each 1,000 gigatonnes of cumulative CO_2 emissions is likely to cause a best estimate of 0.45°C increase in global surface temperature (IPCC, 2021).

The potential contributions of the Modification greenhouse gas emissions to national and international emissions are discussed in Section 3.5 and below in Section 4.5.

4.5 POTENTIAL IMPACTS OF THE MODIFICATION

Biological diversity, or 'biodiversity', is considered to be the number, relative abundance, and genetic diversity of organisms from all habitats (including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are a part) and includes diversity within species and between species as well as diversity of ecosystems (Lindenmayer and Burgman, 2005).

Many natural ecosystems are considered to be vulnerable to climate change. Patterns of temperature and rainfall are key factors affecting the distribution and abundance of species (Preston and Jones, 2006). Projected changes in climate will have diverse ecological implications. Habitat for some species will expand, contract and/or shift with the changing climate, resulting in habitat losses or gains, which could prove challenging, particularly for species that are threatened.

Anthropogenic Climate Change is listed as a key threatening process under the NSW *Biodiversity Conservation Act 2016*, and *Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases* is listed as a key threatening process under the EPBC Act.

Subject to the efficacy of state, national and international greenhouse gas abatement measures, all sources of greenhouse gas emissions will contribute in some way towards the potential global, national, state, regional and local effects of climate change (i.e. both ecosystem and socio-economic effects) if they are additive. As noted in Section 3.5, Modification greenhouse gas emissions have been assumed to be additive for the purposes of this Greenhouse Gas Assessment, where as there is at least a possibility, if not a probability, that any non-supply of coal from a given source may be substituted, in whole or in part, by other coal suppliers in the market serving the international demand for coal.

4.5.1 Modification Direct and Indirect Emissions

Modification Contribution to Global Temperature Change

The IPCC reports that every 1,000 gigatonnes of cumulative global CO_2-e emissions are likely to increase global mean surface temperature by between 0.27 and 0.63 °C, with a central estimate of 0.45°C (IPCC, 2021). These values describe how the global climate system responds to large scale cumulative global emissions. They are not designed to quantify localised effects or to attribute temperature change to any single emissions source.

Nevertheless, an indicative "incremental temperature contribution" has been calculated by applying the IPCC's best-estimate (0.45 °C per 1,000 Gt CO_2-e) to the estimated lifetime Scope 1, Scope 2 and Scope 3 emissions associated with the Modification. This approach assumes conservatively that all Modification emissions are truly additive at the global level, even though this is unlikely in practice. In particular, global coal demand is largely determined by importing countries' energy systems and policy settings; consequently, a corresponding volume of coal would likely continue to be produced from other sources and consumed globally in the absence of this Modification.

This is supported by the fact that, following reductions in Russian coal exports in 2022, exports from other countries increased to meet the supply shortfall associated with existing demand, with the result that overall global coal demand increased by 1.2% (IEA, 2022). Therefore, it is reasonable to assume that, if the Modification does not proceed, the market would respond through an increase in supply from elsewhere to meet global energy demands.

However, based on a conservative approach that assumes that the Modification's emissions are wholly additive, the Modification's total emissions equate to an incremental global temperature influence measured at the scale of millionths (Scope 1 and 2) or ten-thousandths of a °C (Scope 1, 2 and 3). The results are summarised in Table 21.

Table 21
Indicative Incremental Modification Scenario Contribution to Global Surface Temperature Change – Assuming All Emissions Are Additive

Basis of Incremental Modification Contribution	Global Surface Temperature Change (°C)	Scale Descriptor
Total Scope 1 and 2 Emissions	0.000000861	0.86 millionths of a degree
Total Scope 1, 2 and 3 Emissions	0.0000628	0.63 ten thousandths of a degree

Source: IPC (2021); TAS (2025).

There is limited evidence to demonstrate that the Modification would cause any net increase in global greenhouse gas emissions or global average temperature as:

- All emissions scenarios developed by the IPCC (and considered in NARCliM2.0 modelling) include coal as part of the global primary energy mix during the life of the Modification (i.e. to 2032) and continuing through to at least 2050.
- In 2024 estimated global production and consumption of coal was approximately 8,688 Mt of coal (IEA, 2025), whereas the Modification would produce an annual financial year peak of approximately 8.6 Mt of product coal.
- In this context, if the Modification does not proceed, it is likely that customers of the Mount Pleasant Operation would purchase an equivalent amount of coal from an alternate supplier to meet their demand (i.e. there would be no associated reduction in global combustion of coal).

Even if the Modification's estimated greenhouse emissions were considered to result in an incremental *increase* in global emissions, this contribution would be very small relative to current climate change projections, meaning the Modification's contribution to temperature change would also be very small. As temperature change is used as the basis for determining likely changes in other aspects of the climate (e.g. rainfall), it follows that the Modification's incremental contribution to change in these other aspects would also be very small.

As evidenced in Table 21, potential change in global temperature that could conservatively be attributed to the Modification (i.e. assuming all Modification Scope 1, 2 and 3 emissions were in practice globally additive) would be multiple orders of magnitude below the current mean annual average temperature outcome projected under the 10 models adopted for the NARCliM2.0 'low emissions' (SSP1-2.6) scenario for the period 2020-2039 for the locality of the Mount Pleasant Operation. When the Modification conservative Scope 1, 2 and 3 incremental global temperature change (Table 21) is considered relative to the mean (+0.85°C) projected mean temperature outcome for the locality for the period 2020-2039 (Table 20), the difference in magnitude is so great that no meaningful additional environmental implications could be considered to arise at the locality level.

It is noted that the vast bulk of the estimated Scope 1, 2 and 3 emissions of the Modification would be Scope 3 emissions associated with coal product combustion, which would be the direct (i.e. Scope 1) emissions of the customers that use Mount Pleasant Operation coal in electricity generation or other industrial processes in customer countries. The context of these indirect combustion emissions is considered below.

Context of Modification Emissions in a Global Framework

The Modification's Scope 1 and 2 emissions would be significantly less than the Scope 3 emissions produced by customers using Mount Pleasant Operation product coal. It is anticipated that the majority of the Scope 3 emissions from the use of Mount Pleasant Operation coal would occur overseas. The estimated Scope 3 emissions associated with the combustion of coal produced by the Mount Pleasant Operation by customer entities would represent approximately 0.03% of the total anthropogenic greenhouse gas emissions globally (excluding land use change) in 2022 (Section 3.5.3).

Under the *Paris Agreement*, each Party is required to prepare, communicate and maintain NDCs that will contribute to the long-term goals of the *Paris Agreement* (UNFCCC, 2024d).

It is important to note that, under the *Paris Agreement*, each NDC reflects the country's ambition for reducing emissions, taking into account its domestic circumstances and capabilities (UNFCCC, 2024e). Each country will have its own range of opportunities and priorities to trade off various alternative emission reduction (and carbon sink) options having regard to the economic priorities and physical attributes of the country.

Table 22 provides a high-level summary of the NDCs under the *Paris Agreement* of the Expected Export Countries for Mount Pleasant Operation product coal. It should be noted that, under the *Paris Agreement*, these NDCs are successive and are to be updated every five years, with the second round of NDCs due by the end of 2025 (UNFCCC, 2024e). The review mechanisms under the *Paris Agreement*, therefore, provide for increasing the stringency of emission control measures as required over time to achieve the goals of the *Paris Agreement*.

Any Mount Pleasant Operation product coal sold on the domestic market (e.g. to AGL's Bayswater Power Station) under the Modification would likely be substituting or augmenting supply from existing coal sources (i.e. it is anticipated greenhouse gas emissions associated with domestic power generation would align with Australia's electricity network decarbonisation plans).

4.6 CLIMATE CHANGE ADAPTATION

4.6.1 Key Risks and Mitigation

Conservative evaluation of the potential implications of climate change on local groundwater and surface water resources are considered in the Groundwater Assessment (Appendix A of the Modification Report) and the Surface Water Assessment (Appendix B of the Modification Report), respectively.

Water Resources

Significant variations in rainfall patterns have the potential to affect the Mount Pleasant Operation in regard to water storage overtopping (e.g. during high rainfall periods) and water supply reliability risk.

The potential implications of climate change have been considered in the Modification Groundwater Assessment (Australasian Groundwater and Environmental Consultants, 2025) and Surface Water Assessment (ATC Williams, 2025).

Preliminary water storage designs and water reliability estimates have been determined in consideration of a wide range of potential climate scenarios, including prolonged dry periods and long periods of heavy rainfall. In addition, climate change high rainfall scenarios have been evaluated for the final void and determined that no final void overtopping would occur (ATC Williams, 2025).

Table 22
Key Potential Export Customer Country Current Nationally Determined Contributions

Potential Destination Country/State	Summary of NDC
Japan	Japan aims to reduce its greenhouse gas emissions by 60% in FY2035 and by 73% in FY2040 from FY2013 levels, setting ambitious targets aligned with the long-term pathway to net-zero by 2050. These targets represent Japan's strengthened commitment beyond its previous FY2030 goal and place the country on a straight-line trajectory consistent with the global 1.5°C limit.
Korea	The updated and enhanced target is to reduce total national greenhouse gas emissions by 40% from the 2018 level, which is 727.6 Mt CO_2-e, by 2030. 40% reduction target is more enhanced because it is below its linear reduction pathways from 2018 to 2050. This indicates the Republic of Korea's enhanced ambition towards the goal of carbon neutrality by 2050.
Malaysia	Malaysia intends to reduce its economy-wide carbon intensity (against GDP) by 45% in 2030 compared to the 2005 level (unconditional target). This reduction target is 10% higher than the reduction target from the earlier NDC submission in 2015 (a 35% reduction in greenhouse gas emissions per unit of GDP from the 2005 level in 2030).
Taiwan (Republic of China)	Taiwan is not recognised as an independent sovereign nation and therefore is not a member of the United Nations and consequently cannot be a Party to the *Paris Agreement*. Nonetheless it has put forward an intended NDC. Taiwan has committed to a 50% reduction in greenhouse gas emissions compared to the BAU projection for 2030 by 2030, or a total of approximately 214 Mt CO_2-e in 2030.
China	China's updated NDC commits to an economy-wide reduction in net GHG emissions of 7% to 10% below its peak emission level by 2035. China maintains its long-term commitment to carbon neutrality before 2060.
Vietnam	A 15.8% reduction in greenhouse gas emissions compared to the BAU projection for 2030 by 2030, which is equivalent to 146.3 Mt CO_2-e (unconditional with domestic resources). A 43.5% reduction in greenhouse gas emissions compared to the BAU projection for 2030 by 2030, which is equivalent to 403.7 Mt CO_2-e (conditional with international support).

Source: Government of Japan (2025), Government of Korea (2021), Government of Malaysia (2021), Republic of China (Taiwan) (2015), Ministry of Ecology and Environment, People's Republic of China (2025), Government of Vietnam (2022).

Bushfire Risk

The potential for increased bushfire activity in the region poses risks to both the Mount Pleasant Operation workforce and infrastructure. Past Mount Pleasant Operation Preliminary Hazard Analyses assessed a number of fire-related hazards (including those related to bushfires) (MACH, 2020).

MACH's Bushfire Management Plan includes a range of measures to reduce the potential for the ignition of bushfires, as well as minimising potential impacts of bushfires on the Mount Pleasant Operation. Key mitigation measures include the prohibition of smoking on-site, and the management of fuel loads in a number of bushfire management zones.

Future Demand for Coal and Potential for Coal Market Substitution

It is recognised that international measures to 'decarbonise' global economies may alter the future demand for and/or supply of coal.

Expected global trends are factored into coal price forecasts considered in the Modification Economic Assessment (AnalytEcon, 2025). The Economic Assessment also includes sensitivity analysis for variations in export coal prices and the costing of carbon emissions. The sensitivity analysis shows that the Modification would still generate a substantial net benefit to NSW under the scenarios considered (AnalytEcon, 2025).

4.6.2 Adaptive Management

MACH would implement an adaptive management approach to climate change impacts throughout the life of the Modification. This would include conducting climate change risk assessments in consideration of NSW EPA CCMAP adaptation guidance, once finalised/available (NSW EPA, 2025c).

5 CONCLUSION

The Mount Pleasant Operation incorporating the Modification would extract an additional 68 Mt of ROM coal, relative to cessation of mining under Development Consent DA 92/97 in December 2026 at a ROM coal extraction rate of 10.5 Mtpa. The total ROM coal extraction would remain well under the total of 197 Mt of ROM coal as originally approved under DA 92/97 in 1999.

The Mount Pleasant Operation is a low-emissions intensity coal mine. The EID for ROM coal production at the Mount Pleasant Operation is 0.0178 t CO2-e / t ROM, which is significantly lower than the Safeguard Mechanism default value of 0.0653 t CO2-e / t ROM (CER, 2025b). This low emissions intensity is attributable to moderate fugitive emissions and modest waste rock strip ratios characteristic of operations at the Mount Pleasant Operation.

Under the Modification Scenario the Mount Pleasant Operation emissions intensity would remain well below the Safeguard Mechanism default ROM coal production variable (0.0653 t CO_2-e / t ROM), and relative to other current NSW ROM coal EIDs, would rank approximately 5th lowest (excluding the existing Mount Pleasant Operation) out of approximately 26 facilities (based on historical data determinations).

The Mount Pleasant Operation, under the Modification Scenario, is projected to generate average annual Scope 1 and 2 greenhouse gas emissions of 0.24 Mt CO_2-e, while the Modification Only Scenario would result in an average of 0.19 Mt CO_2-e per year. In the context of broader emissions profiles, these contributions are minor, representing 0.207% and 0.163% of New South Wales' total 2023 greenhouse gas emissions, respectively.

The proportion of projected Scope 1 emissions from the Modification and Modification Only Scenario was compared to projected NSW emissions under the ‘Current Policy’ scenario in 2030. In that year, the Modification Only Scenario would account for approximately 0.380% of total NSW projected Scope 1 emissions. It would contribute around 1.237% of NSW fugitive emissions and approximately 0.956% of NSW emissions from stationary energy in 2030.

The Modification’s Scope 1 and 2 emissions would be significantly less than the Scope 3 emissions produced by customers using Mount Pleasant Operation product coal. It is anticipated that the majority of the Scope 3 emissions from third-party use of Mount Pleasant Operation coal would occur overseas. The estimated Scope 3 emissions associated with the combustion of coal produced by the Mount Pleasant Operation by customer entities would represent approximately 0.03% of the total anthropogenic greenhouse gas emissions globally (excluding land use change) in 2022.

MACH has considered the potential for climate change impacts to arise from the incremental greenhouse gas emissions of the Modification, and considers that if the Modification does not proceed it is likely there would be no associated reduction in the global combustion of coal. Assuming, nevertheless that all of the Modification estimated Scope 1, 2 and 3 emissions were globally additive, the Modification’s incremental contribution to temperature change would be so small that no meaningful additional environmental implications could be considered to arise at the locality level.

MACH has evaluated greenhouse gas abatement opportunities and developed a Three-Year Action Plan to advance its evaluation and implementation of reasonable and feasible greenhouse gas mitigation measures. MACH would prepare a CCMAP and conduct regular reviews of greenhouse gas mitigation measures that could reasonably be applied at the Mount Pleasant Operation, should the Modification be approved.

It is noted that ROM coal production at the Mount Pleasant Operation is scheduled to cease by 2032. Consequently, the mine would be in the closure stage and would not materially contribute to Commonwealth or State emissions reduction targets in 2035.

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ATTACHMENT A

MOUNT PLEASANT OPERATION
GREENHOUSE GAS CALCULATIONS REPORT

MOUNT PLEASANT MODIFICATION 8

GREENHOUSE GAS CALCULATIONS

MACH Energy Australia Pty Ltd

12 December 2025

Job Number 23071614A

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Mount Pleasant Modification 8

Greenhouse Gas Calculations

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

Todoroski Air Sciences has prepared this report for MACH Energy Australia Pty Ltd (MACH Energy). It presents greenhouse gas (GHG) calculations associated with the proposed Mount Pleasant Modification 8 (the Modification).

The approved Mount Pleasant Operation is an open cut coal mine and associated infrastructure located approximately 3 kilometres (km) north-west of Muswellbrook in the Upper Hunter Valley of New South Wales (NSW).

MACH Mount Pleasant Operation Pty Ltd is the manager of the Mount Pleasant Operation as agent for and on behalf of the unincorporated Mount Pleasant Joint Venture between MACH Energy (95 percent [%] owner) and J.C.D. Australia Pty Ltd (5% owner)[1].

Under Development Consent 92/97, the Mount Pleasant Operation is approved to produce up to 10.5 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal. Thermal coal products from the Mount Pleasant Operation are transported by rail to the Port of Newcastle for export, or to domestic customers for use in electricity generation.

This GHG Calculations report has been prepared to assess the proposed Modification to the Mount Pleasant Operation Development Consent DA 92/97.

The Modification would include the following key changes to the approved Mount Pleasant Operation under Development Consent DA 92/97:

- a six year extension of permitted (ROM coal) mining operations to 31 December 2032; and,
- an increase in the approved ROM coal extraction rate from 10.5 Mtpa to 12.5 Mtpa.

The Modification would involve no material changes to existing:

- mining tenements;
- mining methods;
- primary site access;
- electricity supply and distribution;
- mine infrastructure area;
- Coal Handling and Processing Plant, coal stockpile and rail loading facilities;
- rehabilitation objectives and methods; and,
- hours of operation and key on-site activities.

[1] MACH Mount Pleasant Operation Pty Ltd and the unincorporated Mount Pleasant Joint Venture are herein referred to as MACH.

2 GREENHOUSE GAS INVENTORY

The Australian National Greenhouse Accounts (NGA) Factors document published by the Commonwealth Department of Climate Change, Energy, the Environment and Water (Commonwealth DCCEEW) defines three scopes (Scope 1, 2 and 3) for different emission categories based on whether the emissions are from "direct" or "indirect" sources.

Scope 1 emissions encompass the direct sources from the Modification defined as:

> "*...produced from sources within the boundary of an organisation and as a result of that organisation's activities*" (**Commonwealth DCCEEW, 2025a**).

Scope 2 emissions are produced by the burning of fossil fuels to generate electricity and defined as:

> "*...indirect emissions which occur as a result of activities that generate electricity, heating, cooling or stream that is consumed by an organisation but which is generated outside that organisation's boundaries*" (**Commonwealth DCCEEW, 2025a**).

Scope 3 emissions are other indirect emissions which:

> "*...occur outside of the boundary of an organisation as a result of actions by the organisation*" (**Commonwealth DCCEEW, 2025a**).

For the purpose of this assessment, emissions generated in all three scopes defined above provide a suitable approximation of the total GHG emissions generated from the Modification and the Mount Pleasant Operation as modified (in terms of Scope 1 emissions) and the key GHG emissions indirectly associated with the Modification that are generated by third parties (in terms of Scope 2 and 3 emissions).

Scope 3 emissions can be a significant component of the total emissions inventory. However, these emissions are not controlled by the operation; rather, they are indirectly associated with the operation. These emissions are understood to be the Scope 1 emissions from other organisations (such as the customers who purchase Mount Pleasant Operation's coal).

2.1 Emission sources

Scope 1 GHG emission sources identified from the Mount Pleasant Operation are the on-site combustion of diesel fuel, gasoline, petroleum-based oils and greases, explosives usage, emissions associated with land clearing and fugitive emissions from the exposed coal seams. Scope 2 GHG emission sources are associated with the generation of purchased electricity. Scope 3 emissions have been identified as resulting from the purchase of consumables for use on-site and the transport of and final use of the product coal.

Estimated quantities of materials and variables used to calculate the potential GHG emissions associated with Scope 1, 2 and 3 emissions for the Mount Pleasant Operation, both with and without the Modification, have been described for the operational, construction[2] and decommissioning phases. These estimates are based on a conservative upper limit of the assumed maximum production throughout the remaining life of the Mount Pleasant Operation and would provide a reasonable worst-case approximation of the potential GHG emissions for the purpose of this assessment.

2.1.1 Modification scenario

Table 2-1 summarises the quantities of materials estimated for the operational, construction and decommissioning phases under the Modification scenario, which is referred to as the 'modified-business' scenario in the *NSW Guide for Large Emitters* (**NSW Environment Protection Authority [EPA], 2025**).

For the purposes of this assessment, it is assumed the Modification begins in financial year 2026 (FY26) (defined as the period from 1 July 2025 to 30 June 2026).

Construction activities associated with the Modification include the construction of a mine water dam and raises to the existing Fines Emplacement Area at the site (Stages 4 and 5). The construction activities would occur over a period of seven years. The quantities of materials estimated for the key construction activities over the life of the Modification are presented in **Table 2-1**.

The decommissioning phase involves bulk earthworks and associated blasting to prepare the site for closure and is projected to occur over a four-year period. **Table 2-1** summarises the quantities of materials estimated for the decommissioning phase.

2.1.2 Baseline scenario

Estimates for a Baseline scenario based on the current approved operations under Development Consent DA 92/97 (as currently modified) have been calculated. Note that in the *NSW Guide for Large Emitters* (**NSW EPA, 2025**) the Baseline scenario is referred to as the 'business-as-usual' scenario.

Emission sources identified for the Modification scenario are the same for the Baseline scenario and have been described for the operational, construction and decommissioning phases in **Table 2-2**.

2.1.3 Modification only scenario

The Modification only scenario is the difference between the Modification scenario and the Baseline scenario presented in **Sections 2.1.1** and **2.1.2**, respectively. Note that in the *NSW Guide for Large Emitters* (**NSW EPA, 2025**) the Modification Only scenario is referred to as the 'project only' scenario.

[2] It is noted that the Mount Pleasant Operation is an existing operational mine. Therefore, emissions associated with key construction activities that would occur in parallel with operations have been separately estimated.

Table 2-1: Summary of quantities of materials estimated for the Modification scenario

Parameter	Units	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	Total
ROM	Mt	12.5	12.5	12.5	12.5	12.5	12.5	7.9	2.0	-	-	-	**84.9**
Product	Mt	8.2	7.6	7.7	7.8	8.1	8.6	5.7	1.5	-	-	-	**55.2**
Diesel	kL	46,923	43,671	52,969	54,652	46,014	25,869	16,214	1,038	-	-	-	**287,350**
Diesel oil - Transport post-2004	kL	66	62	75	77	65	37	23	1	-	-	-	**406**
Diesel oil	kL	175	163	198	204	172	97	61	4	-	-	-	**1,074**
Diesel oil (Euro i) - Transport	kL	92	86	104	107	90	51	32	2	-	-	-	**565**
Diesel oil (Euro iv or higher) - Transport	kL	34	32	38	40	33	19	12	1	-	-	-	**209**
Diesel oil (Euro iii) - Transport	kL	23	21	25	26	22	12	8	0	-	-	-	**138**
Gasoline - Transport	kL	5	5	6	6	5	3	2	0	-	-	-	**31**
Petroleum based oils	kL	807	751	911	939	791	445	279	18	-	-	-	**4,940**
Petroleum based greases	kL	150	139	169	175	147	83	52	3	-	-	-	**918**
Explosives	t	19,864	23,653	25,269	26,096	26,326	25,589	21,929	720	-	-	-	**169,447**
Land clearing – Grassland	ha	32	57	36	37	47	49	16	-	-	-	-	**273**
Land clearing – Woodland	ha	23	39	25	26	32	34	11	-	-	-	-	**190**
Electricity	MWh	52,877	52,877	52,877	52,877	52,877	52,877	33,463	8,381	-	-	-	**359,107**
Construction													
Diesel	kL	2,335	2,219	1,279	-	1,279	1,279	-	-	-	-	-	**8,392**
Petroleum based oils	kL	33	31	18	-	18	18	-	-	-	-	-	**117**
Petroleum based greases	kL	5	4	3	-	3	3	-	-	-	-	-	**17**
Decommissioning													
Diesel	kL	-	-	-	-	-	-	-	4,381	4,901	1,040	520	**10,842**
Petroleum based oils	kL	-	-	-	-	-	-	-	61	68	14	7	**151**
Petroleum based greases	kL	-	-	-	-	-	-	-	9	10	2	1	**22**
Explosives	t	-	-	-	-	-	-	-	3,415	3,415	-	-	**6,831**

Note: Mt = million tonnes, kL = kilolitres, t = tonne, ha = hectares, and MWh = megawatt hour

Table 2-2: Summary of quantities of materials estimated for the Baseline scenario

Parameter	Units	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	Total
ROM	Mt	10.5	5.2	-	-	-	-	-	-	-	-	-	**15.7**
Product	Mt	7.4	3.1	-	-	-	-	-	-	-	-	-	**10.5**
Diesel	kL	40,951	18,860	-	-	-	-	-	-	-	-	-	**59,811**
Diesel oil - Transport post-2004	kL	58	27	-	-	-	-	-	-	-	-	-	**85**
Diesel oil	kL	153	71	-	-	-	-	-	-	-	-	-	**224**
Diesel oil (Euro i) - Transport	kL	81	37	-	-	-	-	-	-	-	-	-	**118**
Diesel oil (Euro iv or higher) - Transport	kL	30	14	-	-	-	-	-	-	-	-	-	**43**
Diesel oil (Euro iii) - Transport	kL	20	9	-	-	-	-	-	-	-	-	-	**29**
Gasoline - Transport	kL	4	2	-	-	-	-	-	-	-	-	-	**7**
Petroleum based oils	kL	704	324	-	-	-	-	-	-	-	-	-	**1,028**
Petroleum based greases	kL	131	60	-	-	-	-	-	-	-	-	-	**191**
Explosives	t	15,089	8,004	-	-	-	-	-	-	-	-	-	**23,093**
Land clearing - grassland	ha	8	-	-	-	-	-	-	-	-	-	-	**8**
Land clearing - woodland	ha	6	-	-	-	-	-	-	-	-	-	-	**6**
Electricity	MWh	44,417	22,208	-	-	-	-	-	-	-	-	-	**66,625**
Construction													
Diesel	kL	2,335	-	-	-	-	-	-	-	-	-	-	**2,335**
Petroleum based oils	kL	33	-	-	-	-	-	-	-	-	-	-	**33**
Petroleum based greases	kL	5	-	-	-	-	-	-	-	-	-	-	**5**
Decommissioning													
Diesel	kL	-	6,363	12,293	7,563	1,633	-	-	-	-	-	-	**27,852**
Petroleum based oils	kL	-	89	171	105	23	-	-	-	-	-	-	**388**
Petroleum based greases	kL	-	13	25	15	3	-	-	-	-	-	-	**56**
Explosives	t	-	1,826	1,826	-	-	-	-	-	-	-	-	**3,652**

Note: Mt = million tonnes, kL = kilolitres, t = tonne, ha = hectares, and MWh = megawatt hour

2.1.4 Scope 3 sources

Scope 3 emissions for the transport and final use of the coal may have the potential to vary in the future depending on the market situation at the time. For the purpose of this assessment, these assumptions include emission factors for the transport modes of rail and shipping and the associated average weighted distance travelled for the export coal to the Asian market.

Product coal is transported to the Port of Newcastle by rail and then transferred to coal loaders before being shipped to its final destination. The approximate rail distance is taken to be 300km (return distance). The approximate shipping distance of 13,000km (return distance) is based predominately on destinations in the Asian market.

The emissions generated from the end use of coal produced by the Modification have been assumed to be used in power generation and would be equivalent to those generated in NSW. The type of thermal coal consumed is classified as bituminous coal.

It is also noted that some of the coal produced by the Modification may be consumed in Australia. For Scope 3 calculations in this assessment, the total Scope 3 emission calculations assume all of the product coal is transported overseas and hence these estimates are conservative, as there would typically be no Scope 3 emissions generated from shipping for any coal consumed in Australia.

Other Scope 3 emissions also arise from a number of other sources indirectly associated with the Mount Pleasant Operation such as emissions generated by employees travelling to and from the site. These relatively minor individual contributions are difficult to accurately quantify due to the diversity and nature of the sources and have not been considered further in this assessment.

2.2 Emission factors

To quantify the amount of carbon dioxide equivalent (CO_2-e) material generated, emission factors were obtained from:

- the NGA Factors (**Commonwealth DCCEEW, 2025a**);
- emission factors for Scope 3 transport based on factors presented in the *Greenhouse gas reporting: conversion factors 2024* (**Department for Environment, Food & Rural Affairs, 2024**);
- emission factors for land clearing (**Transport Authorities Greenhouse Group, 2013**); and,
- the Scope 1 explosives emission factor from the *National Greenhouse Accounts (NGA) Factors Updating and replacing the AGO Factors and Methods Workbook* (**Department of Climate Change, 2008**).

The emission factors used in this assessment are summarised in **Table 2-3**.

Table 2-3: Summary of emission factors

Type	Energy content factor (GJ/kL)	Emission factor			Units	Scope
		CO_2	CH_4	N_2O		
Diesel oil	38.6	69.9	0.1	0.2	kg CO_2-e/GJ	1
		17.3	-	-		3
Diesel – Transport post-2004	38.6	69.9	0.01	0.05	kg CO_2-e/GJ	1
		17.3	-	-		3
Petroleum based oils	38.8	13.9	-	-	kg CO_2-e/GJ	1
		18	-	-		3
Petroleum based greases	38.8	3.5	-	-	kg CO_2-e/GJ	1
		18	-	-		3
Diesel oil (Euro i) - Transport	38.6	69.9	0.2	0.4	kg CO_2-e/GJ	1
		17.3	-	-		3
Diesel oil (Euro iii) - Transport	38.6	69.9	0.1	0.4	kg CO_2-e/GJ	1
		17.3	-	-		3
Diesel oil (Euro iv or higher) - Transport	38.6	69.9	0.07	0.4	kg CO_2-e/GJ	1
		17.3	-	-		3
Gasoline - Transport	34.2	67.4	0.02	0.2	kg CO_2-e/GJ	1
		17.2	-	-		3
Explosives – Heavy ANFO	-	0.18	-	-	t CO_2-e/t explosive	1
Land clearing – woodland/forest	-	521	-	-	t CO_2-e/ha	1
Land clearing - grassland	-	110	-	-	t CO_2-e/ha	1
Rail transport	-	27.79	-	-	t CO_2-e/Mt-km	3
Ship transport	-	3.53	-	-	t CO_2-e/Mt-km	3
Thermal coal*	27.0	90	0.04	0.2	kg CO_2-e/GJ	3

*Assumes type of coal is bituminous coal

Note: GJ = gigajoule, GJ/kL = gigajoule per kilolitre, kg CO_2-e = kilograms of carbon dioxide equivalent, t CO_2-e = tonnes of carbon dioxide equivalent, t = tonnes, ha = hectare, kg = kilogram, Mt-km = million tonne-kilometres, CO_2 = Carbon Dioxide, CH_4 = Methane and N_2O = Nitrous Oxide

Site specific fugitive emissions factors determined using Method 2 of the *National Greenhouse and Energy Reporting Act 2007* have been used to estimate fugitive emissions over the life of the Mount Pleasant Operation (**Coalbed Energy, 2023**) and are estimated based on the mining sequence and depth by MACH's mine planners. The emission factors vary with depth and location across the activity mining area. The estimated fugitive emissions have been provided for the assessment and presented in the following section.

Emission factors for electricity usage were obtained from *Australia's emissions projections 2025* (**Commonwealth DCCEEW, 2025b**). These emission factors are based on projections for the decarbonising of the NSW electricity grid over time. It is understood that there would be no material electricity generation on-site from the burning of fossil fuels. The Scope 2 and 3 emissions factors for electricity usage are presented in **Table 2-4**.

Table 2-4: Summary of emission factors for electricity usage (t CO_2-e per MWh)

Period	Scope 2	Scope 2 and 3	Scope 3 *
2026	0.55	0.57	0.02
2027	0.5	0.52	0.02
2028	0.38	0.4	0.02
2029	0.24	0.25	0.01
2030	0.11	0.12	0.01
2031	0.09	0.09	0.00
2032	0.09	0.1	0.01
2033	0.08	0.09	0.01
2034	0.07	0.07	0.00
2035	0.07	0.08	0.01
2036	0.08	0.08	0.00
2037	0.08	0.08	0.00
2038	0.08	0.08	0.00
2039	0.08	0.08	0.00
2040	0.08	0.08	0.00

Source: **Commonwealth DCCEEW (2025b)**

* Calculated by subtracting the Scope 2 column from the Scope 2 and 3 column.

Note: The emission factors for electricity usage are based on calendar years, but have been used to calculate emissions from electricity usage on a financial year basis.

2.3 Estimated emissions

The estimated Scope 1 and Scope 2 annual CO_2-e emissions for the Modification scenario and the Baseline scenario are also presented graphically in **Figure 2-1** and **Figure 2-2**. These figures illustrate that the majority of emissions generated by the Mount Pleasant Operation under either scenario would be from fugitive emissions and diesel (& other fuels) consumption.

Table 2-5 and **Table 2-6** summarises the estimated annual CO_2-e emissions for the Modification scenario and the Baseline scenario, respectively. The estimated annual CO_2-e emissions for the Modification only scenario is the difference between the Modification scenario and the Baseline scenario and summarised in **Table 2-7**.

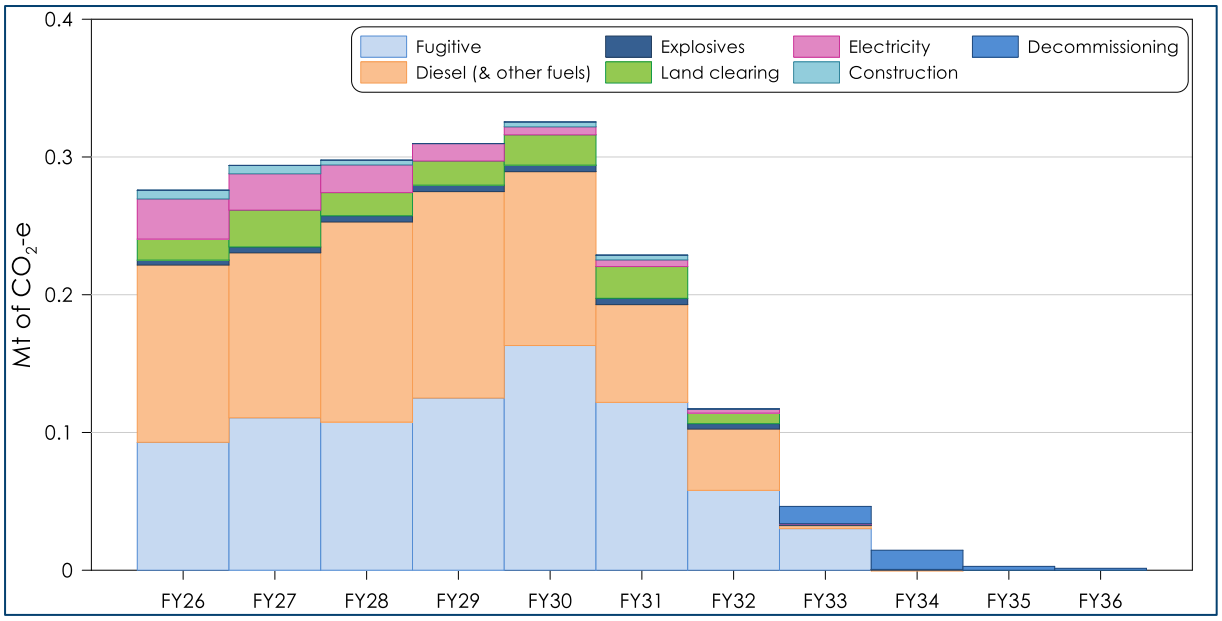

Figure 2-1: Summary of CO_2-e emissions for the Modification scenario

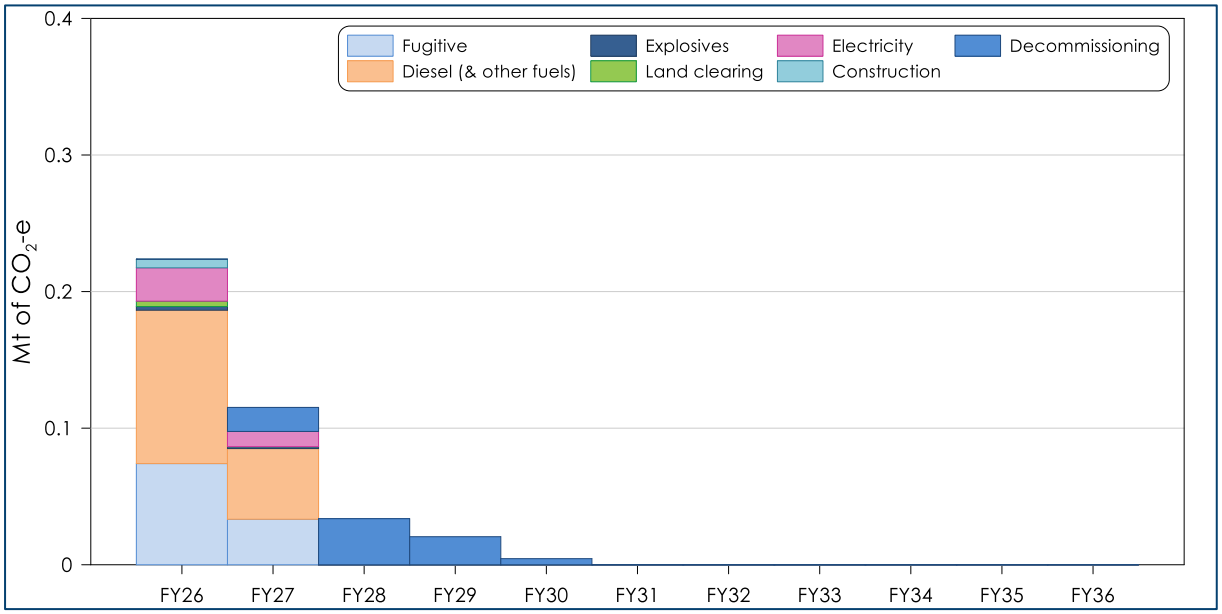

Figure 2-2: Summary of CO_2-e emissions for the Baseline scenario

Table 2-5: Summary of CO_2-e emissions for the Modification scenario

Parameter	Units	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	Total
Scope 1 - Total	**t CO_2-e**	**246,767**	**267,410**	**277,599**	**297,036**	**319,553**	**223,959**	**114,056**	**45,679**	**13,934**	**2,826**	**1,413**	**1,810,231**
Fugitive	t CO_2-e	92,864	110,660	107,539	124,996	163,124	121,847	58,017	30,180	-	-	-	**809,228**
Diesel	t CO_2-e	127,148	118,336	143,532	148,091	124,685	70,099	43,935	2,813	-	-	-	**778,638**
Diesel oil - Transport post-2004	t CO_2-e	180	168	203	210	177	99	62	4	-	-	-	**1,103**
Diesel oil	t CO_2-e	475	442	537	554	466	262	164	11	-	-	-	**2,911**
Diesel oil (Euro i) - Transport	t CO_2-e	251	234	283	292	246	138	87	6	-	-	-	**1,538**
Diesel oil (Euro iv or higher) - Transport	t CO_2-e	92	86	104	108	91	51	32	2	-	-	-	**566**
Diesel oil (Euro iii) - Transport	t CO_2-e	61	57	69	71	60	34	21	1	-	-	-	**375**
Gasoline - Transport	t CO_2-e	12	11	13	14	12	7	4	0	-	-	-	**72**
Petroleum based oils	t CO_2-e	435	405	491	507	427	240	150	10	-	-	-	**2,664**
Petroleum based greases	t CO_2-e	20	19	23	24	20	11	7	0	-	-	-	**125**
Explosives	t CO_2-e	3,576	4,258	4,548	4,697	4,739	4,606	3,947	130	-	-	-	**30,500**
Land clearing - grassland	t CO_2-e	3,567	6,223	3,910	4,071	5,134	5,380	1,778	-	-	-	-	**30,063**
Land clearing - woodland	t CO_2-e	11,740	20,482	12,869	13,401	16,897	17,709	5,851	-	-	-	-	**98,948**
Construction													
Diesel	t CO_2-e	6,327	6,012	3,467	-	3,467	3,467	-	-	-	-	-	**22,740**
Petroleum based oils	t CO_2-e	18	17	10	-	10	10	-	-	-	-	-	**63**
Petroleum based greases	t CO_2-e	1	1	0	-	0	0	-	-	-	-	-	**2**
Decommissioning													
Diesel	t CO_2-e	-	-	-	-	-	-	-	11,872	13,281	2,818	1,409	**29,380**
Petroleum based oils	t CO_2-e	-	-	-	-	-	-	-	33	37	8	4	**81**
Petroleum based greases	t CO_2-e	-	-	-	-	-	-	-	1	1	0	0	**3**
Explosives	t CO_2-e	-	-	-	-	-	-	-	615	615	-	-	**1,229**
Scope 2 - Total	**t CO_2-e**	**29,083**	**26,439**	**20,093**	**12,691**	**5,817**	**4,759**	**3,012**	**670**	**-**	**-**	**-**	**102,563**
Electricity	t CO_2-e	29,083	26,439	20,093	12,691	5,817	4,759	3,012	670	-	-	-	**102,563**
Scope 3 - Total	**Mt CO_2-e**	**20.4**	**19.0**	**19.2**	**19.5**	**20.1**	**21.5**	**14.3**	**3.7**	**0**	**0**	**0**	**137.6**
Consumables	t CO_2-e	33,324	31,087	37,481	38,110	32,170	17,789	11,484	798	-	-	-	**202,242**
Consumables - Construction	t CO_2-e	1,585	1,506	869	-	869	869	-	-	-	-	-	**5,697**
Consumables - Decommissioning	t CO_2-e	-	-	-	-	-	-	-	2,975	3,328	706	353	**7,361**
Rail transport	t CO_2-e	68,007	63,344	63,993	65,219	67,280	71,910	47,816	12,232	-	-	-	**459,799**
Ship transport	t CO_2-e	374,335	348,669	352,239	358,988	370,335	395,818	263,197	67,328	-	-	-	**2,530,910**
Thermal coal	Mt CO_2-e	19.9	18.5	18.7	19.1	19.7	21.0	14.0	3.6	-	-	-	**134.4**

Table 2-6: Summary of CO_2-e emissions for the Baseline scenario

Parameter	Units	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	Total
Scope 1 - Total	**t CO_2-e**	**199,313**	**104,105**	**33,735**	**20,553**	**4,437**	**-**	**-**	**-**	**-**	**-**	**-**	**362,143**
Fugitive	t CO_2-e	74,043	33,327	-	-	-	-	-	-	-	-	-	**107,370**
Diesel	t CO_2-e	110,967	51,104	-	-	-	-	-	-	-	-	-	**162,071**
Diesel oil - Transport post-2004	t CO_2-e	157	72	-	-	-	-	-	-	-	-	-	**230**
Diesel oil	t CO_2-e	415	191	-	-	-	-	-	-	-	-	-	**606**
Diesel oil (Euro i) - Transport	t CO_2-e	219	101	-	-	-	-	-	-	-	-	-	**320**
Diesel oil (Euro iv or higher) - Transport	t CO_2-e	81	37	-	-	-	-	-	-	-	-	-	**118**
Diesel oil (Euro iii) - Transport	t CO_2-e	53	25	-	-	-	-	-	-	-	-	-	**78**
Gasoline - Transport	t CO_2-e	10	5	-	-	-	-	-	-	-	-	-	**15**
Petroleum based oils	t CO_2-e	380	175	-	-	-	-	-	-	-	-	-	**555**
Petroleum based greases	t CO_2-e	18	8	-	-	-	-	-	-	-	-	-	**26**
Explosives	t CO_2-e	2,716	1,441	-	-	-	-	-	-	-	-	-	**4,157**
Land clearing - grassland	t CO_2-e	911	-	-	-	-	-	-	-	-	-	-	**911**
Land clearing - woodland	t CO_2-e	2,997	-	-	-	-	-	-	-	-	-	-	**2,997**
Construction													
Diesel	t CO_2-e	6,327	-	-	-	-	-	-	-	-	-	-	**6,327**
Petroleum based oils	t CO_2-e	18	-	-	-	-	-	-	-	-	-	-	**18**
Petroleum based greases	t CO_2-e	1	-	-	-	-	-	-	-	-	-	-	**1**
Decommissioning													
Diesel	t CO_2-e	-	17,241	33,311	20,494	4,425	-	-	-	-	-	-	**75,471**
Petroleum based oils	t CO_2-e	-	48	92	57	12	-	-	-	-	-	-	**209**
Petroleum based greases	t CO_2-e	-	2	3	2	0	-	-	-	-	-	-	**8**
Explosives	t CO_2-e	-	329	329	-	-	-	-	-	-	-	-	**657**
Scope 2 - Total	**t CO_2-e**	**24,429**	**11,104**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**35,534**
Electricity	t CO_2-e	24,429	11,104	-	-	-	-	-	-	-	-	-	**35,534**
Scope 3 - Total	**Mt CO_2-e**	**18.5**	**7.7**	**0**	**0**	**0**	**-**	**-**	**-**	**-**	**-**	**-**	**26.2**
Consumables	t CO_2-e	29,048	13,413	-	-	-	-	-	-	-	-	-	**42,461**
Consumables - Construction	t CO_2-e	1,585	-	-	-	-	-	-	-	-	-	-	**1,585**
Consumables - Decommissioning	t CO_2-e	-	4,320	8,346	5,135	1,109	-	-	-	-	-	-	**18,909**
Rail transport	t CO_2-e	61,780	25,607	-	-	-	-	-	-	-	-	-	**87,387**
Ship transport	t CO_2-e	340,058	140,953	-	-	-	-	-	-	-	-	-	**481,011**
Thermal coal	Mt CO_2-e	18.1	7.5	-	-	-	-	-	-	-	-	-	**25.5**

Table 2-7: Summary of CO_2-e emissions for the Modification only scenario

Parameter	Units	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	Total
Scope 1 - Total	**t CO_2-e**	**47,454**	**163,304**	**243,864**	**276,483**	**315,116**	**223,959**	**114,056**	**45,679**	**13,934**	**2,826**	**1,413**	**1,448,087**
Fugitive	t CO_2-e	18,821	77,333	107,539	124,996	163,124	121,847	58,017	30,180	-	-	-	**701,858**
Diesel	t CO_2-e	16,181	67,231	143,532	148,091	124,685	70,099	43,935	2,813	-	-	-	**616,567**
Diesel oil - Transport post-2004	t CO_2-e	23	95	203	210	177	99	62	4	-	-	-	**874**
Diesel oil	t CO_2-e	60	251	537	554	466	262	164	11	-	-	-	**2,305**
Diesel oil (Euro i) - Transport	t CO_2-e	32	133	283	292	246	138	87	6	-	-	-	**1,218**
Diesel oil (Euro iv or higher) - Transport	t CO_2-e	12	49	104	108	91	51	32	2	-	-	-	**448**
Diesel oil (Euro iii) - Transport	t CO_2-e	8	32	69	71	60	34	21	1	-	-	-	**297**
Gasoline - Transport	t CO_2-e	2	6	13	14	12	7	4	0	-	-	-	**57**
Petroleum based oils	t CO_2-e	55	230	491	507	427	240	150	10	-	-	-	**2,110**
Petroleum based greases	t CO_2-e	3	11	23	24	20	11	7	0	-	-	-	**99**
Explosives	t CO_2-e	860	2,817	4,548	4,697	4,739	4,606	3,947	130	-	-	-	**26,344**
Land clearing -grassland	t CO_2-e	2,656	6,223	3,910	4,071	5,134	5,380	1,778	-	-	-	-	**29,152**
Land clearing - woodland	t CO_2-e	8,743	20,482	12,869	13,401	16,897	17,709	5,851	-	-	-	-	**95,950**
Construction													
Diesel	t CO_2-e	-	6,012	3,467	-	3,467	3,467	-	-	-	-	-	**16,413**
Petroleum based oils	t CO_2-e	-	17	10	-	10	10	-	-	-	-	-	**45**
Petroleum based greases	t CO_2-e	-	1	0	-	0	0	-	-	-	-	-	**2**
Decommissioning													
Diesel	t CO_2-e	-	-17,241	-33,311	-20,494	-4,425	-	-	11,872	13,281	2,818	1,409	**-46,091**
Petroleum based oils	t CO_2-e	-	-48	-92	-57	-12	-	-	33	37	8	4	**-128**
Petroleum based greases	t CO_2-e	-	-2	-3	-2	-0	-	-	1	1	0	0	**-5**
Explosives	t CO_2-e	-	-329	-329	-	-	-	-	615	615	-	-	**572**
Scope 2 - Total	**t CO_2-e**	**4,653**	**15,334**	**20,093**	**12,691**	**5,817**	**4,759**	**3,012**	**670**	**-**	**-**	**-**	**67,029**
Electricity	t CO_2-e	4,653	15,334	20,093	12,691	5,817	4,759	3,012	670	-	-	-	**67,029**
Scope 3 - Total	**Mt CO_2-e**	**1.9**	**11.3**	**19.1**	**19.5**	**20.1**	**21.5**	**14.3**	**3.7**	**0**	**0**	**0**	**111.4**
Consumables	t CO_2-e	4,275	17,675	37,481	38,110	32,170	17,789	11,484	798	-	-	-	**159,781**
Consumables - Construction	t CO_2-e	-	1,506	869	-	869	869	-	-	-	-	-	**4,112**
Consumables - Decommissioning	t CO_2-e	-	-4,320	-8,346	-5,135	-1,109	-	-	2,975	3,328	706	353	**-11,548**
Rail transport	t CO_2-e	6,227	37,737	63,993	65,219	67,280	71,910	47,816	12,232	-	-	-	**372,413**
Ship transport	t CO_2-e	34,277	207,716	352,239	358,988	370,335	395,818	263,197	67,328	-	-	-	**2,049,899**
Thermal coal	Mt CO_2-e	1.8	11.0	18.7	19.1	19.7	21.0	14.0	3.6	-	-	-	**108.8**

Table 2-8 and **Table 2-9** present a summary of the estimated t CO_2-e emissions per tonne of ROM coal (t CO_2-e/ t ROM) for the Modification scenario and the Baseline scenario, respectively. These estimates exclude the contribution from the decommissioning phase to avoid distorting the values with lower post-mining emissions (thus correlating with the period of ROM coal production only).

The results indicate that on average the Modification scenario would generate approximately 0.021 t CO_2-e/ t ROM for Scope 1 and 0.0011 t CO_2-e/ t ROM for Scope 2. The Baseline scenario would generate approximately 0.019 t CO_2-e/ t ROM for Scope 1 and 0.0022 t CO_2-e/ t ROM for Scope 2.

The increase in estimated Scope 1 emissions per tonne of ROM coal factor for the Modification scenario compared to the Baseline scenario is due to the increase in fugitive emissions and liquid fuels consumed in the later years of mining. Conversely, the estimated Scope 2 emissions per tonne of ROM coal factor for the Modification scenario reduces compared to the Baseline scenario with the progressive decarbonisation of the NSW electricity grid.

Table 2-8: Summary of CO_2-e emissions per unit of production for the Modification scenario

Period	ROM coal (t)	Scope 1 (t CO2-e)	Scope 2 (t CO2-e)	Scope 1 (t CO2-e/ t ROM)	Scope 2 (t CO2-e/ t ROM)
FY26	12,500,000	246,767	29,083	0.020	0.0023
FY27	12,500,000	267,410	26,439	0.021	0.0021
FY28	12,500,000	277,599	20,093	0.022	0.0016
FY29	12,500,000	297,036	12,691	0.024	0.0010
FY30	12,500,000	319,553	5,817	0.026	0.0005
FY31	12,500,000	223,959	4,759	0.018	0.0004
FY32	7,910,426	114,056	3,012	0.014	0.0004
FY33^	1,981,178	45,679	670	0.023	0.0003
FY34^	-	13,934	-	-	-
FY35^	-	2,826	-	-	-
FY36^	-	1,413	-	-	-
Average				**0.021**	**0.0011**

^ Decommissioning year

Table 2-9: Summary of CO_2-e emissions per unit of production for the Baseline scenario

Period	ROM coal (t)	Scope 1 (t CO2-e)	Scope 2 (t CO2-e)	Scope 1 (t CO2-e/ t ROM)	Scope 2 (t CO2-e/ t ROM)
FY26	10,500,000	199,313	24,429	0.019	0.0023
FY27	5,250,000	104,105	11,104	0.020	0.0021
FY28^	-	33,735	-	-	-
FY29^	-	20,553	-	-	-
FY30^	-	4,437	-	-	-
FY31	-	-	-	-	-
FY32	-	-	-	-	-
FY33	-	-	-	-	-
FY34	-	-	-	-	-
FY35	-	-	-	-	-
FY36	-	-	-	-	-
Average				**0.019**	**0.0022**

^ Decommissioning year

2.4 Modification only scenario

The Modification seeks a six year extension of permitted (ROM coal) mining operations to 31 December 2032 and an increase to the approved ROM coal extraction rate from 10.5 Mtpa to 12.5 Mtpa. In comparison to the Baseline scenario there is an increase in GHG emissions as expected.

Figure 2-1 and **Figure 2-2** show the estimated Scope 1 and Scope 2 annual emissions for the Modification scenario and the Baseline scenario over time.

The change in emissions is quantified as the Modification only scenario (i.e. the difference between the Modification scenario and the Baseline scenario). **Table 2-10** summarises the emissions associated with the Modification scenario, Baseline scenario and the Modification only scenario based on Scopes 1, 2 and 3.

Table 2-10: Summary of CO_2-e emissions per scope (Mt CO_2-e)

Period	Scenario	Scope 1	Scope 2	Scope 3
Average Annual*	Baseline	0.15	0.018	13.08
	Modification	0.22	0.013	17.20
	Modification only	0.18	0.008	13.93
Total	Baseline	0.36	0.036	26.17
	Modification	1.81	0.103	137.58
	Modification only	1.45	0.067	111.41

* Excludes decommissioning phase

2.5 Contribution of greenhouse gas emissions

The estimated annual GHG emissions for Australia for the year to March 2025 was 440.2 million tonnes of carbon dioxide equivalent (Mt CO_2-e) (**Commonwealth DCCEEW, 2025c**). In comparison, the estimated annual average GHG emission for the Modification is 0.24 Mt CO_2-e (Scope 1 and 2) and the Modification only scenario is 0.19 Mt CO_2-e (Scope 1 and 2). Therefore, the annual contribution of GHG emissions from the Modification scenario in comparison to the Australian GHG emissions for the year to March 2025 period is estimated to be approximately 0.054% and for the Modification only scenario is approximately 0.043%.

For NSW, the estimated GHG emissions for FY23 were 114.45 Mt CO_2-e (**Commonwealth DCCEEW, 2025d**). The annual contribution of GHG emissions from the Modification scenario (Scopes 1 and 2) in comparison to the NSW GHG emissions for the 2022 period is estimated to be approximately 0.207% and for the Modification only scenario is approximately 0.163%.

The Scope 3 emissions from the Modification scenario include the use of coal by other parties. It is reasonable to expect that there may be future policy changes in the countries which receive Australian coal due to the Paris Agreement or other influencing factors. As such, it is also reasonable to expect that MACH Energy would monitor such changes and adjust the Mount Pleasant Operation accordingly to any new policy, guidelines, carbon pricing, coal demand and trade contracts.

The estimated GHG emissions generated in all three scopes are based on approximated quantities of materials and, where applicable, standard emission factors. Therefore, the estimated emissions for the Modification are considered conservative.

2.6 Comparison with projected future GHG emissions

The projected future GHG emissions for NSW to 2050 can be obtained from the Net Zero Emissions Dashboard (**NSW Government, 2025**). Projections are provided for two scenarios: Business as Usual (BAU) and Current Policy. The BAU scenario factors in historical state policies but excludes the impact of actions outlined in the Net Zero Plan and other current government policies and programs. The Current Policy scenario adjusts the emissions trajectory based on the designed abatement and timelines in the existing NSW and Commonwealth policies and programs.

Figure 2-3 presents a comparison of the annual Scope 1 emissions for the Modification scenario with the projected future GHG emissions for NSW to 2050. In comparison to the projected future GHG emissions for NSW, the Scope 1 emissions associated with the Modification scenario would comprise approximately 0.003% in FY36 (during decommissioning) to 0.385% in FY30 of the NSW emissions per the Current Policy.

Figure 2-4 and **Figure 2-5** present comparisons of the annual fugitive emissions and stationary emissions for the Modification scenario with the projected future fugitive emissions and stationary energy emissions for NSW to 2050, respectively.

The fugitive emissions associated with the Modification scenario would comprise approximately 0.332% in FY33 (during the last year of mining) to 1.237% in FY30 of the NSW emissions per the Current Policy. For Stationary Energy Emissions, the Modification scenario would comprise approximately 0.014% in FY36 to 1.117% in FY29 of the NSW emissions per the Current Policy.

Further comparison of the Modification scenario and Modification only scenario emissions during 2030 and 2035 are presented in **Table 2-11**. The comparisons include NSW Scope 1, fugitive and Stationary Energy emissions per the Current Policy, along with the Australia-wide Scope 1 emissions during the 2030 and 2035 periods.

Comparison of the Modification Scenario annual average Scope 1, 2 and 3 emissions during mining (approximately 17.43 Mt CO_2-e per annum on average [**Table 2-3**]) to the total anthropogenic GHG emissions globally (excluding land use change) in 2024 of approximately 57,700 Mt CO_2-e (**United Nations Environment Programme, 2025**) indicates that the Scope 1, 2 and 3 emissions would contribute approximately 0.03% in the context of cumulative global emissions.

The results show that emissions associated with both the Modification and Modification only scenarios represent only a very small proportion of total NSW and Australian emissions in 2030. The proportional contribution further decreases between 2030 and 2035 due to the significant reduction in emissions during the decommissioning period.

Table 2-11: Comparison emissions during 2030 and 2035

Period	NSW Scope 1 (Mt CO_2-e)	Modification		Modification only	
		Scope 1 (Mt CO_2-e)	Proportion of emissions	Scope 1 (Mt CO_2-e)	Proportion of emissions
2030	83.0	0.320	0.385%	0.315	0.380%
2035	57.4	0.003	0.005%	0.003	0.005%
Period	**NSW Fugitive emissions (Mt CO_2-e)**	**Fugitive (Mt CO_2-e)**	**Proportion of emissions**	**Fugitive (Mt CO_2-e)**	**Proportion of emissions**
2030	13.2	0.163	1.237%	0.163	1.237%
2035	7.6	-	-	-	-
Period	**NSW Stationary Energy (Mt CO_2-e)**	**Stationary Energy (Mt CO_2-e)**	**Proportion of emissions**	**Stationary Energy (Mt CO_2-e)**	**Proportion of emissions**
2030	13.1	0.130	0.990%	0.125	0.956%
2035	10.4	0.003	0.027%	0.003	0.027%
Period	**Australia Scope 1 (Mt CO_2-e)**	**Scope 1 (Mt CO_2-e)**	**Proportion of emissions**	**Scope 1 (Mt CO_2-e)**	**Proportion of emissions**
2030	351.4	0.320	0.091%	0.315	0.090%
2035	301.3	0.003	0.001%	0.003	0.001%

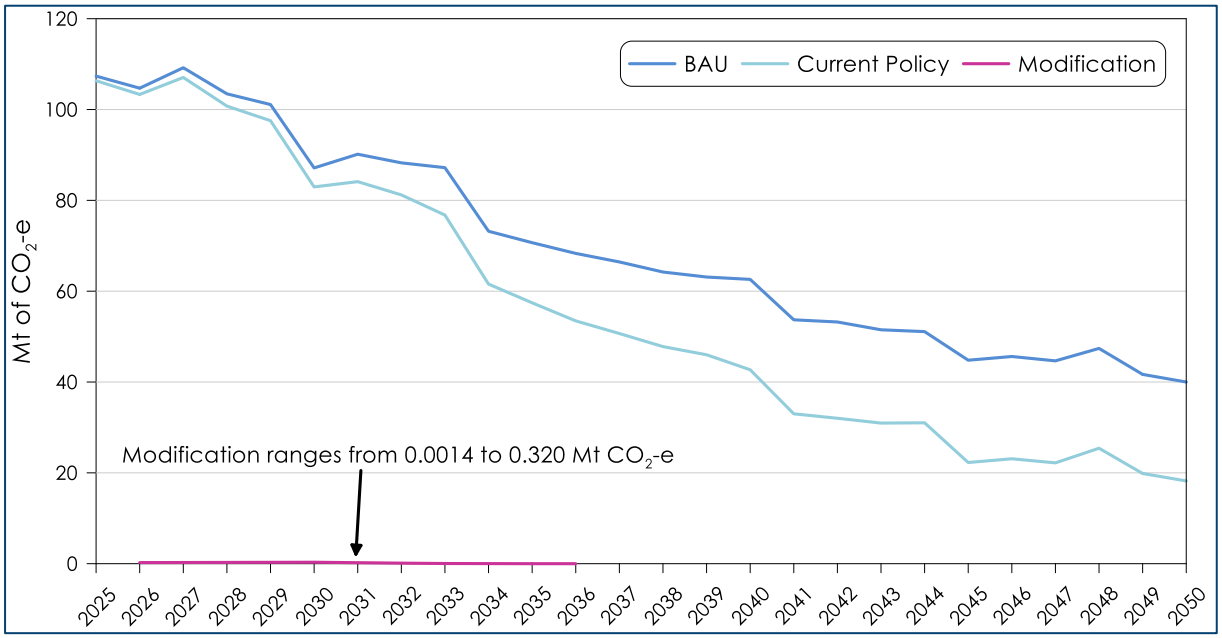

Figure 2-3: Comparison of Scope 1 emissions for the Modification scenario with projected future GHG emissions for NSW

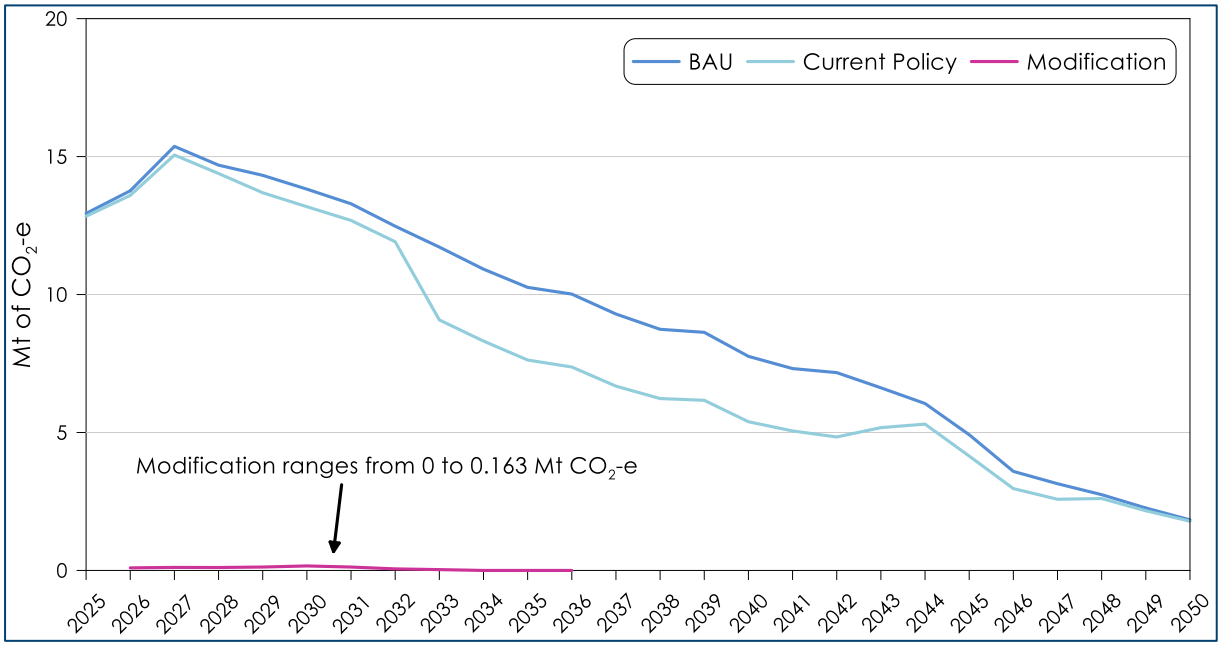

Figure 2-4: Comparison of Fugitive emissions for the Modification scenario with projected future fugitive GHG emissions for NSW

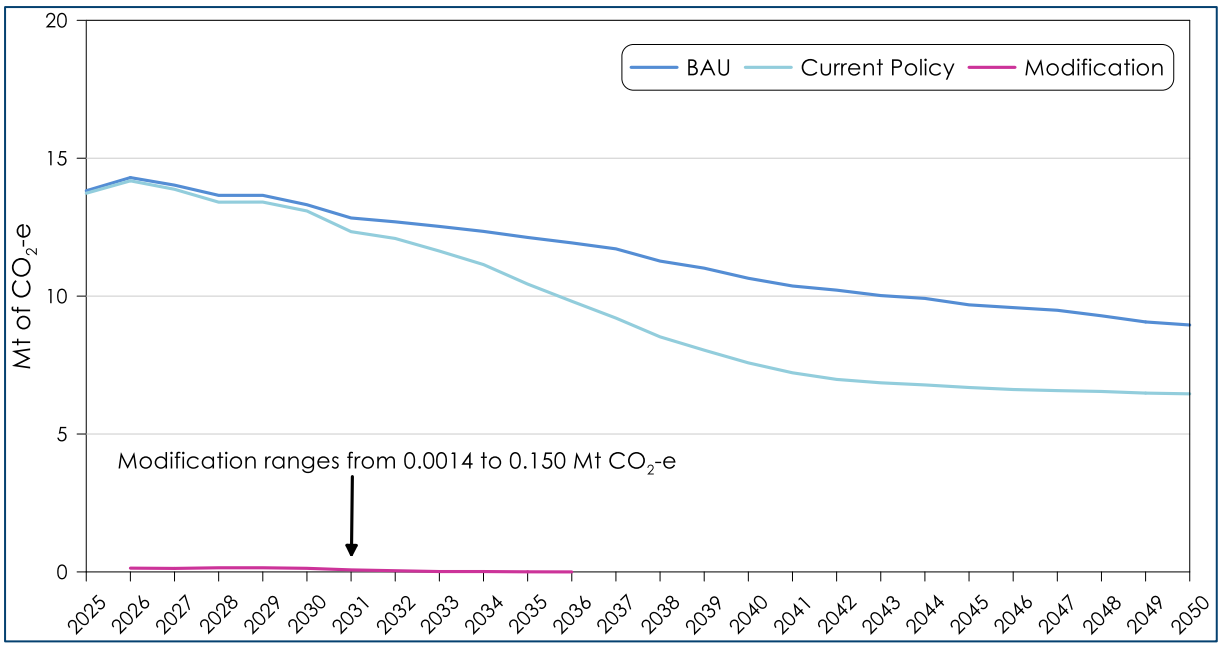

Figure 2-5: Comparison of Stationary Energy emissions for the Modification scenario with projected future stationary energy GHG emissions for NSW

3 SUMMARY AND CONCLUSIONS

This study has assessed the potential GHG emissions associated with the Modification.

As the Modification seeks a six year extension of permitted mining operations and an increase to the approved ROM coal extraction rate, there is a corresponding increase in GHG emissions generated relative the Baseline scenario.

The estimated annual average GHG emission for the Modification Scenario is 0.24 Mt CO_2-e (Scope 1 and 2), which is calculated to be approximately 0.054% of the Australian GHG emissions for the year to March 2025 period and approximately 0.207% of the NSW GHG emissions for the FY23 period.

In comparison to the projected future GHG emissions for NSW, the Scope 1 emissions associated with the Modification scenario would comprise approximately 0.003% to 0.385% of the NSW emissions per the Current Policy. The fugitive emissions for the Modification scenario are projected to range from 0.332% to 1.237% and for Stationary Energy emissions it will account for between 0.014% and 1.117% of the projected future GHG emissions for NSW per the Current Policy.

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ATTACHMENT B

MOUNT PLEASANT OPERATION
GREENHOUSE GAS ABATEMENT EVALUATION AND THREE-YEAR ACTION PLAN

MOUNT PLEASANT OPERATION

GREENHOUSE GAS ABATEMENT EVALUATION AND THREE-YEAR ACTION PLAN – Q4 2025

December 2025
Document No. 1338171

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

1 INTRODUCTION

The approved Mount Pleasant Operation is an open cut coal mine and associated infrastructure located approximately 3 kilometres north-west of Muswellbrook in the Upper Hunter Valley of New South Wales (NSW) (Figures 1).

MACH Mount Pleasant Operation Pty Ltd is the manager of the Mount Pleasant Operation as agent for and on behalf of the unincorporated Mount Pleasant Joint Venture between MACH Energy Australia Pty Ltd (95 percent [%] owner) and J.C.D. Australia Pty Ltd (5% owner)[1].

1.1 PURPOSE OF THIS DOCUMENT

This document is a Greenhouse Gas Abatement Evaluation and Three-Year Action Plan (Abatement Evaluation) for the Mount Pleasant Operation (prepared in the context of Modification 8 to DA 92/97 [the Modification] [Figure 2]), which has been prepared to support MACH's identification and assessment of appropriate reasonable and feasible greenhouse gas mitigation measures for potential implementation over the life of the mine.

An Abatement Evaluation was previously prepared for the Mount Pleasant Operation as part of the Air Quality and Greenhouse Gas Management Plan (AQGGMP) supporting SSD 10418 (which authorises a coal extraction rate of 21 million tonnes (Mt) of run-of-mine coal (ROM) per annum until 2048).

This updated Abatement Evaluation has been prepared specifically to support the Modification to DA 92/97 (which proposes a coal extraction rate of 12.5 Mt ROM coal per annum until 31 December 2032).

It is noted that this Abatement Evaluation does not estimate the actual or potential greenhouse gas emission reductions arising from the potential adoption of any identified emission abatement opportunities. Rather, this Abatement Evaluation is a review of currently available and emerging technologies, with a view to informing MACH's identification of reasonable and feasible greenhouse gas mitigation measures that could potentially be adopted over the life of the mine under the Modification. MACH will revisit these potential emission abatement opportunities during the life of the mine and build upon this evaluation as additional information becomes available.

Consistent with NSW EPA guidance, this document is primarily directed towards on-site emissions over which MACH has operational control (i.e. Scope 1). However, some consideration is also given to emissions associated with on-site electricity consumption (Scope 2), over which MACH potentially has some limited indirect (i.e. purchasing decision) control. This document does not address other indirect NSW, Australian or international emissions, whether upstream or downstream of the mine (i.e. Scope 3), as these are the direct Scope 1 emissions of other parties.

1.2 KEY GUIDANCE MATERIAL

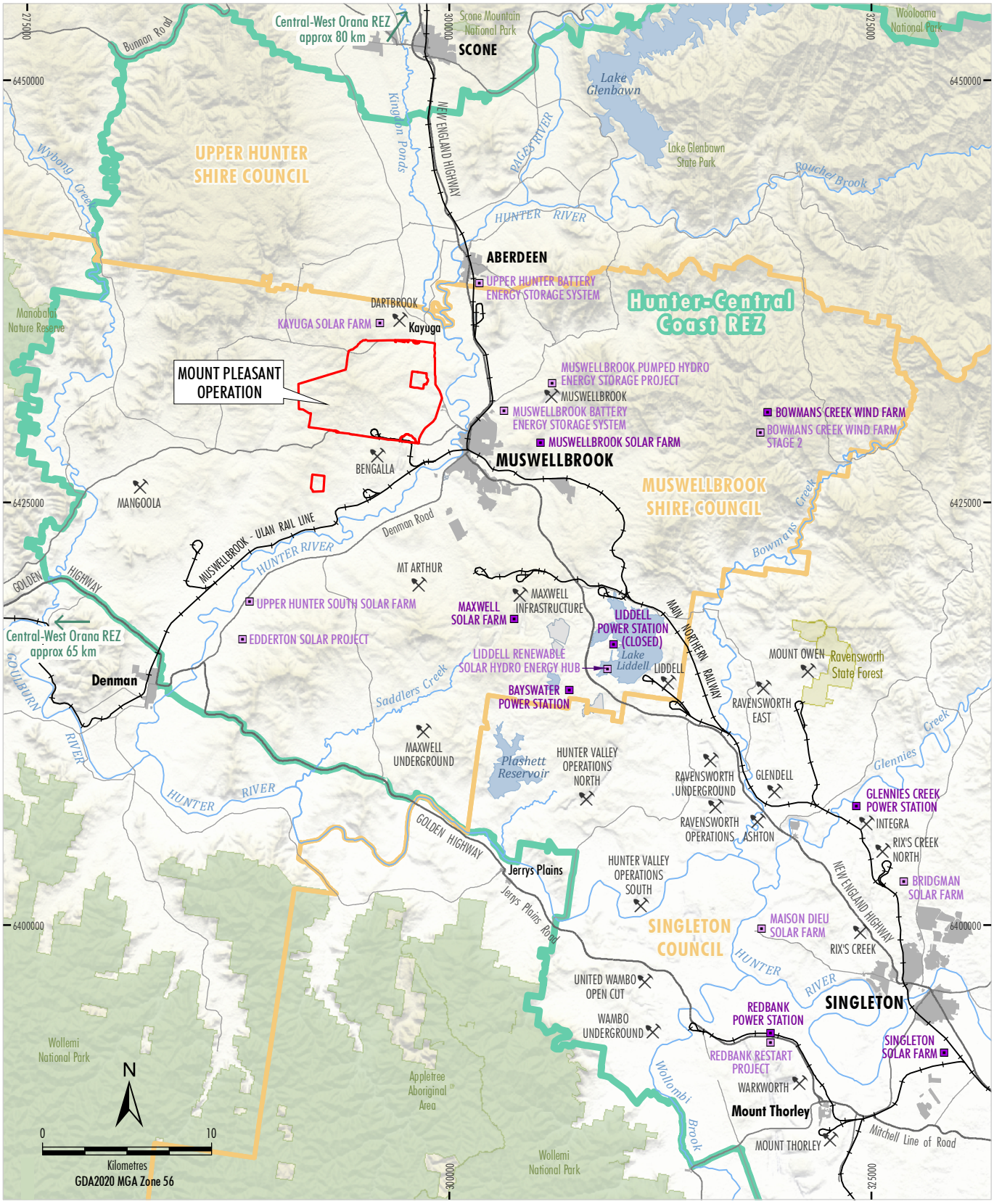
1.2.1 CLIMATE CHANGE AUTHORITY

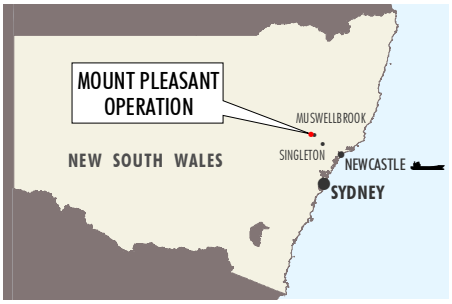
1.2.1.1 2024 ISSUES PAPER: TARGETS, PATHWAYS AND PROGRESS

The Climate Change Authority's (CCA) (2024a) *Targets, Pathways and Progress* paper sets out the authority's initial considerations in making recommendations to the Australian government on 2035 emission reduction targets that are ambitious and achievable. The *Targets, Pathways and Progress* paper notes that each emissions sector can support Australia's transition in various and significant ways that must work together for Australia to achieve net zero (e.g. the transport sector will rely on the electricity sector to deliver clean energy to charge electric vehicles).

The *Targets, Pathways and Progress* paper (CCA, 2024a) also notes that some sectors have very hard-to-abate emissions and may be unable to achieve net zero, whereas the land sector already achieves net negative emissions by removing carbon from the atmosphere. For Australia to achieve net zero emissions economy-wide, any residual emissions remaining in a sector will need to be offset by the removal of carbon from the atmosphere, either within another Australian emissions sector or through accessing carbon markets.

[1] MACH Mount Pleasant Operation Pty Ltd and the unincorporated Mount Pleasant Joint Venture are herein referred to as MACH.





LEGEND

- Mining Operation
- Existing/Approved Major Energy Generation Site
- Proposed Major Energy Generation Site
- Railway
- National Parks and Wildlife Estate
- State Forest/Reserve
- Local Government Boundary
- Hunter-Central Coast Renewable Enery Zone (REZ)
- Mining Lease Boundary (Mount Pleasant Operation)

Source: NSW Spatial Services (2025); EnergyCo (2024)

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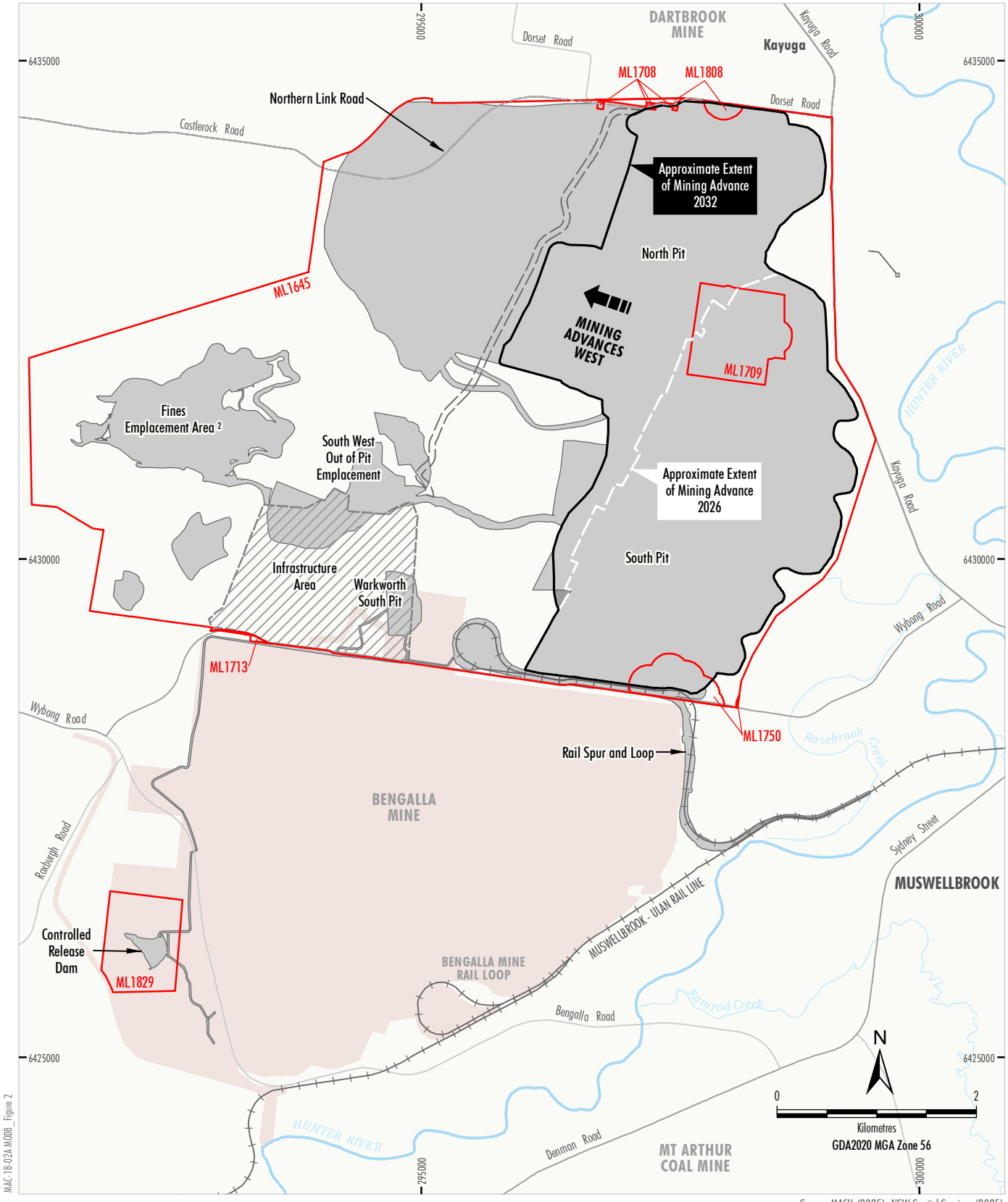
MOUNT PLEASANT OPERATION

Location of the Mount Pleasant Operation

Figure 1



Source: MACH (2025); NSW Spatial Services (2025); Department of Planning and Environment (2016)

LEGEND

- Mining Lease Boundary (Mount Pleasant Operation)
- Approved Surface Disturbance Plan - DA 92/97 [1]
- Services Corridor Being Developed Under SSD-10418 to be Used Under the Modification
- Extension of Open Cut Mining and Emplacement Area (Land Lawfully Disturbed under SSD-10418)
- Revised Infrastructure Area Envelope
- Bengalla Mine Approved Disturbance Boundary (SSD-5170)

[1] Excludes some incidental Project components such as water management infrastructure, access tracks, topsoil stockpiles, power supply, temporary offices, other ancillary works and construction disturbance.

[2] The general arrangement of the Fines Emplacement Area has been amended from the area shown in DA 92/97 to reflect as-built structures.

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MOUNT PLEASANT OPERATION

Overview of the Modification

Figure 2

The *Targets, Pathways and Progress* paper (CCA, 2024a) states that the resources sector contributes to approximately 13.4% of Australia's Gross Domestic Product, accounts for more than two-thirds of Australia's total merchandise exports, and in 2021 contributed some 21% of Australia's Scope 1 emissions.

The *Targets, Pathways and Progress* paper (CCA, 2024a) identified key emissions reduction technologies (of relevance to mining) as including:

- fuel switching from diesel (for mining haulage and equipment) to lower-carbon alternatives, such as renewable diesel or hydrogen; and
- pre-mining drainage and ventilation air methane abatement technologies for fugitive emissions from coal mining.

The *Targets, Pathways and Progress* paper (CCA, 2024a) also identified barriers to deploying these technologies across the resources sector as typically including high upfront costs and asset replacement cycles with large, capital-intensive assets including haulage fleets. *Targets, Pathways and Progress* paper (CCA, 2024a) also identified the lack of maturity of some potential technology solutions in terms of meeting safety or operational performance standards is a barrier, such as with coal mine methane emission reductions technologies and battery or fuel cell electric haulage in mining.

Notwithstanding, the *Targets, Pathways and Progress* paper (CCA, 2024a) also identified enabling measures to support the increased deployment of these technologies including:

- targeted efforts to accelerate research and development and demonstration of more prospective technologies;
- alignment of financial incentives and business models to support investment into decarbonisation opportunities;
- development and access to key enabling infrastructure such as renewable electricity and hydrogen; and
- policy certainty and supportive regulatory settings.

Following the publication of the *Targets, Pathways and Progress* paper, the CCA subsequently published its *Sector Pathways Review* (CCA, 2024b), which further explores potential pathways for key emitting sectors, including the resources sector, as discussed below.

1.2.1.2 SECTOR PATHWAYS REVIEW

In the *Sector Pathways Review* (CCA, 2024b), the CCA examined potential technology transition and emissions pathways in six key emission sectors to support Australia's transition to net zero emissions by 2050:

- electricity and energy;
- transport;
- industry and waste;
- agriculture and land;
- resources; and
- the built environment.

The *Sector Pathways Review* (CCA, 2024b) identified the range of emissions reductions that are achievable through the deployment of available and prospective technologies, and examined the relevant barriers, opportunities and enablers for each key sector.

Part 1 of the Sector Pathways Review addresses the Resources sector, which incorporates Australian mining, oil and gas industries (CCA, 2024b).

The *Sector Pathways Review* (CCA, 2024b) indicates that emissions from the Resources sector contributed some 23% of 2022 national emissions, and these emissions were dominated by fossil fuel combustion and fugitive emissions from the mining, oil and gas subsectors.

Key findings of Part 1 of the *Sector Pathways Review* (Resources) (CCA, 2024b) of potential relevance to the Mount Pleasant Operation include:

> *Decarbonisation of the* (Resources) *sector requires widespread electrification, and deployment of fugitive abatement technologies in oil, gas and coal mining operations.*
> …
> *Electrification can play a significant role in reducing emissions from fuel combustion in the sector. Electric mining haulage and equipment is at pilot scale, with widespread adoption expected after 2030.*
> …
> *Based on available technologies, several sources of emissions across the sector are expected to remain largely unabated while the activities continue. There are few opportunities to significantly reduce fugitive emissions from surface coal mines.*
> …
> *Barriers to electrification and deployment of fugitive abatement measures across the sector include high upfront capital costs, integration challenges within existing facilities and the lack of access to a sufficient firmed supply of renewable electricity.*
> …

Section R.2.2.2 (Emissions reduction levers for mining haulage and equipment) of the *Sector Pathways Review* (CCA, 2024b) identifies that combustion of diesel fuels in mining haulage and equipment accounts for some 14% of the Australian Resources sector emissions.

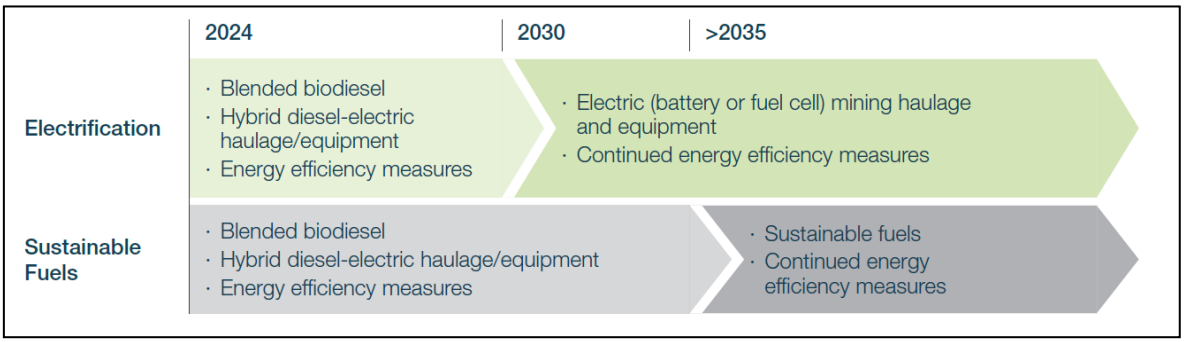
Key emission reduction levers for reducing emissions from mining haulage and equipment, along with a summary of readiness and potential barriers to adoption as identified by the *Sector Pathways Review* (CCA, 2024b) are reproduced in Table 1.

Table 1
Key Mining Haulage and Equipment Emissions Reduction Levers

Emissions Reduction Levers		Readiness	Barriers to Adoption^
Electrification of haulage and equipment	Battery and tethered electric trucks and mining equipment. Trolley assist systems where haul trucks are connected to an overhead cable to power the electric drive.	Demonstration	• low technology maturity; • high capital expenditure (CAPEX); • integration of the required supporting infrastructure to existing mines; • lack of supply of electric haulage and equipment; and • lack of supply of firmed renewable electricity.
Fuel cell electric trucks	Hydrogen fuel cell-powered haulage trucks and mining equipment.	Demonstration	• low technology maturity; • high CAPEX; and • lack of supply of renewable hydrogen.
Sustainable fuels	Fuel switching to more lower carbon fuels such as biodiesel or renewable diesel.	Commercial	• high operational expenditure (OPEX); and • lack of supply of sustainable fuels.

After: CCA (2024b).
^ MACH also notes that electrification of haulage equipment and fuel cell trucks (as described above) are also likely to have barriers to adoption associated with potential impacts on mine planning, production and safety.

Figure R.4 of the *Sector Pathways Review* (CCA, 2024b) provides a schematic diagram illustrating two key prospective alternative decarbonisation pathways for mining and haulage equipment, reproduced below as Figure 3.



After: CCA (2024b).

Figure 3
Prospective Decarbonisation Pathways for Mining and Haulage Equipment

MACH notes that the schematic above indicates that irrespective of which prospective CCA decarbonisation pathway is followed, the initial stage of each is likely to involve some combination of blended biodiesel, hybrid diesel-electric equipment and energy efficiency measures.

The *Sector Pathways Review* (CCA, 2024b) also noted the following potential limitations with respect to the electrification pathway for mining and haulage equipment:

> *A key prerequisite for mine site electrification is access to a sufficient supply of flexible but firmed electricity. Significantly higher electricity demand and increased variability of demand loads are expected as mines electrify. The ability to provide sufficient electricity, either from onsite generation or the grid, to support the electrification of mines has been identified as a key concern by industry.*
>
> *Electrification of a mine site also requires significant enabling infrastructure, including: charging stations, transmission lines and overhead power lines for trolley assist systems. The dynamic nature of some mining operations presents a challenge for the installation of such semi-permanent infrastructure due to continually evolving mine plans.*

The *Sector Pathways Review* (CCA, 2024b) also noted the following potential limitations with respect to the sustainable fuel pathway for mining and haulage equipment:

> *Various mining companies have proposed the use of sustainable fuels as a long-term decarbonisation strategy due to their benefits as drop-in fuels and the operational flexibility they offer. However limited supply of sustainable fuels (and no current domestic supply chain) and expected competition from other sectors with limited alternatives, such as aviation, introduce uncertainty around the viability of this pathway to decarbonise mining haulage.*
> *…*
> *The authority observed there is an information gap relating to the future production, use and import of biofuels in Australia.*

These limitations have been considered when assessing the potential application of alternative sustainable fuels to key mining processes for the Mount Pleasant Operation (Section 3).

Further, Section R.2.2.3 (Emissions pathways for the mining subsector) of the *Sector Pathways Review* (CCA, 2024b) identifies four possible decarbonisation levers specifically for the coal-mining subsector, including potential implementation commencement timeframes (Table 2).

Table 2
Possible Decarbonisation Pathways for the Coal Mining Subsector

Emissions Reduction Levers	Emissions Reduction Opportunity (as % of Total Subsector Emissions)	Estimated Start of Implementation
Battery or tethered electric ancillary fleet	10	2025^
Battery electric haul trucks	13	2030
Ventilation air methane (VAM) and gas drainage	29	2030
Open cut drainage	5	2035

After: CCA (2024b).
^ CCA (2024b) indicates underground mines will electrify first due to enabling regulatory environment, co-benefits of switching from diesel to electric equipment, and the commercial availability of electric equipment for underground operations.

These potential CCA-identified emission reduction levers, and their potential application to the Mount Pleasant Operation (with the exception of VAM, which is an underground mine emissions reduction technology), have been considered in Sections 3 and 4.

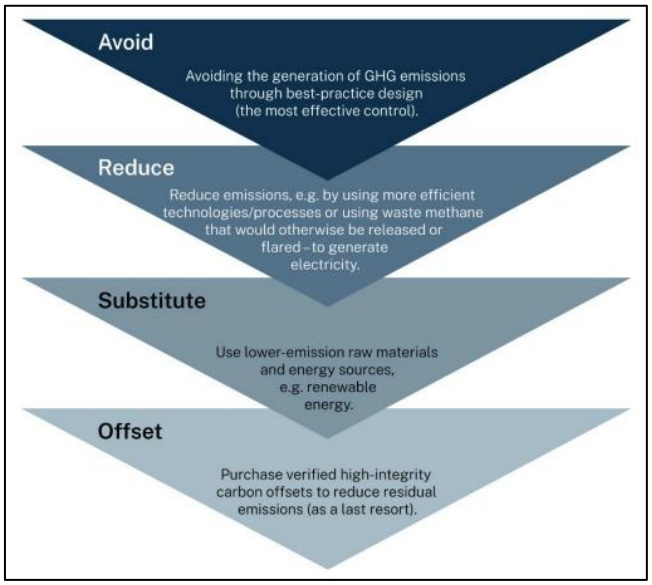
1.2.2 NSW ENVIRONMENT PROTECTION AUTHORITY

1.2.2.1 GUIDE FOR LARGE EMITTERS

In January 2025, following a period of consultation, the Environment Protection Authority (EPA) released the *NSW Guide for Large Emitters - Guidance on how to prepare a greenhouse gas assessment as part of NSW environmental planning processes* (NSW EPA, 2025a) (Large Emitters Guide).

The Large Emitters Guide sets out a description of NSW's emission reduction objectives, types of greenhouse gases, and the EPA's suggested greenhouse gas assessment and mitigation requirements to be addressed in environmental approvals.

Central to the description and evaluation of potential greenhouse gas mitigation measures for the Mount Pleasant Operation is the NSW EPA mitigation hierarchy (NSW EPA, 2025a) (Figure 4).



Source: NSW EPA (2025a).

Figure 4
Greenhouse Gas Mitigation Hierarchy

The Large Emitters Guide describes the key components of the hierarchy as follows (NSW EPA, 2025a):

> ***Avoiding emissions*** *through design may involve:*
>
> - *comparing absolute emissions and emissions-intensity performance metrics with comparable activities*
> - *minimising emissions and intensity at design stage*
> - *adopting more efficient, renewable, and/or low-emissions technologies (**Box 6**).*
>
> *It may be possible to avoid emissions at other stages of the project (construction, commissioning, operations, maintenance and refurbishment) as lower-emissions approaches, materials and technologies become more available and cost-effective. The proponent should consider how they can adopt additional measures over time e.g. when assets are refurbished or replaced.*
>
> ***Reducing emissions*** *can involve:*
>
> - *optimising operational plans, including staging, location and process characteristics such as:*
> - *closed-loop systems and low-impact materials and products*
> - *adapting temporary works for permanent purposes*
> - *reusing or repurposing waste energies and materials and co-products and by-products*
> - *adopting maintenance strategies for optimal productivity from plant, equipment, machinery and vehicles*
> - *embedding mitigation measures in quality management systems for monitoring, reporting and continual improvement*
> - *undertaking energy measurement, verification and audits of activities to identify where and how energy is consumed and wasted. This may identify cost savings or returns on investment, as well as emissions reduction opportunities*
> - *designing and implementing integrated gas management plans for coal mining operations, including effective pre- and post-mining drainage, and the effective capture and use of methane for power generation*
> - *investing in emerging technologies to speed up their implementation, to reduce emissions during the life of the operation*
> - *engaging with supply chains and sourcing from suppliers located close to the activity. Local sourcing can potentially bring further socioeconomic benefits, particularly for areas of relative social disadvantage.*
>
> *…*
>
> ***Substituting emissions*** *may involve:*
>
> - *replacing higher-emissions processes, materials and energy sources or technologies with lower emissions options that produce the same or improved output. For example, solar and battery technologies installed at premises could provide lower-emission energy than fossil-fuelled generators, while reducing operating cost and improving security of supply.*
> - *adapting processes with new technology or materials (for example, using low-temperature methods, natural processes, or more efficient sequencing and finishing)*
> - *replacing fossil-fuelled vehicles, machinery and equipment with battery-electric alternatives that reduce emissions, improve the safety of the working environment, and reduce noise and air pollution in the local communities*
> - *using lower-emission materials that are available, or which could be developed (for example, using recycled materials in concrete, higher-strength steel products, or coatings that increase performance while reducing emissions)*
> - *reviewing the emissions performance of existing assets at end of life and replacing them with lower-emission assets (for example, replacing end-of-life halogen or fluorescent lighting with more efficient LED lighting, which would reduce both emissions and operating costs).*
>
> ***Offsetting emissions*** *must only be done for emissions that cannot be avoided, reduced or substituted (i.e. residual emissions), to meet emission goals.*

MACH has adopted the above methodology to inform the assessment of greenhouse gas mitigation measures for the Mount Pleasant Operation. The mitigation measures assessment has therefore been structured around the NSW EPA mitigation hierarchy.

1.2.2.2 PROPOSED GREENHOUSE GAS MITIGATION GUIDE FOR NSW COAL MINES

Developed as the first sector-specific guidance under the NSW EPA's climate change program, the *Proposed Greenhouse Gas Mitigation Guide for NSW Coal Mines* (NSW EPA, 2025b) (Proposed Mitigation Guide) provides state-specific expectations for reducing greenhouse gas emissions from coal mining operations. The NSW EPA's draft key proposed mitigation measures and implementation dates as set out in the Proposed Mitigation Guide are as follows:

- Methane management[2]:
  - By 2027 – Installation of gas drainage and destruction systems (e.g. flaring or utilisation) at underground mines emitting >25,000 tonnes (t) of carbon dioxide equivalent (CO_2-e) per year (CO_2-e/year).
  - By 2030 – Installation of VAM abatement systems at underground mines emitting >100,000 t CO_2-e/year, subject to safety considerations.
- Diesel emission reductions:
  - By 2030 – at least 5% of fuel used to be a low-carbon alternative to fossil diesel.
  - By 2035 – at least 10% low-carbon fuel uptake.
  - By 2040 – at least 25% low-carbon fuel uptake and 75% of large mining machinery and vehicles to be zero-emission.
  - By 2050 – at least 25% low-carbon fuel uptake and 100% of large mining machinery and vehicles to be zero-emission.

It is noted that the EPA is seeking to have the above requirements apply to all relevant licenced facilities, unless sites have sought and obtained an exemption from the EPA. Exemptions to these proposed mitigation requirements can be sought with sufficient supporting assessment (NSW EPA, 2025b):

> *The EPA recognises that the NSW coal mining sector is complex, with a range of mine types, geological characteristics, mine configurations, mining techniques and regulatory requirements. Coal mining companies are best placed to consider, in detail, whether the various mitigation measures described in this mitigation guide are feasible for their operation.*
>
> *If a mining company determines it is not feasible to implement a mitigation measure, it will be able to seek to be exempt from that requirement. This will need to be supported by documentation that demonstrates the measure is not feasible at the site, by providing a pre-feasibility assessment that is independently verified.*
>
> *If a mine intends to implement a mitigation measure but cannot do so in the timeline set by the EPA, then it can apply to the EPA for an extension …*

Based on its understanding of the current state of development of zero-emission equipment and the current supply and cost of low-carbon fuels, MACH is of the view that these proposed requirements would not be reasonable and feasible at the Mount Pleasant Operation until they are more readily available at significantly lower cost in NSW. Notwithstanding, these mitigation measures are discussed in further detail in Section 3.

1.2.2.3 GREENHOUSE GAS MITIGATION AT NSW COAL MINES LITERATURE REVIEW AND INDUSTRY SCAN

EMM Consulting Pty Limited (EMM) (2025) was commissioned by the NSW EPA to undertake a literature review and industry scan to provide technical information for the NSW EPA to consider in the development of the Proposed Mitigation Guide.

The literature review covered international guidance and measures relating to the mitigation of greenhouse gas emissions from coal mines. The industry scan involved consultation with coal mining companies in NSW to better understand what the coal sector is currently doing to mitigate emissions, to identify the most important factors that influence mine operator decision-making, and to identify potential case studies.

[2] The EPA is seeking feedback on whether this requirement should apply to both underground and surface coal mines.

MACH has considered the literature review undertaken by EMM (2025) as a source of contemporary advice available for NSW coal mines in the development of this Abatement Evaluation. However, MACH has not limited its consideration of potential abatement opportunities to those listed in EMM's (2025) literature review (Section 3). Existing mitigation measures for Scope 1 and 2 emissions identified by EMM (2025) relevant to surface mines have been reproduced in Table 3 along with the relevance of the mitigation measure at the Mount Pleasant Operation.

Similarly, emerging Scope 1 and 2 mitigation measures for surface mines identified by EMM (2025) have been summarised in Table 4, along with MACH's qualitative assessment identification number (if they were assessed in this Abatement Evaluation). MACH has focused its assessment on the key sources of on-site emissions (e.g. diesel consumption and fugitive emissions). Where a measure has not been assessed further, MACH considers it to offer negligible emission reduction potential relative to other more prospective opportunities for the site (e.g. alternative lubricants).

Table 3
EMM 2025 – Summary of Existing Scope 1 and 2 Mitigation Measures at Surface Mines

Greenhouse Gas Source	Mitigation Measure	Notes	Technology Readiness	Potential Barriers	Mount Pleasant Operation Current Status
Existing measures for Scope 1 emissions – diesel combustion					
All heavy mining vehicles and equipment	Mine planning	Planning and scheduling mine operations to minimise material handling, optimise payloads, reduce haul route lengths, reduce gradients and avoid unnecessary stops	Mature	-	Adopted at the Mount Pleasant Operation (Section 2.7.2).
	Fleet planning	Structuring of haul truck fleet (e.g. truck capacity) to minimise energy consumption	Mature	-	Adopted at the Mount Pleasant Operation (Section 2.7.2).
	Energy-efficient units	Procurement of energy-efficient vehicles and equipment, including ventilation, lighting and control systems	Mature	-	Adopted at the Mount Pleasant Operation (Section 2.7.3).
	Servicing and maintenance	Maintenance of vehicles and equipment according to manufacturers' specifications	Mature	-	Adopted at the Mount Pleasant Operation (Section 2.7.2).
	Renewable fuels	Switching to biodiesel (likely to be an interim measure)^	Mature	• High OPEX • Lack of supply • Vehicle modifications^ • Long-term storage^ • Increased maintenance^	Not currently adopted at the Mount Pleasant Operation (Section 3.1).
Light vehicle	Electrification	Hybrid, Battery Electric Vehicle (BEV)	Mature	• High CAPEX • Range • Power limitations	Not a key emissions source at the Mount Pleasant Operation. Not discussed further.
Haul trucks	Driver training	Eco-driving	Mature	-	Adopted at the Mount Pleasant Operation (Section 2.7.2).
Existing measures for Scope 1 emissions – fugitive methane (Active Surface Mines)					
Drainage gas	None identified	-	-	-	Not currently adopted at the Mount Pleasant Operation (Section 2.7.2).

Table 3 (Continued)
EMM 2025 – Summary of Existing Scope 1 and 2 Mitigation Measures at Surface Mines

Greenhouse Gas Source	Mitigation Measure	Notes	Technology Readiness	Potential Barriers	Mount Pleasant Operation Current Status
Existing measures for Scope 1 emissions – other processes					
Petrol combustion	Electrification	Hybrid, BEV	Mature	-	Not a key emissions source at the Mount Pleasant Operation. Not discussed further.
	Driver training	Eco-driving	Mature	-	
Ammonium nitrate-fuel oil (ANFO) combustion	Optimised blasting strategy	Optimisation of blasting to minimise the movement of equipment and rehandling of material	Mature	-	Blasting at the Mount Pleasant Operation is planned to minimise equipment and material movement and developed in accordance with the Blast Management Plan.
Oils, greases	Recycling	Recycling of oils and greases	Mature	-	Oils and greases are recycled wherever practicable at the Mount Pleasant Operation.
Fugitive sulfur hexafluoride (SF_6)	Best practice management	Operational protocols, gas accounting, training, recycling, Leak Detection and Repair (LDAR), equipment upgrades	Mature	-	SF_6 emissions are considered a negligible source of greenhouse gases at the Mount Pleasant Operation, however electrical infrastructure is regularly maintained to prevent leaks.
Coal oxidation (stockpiles)	Various measures	Covering and sealing stockpiles, dust suppressants, biochemical agents, spraying with water, stockpile management, temperature monitoring	Mature	Covering/sealing: operating costs, integration with existing stockpiling infrastructure/methods, re-handling (i.e. adding/removing covers)	The Mount Pleasant Operation manages coal oxidisation (i.e. spontaneous combustion) in accordance with the Air Quality and Greenhouse Gas Management Plan. Mitigation measures include temperature monitoring, spraying with water and stockpile management.
Vegetation removal	Best practice management	Minimising vegetation clearing, re-use of the removed vegetation, rehabilitation of land as quickly as possible	Mature	-	Adopted at the Mount Pleasant Operation (Section 2.7.1).

Table 3 (Continued)
EMM 2025 – Summary of Existing Scope 1 and 2 Mitigation Measures at Surface Mines

Greenhouse Gas Source	Mitigation Measure	Notes	Technology Readiness	Potential Barriers	Mount Pleasant Operation Current Status
Existing measures for Scope 2 emissions					
Purchased electricity	Various energy efficiency measures	Reduction of electricity use through, for example, variable-speed drives on motors, the use of the latest high-efficiency air conditioners, fans and pumps, ventilation system maintenance improvements, timers on air conditioning units and lights	Mature	-	Adopted at the Mount Pleasant Operation (Section 2.7.3).
	Renewable grid electricity	Source renewable energy via an independent power provider	Mature	• Lack of supply of firmed renewable electricity • Limited incentives under the Safeguard Mechanism	Not adopted at the Mount Pleasant Operation to date (Section 3.1.3).

After: EMM (2025).
^ MACH notes some of the limitations of biodiesel identified by EMM (2025) do not equally apply to renewable diesel (Section 3.2.1).

Table 4
EMM 2025 – Summary of Emerging Scope 1 and 2 Mitigation Measures at Surface Mines

Greenhouse Gas Source	Mitigation Measure	Notes	Technology Readiness	Potential Barriers^	Risks or Disadvantages*	Qualitative Assessment ID
Emerging measures for Scope 1 emissions – diesel combustion						
Haul trucks	Electrification	On-board: hybrid, BEV[(1)(5)]	Research and Development (R&D) to demonstration (>2030-2035) (possibly earlier for underground mines)	• Technology development needed • Lack of supply of vehicles • Lack of supply of firmed renewable electricity • Integration of the required supporting infrastructure to existing mines • High CAPEX	• Risk of collision due to quiet operation • New worker safety issues • Batteries • Battery efficiency affected by climate • Battery fires	MPO-Diesel-11/25-9, 16
		On-board: fuel cell/H2[(5)]		• Lack of supply of renewable hydrogen • High cost of renewable hydrogen		MPO-Diesel-11/25-5, 6
		Tethering: connection to a fixed electricity supply[(5)]		• Impractical for haul trucks at surface coal • Mines due to distances involved		-
		Trolley assist: connection to an overhead cable to power an electric drive[(1)(5)]		• Likely to be impractical for surface coal • Mines due to evolving mine plans		MPO-Diesel-11/25-14, 15
Other heavy mining vehicles and equipment	Electrification	General electrification of mine equipment other than haul trucks	R&D to demonstration (>2025)	• Technology development needed • Lack of supply of vehicles • Lack of supply of firmed renewable electricity • Integration of the required supporting infrastructure to existing mines • High CAPEX	• Battery efficiency affected by climate • Battery fires • New worker safety issues	MPO-Diesel-11/25-8, 10

Table 4 (Continued)
EMM 2025 – Summary of Emerging Scope 1 and 2 Mitigation Measures at Surface Mines

Greenhouse Gas Source	Mitigation Measure	Notes	Technology Readiness	Potential Barriers^	Risks or Disadvantages*	Qualitative Assessment ID
		Tethering: connection to a fixed electricity supply	Demonstration to mature (>2025)	• Requires high-voltage infrastructure • Challenged by on-board electric power • Restricted operational flexibility	• Safety (high-voltage cables)	MPO-Diesel-11/25-11, 12, 13
		Automation[2]	Demonstration to mature	• Technology development needed • High CAPEX	• New worker safety issues • Elimination of jobs	MPO-Diesel-11/25-18
All vehicles and equipment	Renewable fuels	Switching to renewable diesel	Demonstration to mature (>2025)	• High OPEX • Lack of supply, and possible competition from other sectors	-	MPO-Diesel-11/25-1, 2, 3, 4
Emerging measures for Scope 1 emissions – fugitive methane (Active Surface Mines)						
Drainage gas	Flaring	Capture of gas through boreholes, followed by combustion in a flare	Reduce (reduces Global Warming Potential [GWP] through conversion of CH_4 to CO_2)	• Lack of financial incentive • No regulatory driver • Decreasing CH_4 output over time	• Air pollution and noise • Safety (e.g. air ingress) • Residual CO_2 emissions	MPO-Diesel-11/25-7, MPO-Fugitive-11/25-1
	Utilisation (any purpose)	Capture of gas through boreholes, followed by utilisation[3][6]	Reduce (reduces GWP through conversion of methane [CH_4] to CO_2)	• Cost to purify gas for utilisation • Low or variable CH_4 concentrations • Lack of supporting infrastructure for utilisation	• Residual CO_2 emissions	
Emerging measures for Scope 1 emissions – other processes						
Petrol combustion	None identified	-	-	-	-	-
ANFO combustion	Waste oils or renewables	Alternative fuels	Demonstration (>2025)	• Compliance with regulations • Market availability	• Blasting safety • Performance consistency	MPO-Diesel-11/25-3

Table 4 (Continued)
EMM 2025 Summary of Emerging Scope 1 and 2 Mitigation Measures at Surface Mines

Greenhouse Gas Source	Mitigation Measure	Notes	Technology Readiness	Potential Barriers^	Risks or Disadvantages*	Qualitative Assessment ID
Oils, greases	Alternative lubricants	-	-	-	-	-
Fugitive SF_6	None identified	-	-	-	-	-
Coal oxidation (stockpiles)	None identified	-	-	-	-	-
Vegetation removal	Pyrolysis	Thermal degradation of vegetation using low-oxygen technology to produce biochar	Demonstration to mature	• Market availability	• Feedstock variability • Fire risk	-
Emerging measures for Scope 2 emissions						
Purchased electricity	On-site renewable electricity generation[4][7]	Wind, solar or geothermal power	Demonstration to mature	• High CAPEX • Regulatory approvals • Space constraints	• Reliability (dependency on weather)	MPO-Electricity-11/25-1
	On-site energy storage (batteries)	Facilitates the wider electrification of mining operations	Demonstration to mature (>2025)	• Battery size and robustness needed for mine sites	• Replacement potentially every few years leading to more greenhouse gas lifecycle emissions and costs • Safety (overheating leading to fires or explosions) • Environmental (leaks causing contamination of water/soil)	MPO-Electricity-11/25-1

After: EMM (2025).

^ MACH notes that additional potential barriers may also include: (1) high stress on grid, requiring strong grid firming; (2) emissions reduction difficult to determine; (3) lack of financial incentive to utilise gas rather than flare; (4) difficulty in securing social licence from community to progress renewable installations.

* MACH notes that potential risks or disadvantages may also include: (5) electricity grid disruption through swinging loads; (6) offset calculation methodology for coal mine waste gas to power is no longer applicable with new methodology; (7) increased maintenance required if solar panels are located on site.

2 GREENHOUSE GAS EMISSIONS CONTEXT

This section provides an overview of the greenhouse gas emissions context relevant to current mining operations. It outlines MACH's emission reduction objectives, electricity supply characteristics, operational life-of-mine considerations, and current key sources of Scope 1 and Scope 2 emissions. It also summarises the composition of the mining fleet and outlines the existing reasonable and feasible mitigation measures currently implemented across site operations.

The Mount Pleasant Operation, while owned by MACH, is largely operated by major mining and processing contractors (i.e. currently Thiess and Sedgman). This contractor-based operating model influences operational decision-making, with performance being highly focused on production efficiency.

2.1 MACH EMISSION REDUCTION OBJECTIVES

MACH's greenhouse gas policy of relevance to the site's evaluation of greenhouse gas emissions reduction objectives and opportunities is as follows:

> *MACH Energy Australia Pty Ltd is committed to achieving net zero Scope 1 and Scope 2 emissions from its operations by 2050, and complying with progressively declining interim net emission reduction targets as may be applicable to its operations under the Safeguard Mechanism and associated Commonwealth legislation.*

2.2 ELECTRICITY SUPPLY CONTEXT

The Mount Pleasant Operation is located near Muswellbrook, where grid electricity is supplied through the 132 kilovolt (kV) network that services the Hunter Valley. The regional transmission network is primarily supported by the 330/132 kV Muswellbrook and Bayswater substations, which form part of TransGrid's high-voltage system linking the Liddell–Bayswater generation precinct to the broader NSW grid.

TransGrid's (2025) *Transmission Annual Planning Report* discusses various planned electrical infrastructure upgrades to the Northern NSW area, however, none target the Muswellbrook area.

The Mount Pleasant Operation is powered by a 66 kV overhead transmission line, which supplies electricity to the site via an intake switching station. Power is then distributed through a network of overhead and underground cables to major facilities, including the coal handling and preparation plant (CHPP) and water storage infrastructure.

The Mine Infrastructure Area has recently installed solar panels that generate approximately 100,000 kilowatt (kW) hour of electricity annually, representing approximately 0.2% of the operation's total power consumption in Financial Year (FY) 25. The solar system supplies the Mine Infrastructure Area including powering two electric vehicle charging stations, with surplus production going into the MPO grid (which also powers the CHPP and other powered items on-site, including pumps and water fill points).

MACH has an existing electricity retail agreement in place with an energy generation company that extends to 2027; surrender of mandatory Large-scale Generation Certificates are part of this agreement. Additional information on solar initiatives that have been evaluated at the Mount Pleasant Operation is discussed in Section 2.7.2.

2.3 LIFE-OF-MINE CONTEXT

The Mount Pleasant Operation began construction in 2016 with coal first being mined in 2018. Mining activities at the Mount Pleasant Operation have been undertaken to date by Thiess, with the mining contractor providing progressive delivery of major mobile mining equipment in alignment with operational demands.

Under the currently approved Development Consent DA 92/97, mining is approved to continue until 22 December 2026. The Modification proposes a six-year extension of permitted mining operations to 31 December 2032. Major mobile equipment purchases by MACH (i.e. rather than by the mining contractor) are therefore expected to be limited under the Modification, with no material increase in the overall fleet size anticipated.

Accordingly, opportunities for significant new equipment procurement are expected to be more limited under the Modification, with any replacement or major rebuilds primarily driven by equipment condition, safety and reliability requirements (Section 2.5).

2.4 MINING EMISSIONS CONTEXT

Estimated life-of-mine emissions for the Mount Pleasant Operation under the proposed Modification have been calculated by Todoroski Air Sciences and are presented in Attachment A to the Greenhouse Gas Assessment and Mitigation Plan. The following discussion on major emissions sources is sourced from this data and has been augmented by recently collected diesel consumption data on-site.

Figure 5 provides a summary of Scope 1 and 2 emission sources for the Mount Pleasant Operation under the proposed Modification, disaggregated by key source as percentage contributions. Diesel consumption (approximately 45%) and fugitive emissions (approximately 42%) are the largest contributors to emissions, with the remainder (approximately 13%) sourced from land clearing, explosives and Scope 2 electricity consumption.

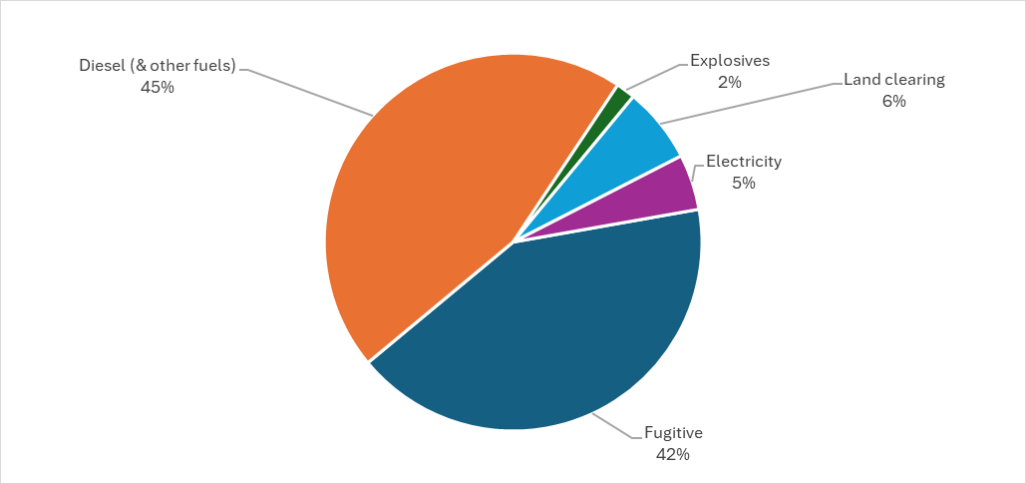


Figure 5
Breakdown of Total Predicted Scope 1 and 2 Emissions for the Mount Pleasant Operation Under the Proposed Modification by Source

Diesel Consumption

As shown on Figure 5, diesel consumption in mobile fleet items and fugitive emissions are the primary source of greenhouse gas emissions at the Mount Pleasant Operation under the proposed Modification.

Figure 6 provides a summary of 2025 key mobile fleet item diesel consumption at the Mount Pleasant Operation for the period January to October, and illustrates that, in this period, haul trucks (55%) were the largest diesel consumers followed by excavators (24%) and dozers (12%).

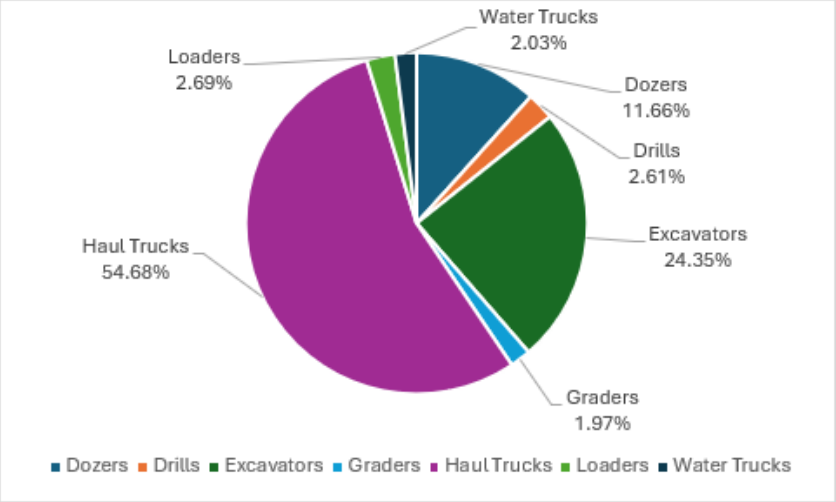


Figure 6
Breakdown of Mobile Fleet Diesel Consumption at the Mount Pleasant Operation Jan-Oct 2025

Projected future proportional diesel demand over the life of the operation is expected to follow similar trends and life-of-mine estimates provided in Figure 7.

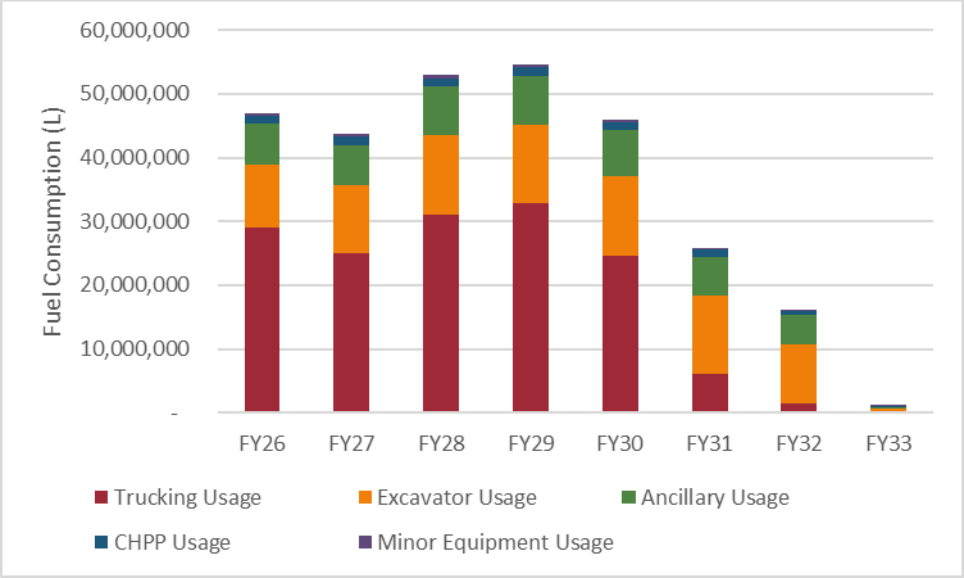


Figure 7
Breakdown of Projected Diesel Consumption at the Mount Pleasant Operation Under the Proposed Modification

Figure 7 presents the projected diesel consumption profile for key mobile fleet items over the life of the Mount Pleasant Operation under the proposed Modification. Diesel demand is forecast to gradually increase in the early years as mining progresses westwards and haul distances lengthen, resulting in higher fuel burn across the fleet. Consumption peaks between approximately FY2029 during the maximum production phase before declining as mining activities progressively wind down.

Haul trucks remain the dominant diesel users throughout the-life-of mine, accounting for roughly half of total fuel consumption. Excavators consistently represent the second-largest fuel consumers (around 25-30%). CHPP, ancillary and minor equipment usage such as dozers, graders, water carts, service carts comprise the remaining share.

Fugitive Emissions

A summary of the gas domain at the Mount Pleasant Operation is provided in Table 5. The Mount Pleasant gas domain is characterised by a single distinct gas domain where low gas concentrations, dominated by carbon dioxide, are present to a depth of approximately 100 metres (m), followed up by an increase in gas content and transition to up to 100% methane at a depth of approximately 350 m.

Table 5
Summary of Gas Content at the Mount Pleasant Operation

Depth Interval	Gas Content (m^3/t)	CH_4 (Ratio)	CO_2 (Ratio)	Total CO_2-e (t/t)
0 to 25 m	0.58	0.18	0.82	0.00281
25 to 50 m	0.67	0.36	0.64	0.00542
50 to 75 m	0.77	0.28	0.72	0.00511
75 to 100 m	0.89	0.44	0.56	0.00838
100 to 125 m	1.09	0.57	0.43	0.01263
125 to 150 m	1.38	0.86	0.14	0.02245
150 to 175 m	1.83	0.79	0.21	0.02833
175 to 200 m	2.33	0.96	0.04	0.04271
200 to 225 m	2.74	0.98	0.02	0.05095
225 to 250 m	3.17	0.98	0.02	0.05907
250 to 275 m	3.54	0.98	0.02	0.06631
275 to 300 m	3.91	0.99	0.01	0.07355
300 to 325 m	4.46	0.99	0.01	0.08433
325 to 350 m	4.87	1.00	0.00	0.09234

Source: CoalBed (2022).
Note: m^3/t = cubic metres per tonne, t/t = tonnes per tonne
MACH notes that the depth of mining under the Modification proposal does not extend to 350 m and typically remains above 175m.

Figure 8 presents the forecast annual fugitive emissions for the Mount Pleasant Operation under the proposed Modification. Emissions are expected to peak in FY30 due to increased extraction below 125 m.

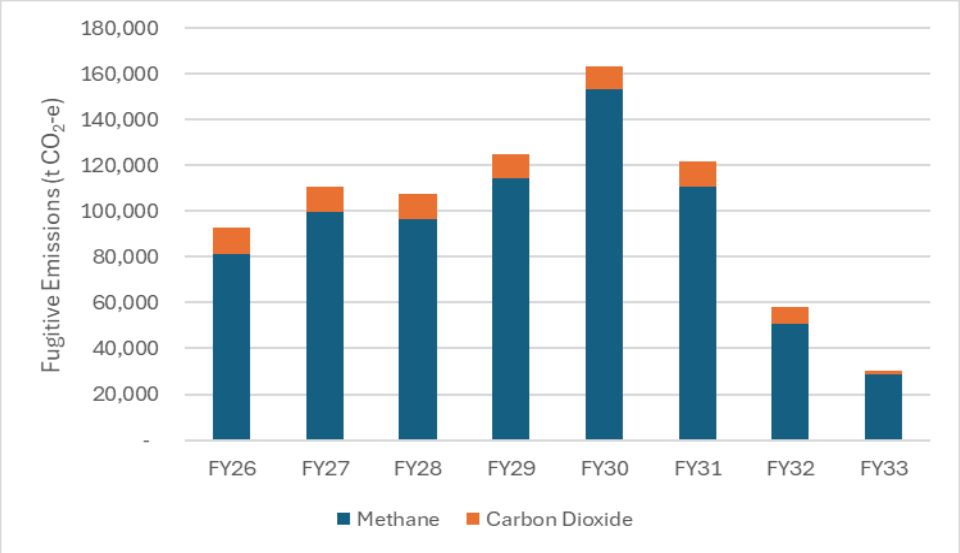


Figure 8
Fugitive Emissions at the Mount Pleasant Operation Under the Proposed Modification

2.5 MINING FLEET DEMANDS AND SCHEDULING

Until recently, the mining fleet utilised at the site was supplied and operated under a contractor mining model, with major equipment owned and maintained by the mining contractor (i.e. Thiess). During this period, MACH's involvement was primarily limited to fuel supply and broader operational oversight, with diesel provided directly to the contractor to support fleet operations.

MACH has recently commenced procurement of some of its own primary mining equipment. This shift is expected to provide MACH with greater control over mobile fleet buying decisions, maintenance scheduling, and access to future decarbonisation options over the life of the operation.

Under the Modification timeframe (i.e. to 2032) and given that ROM coal production remains broadly consistent with existing approved production rates under DA 92/97 (unlike SSD 10418), only limited additional fleet procurement is anticipated. Major fleet expansion is not expected under the Modification, with procurement primarily focused on maintaining operational continuity rather than significantly increasing fleet size (Figure 9).

Specifically, indicative scheduling based on average equipment lifespans shows:

- **Drills**: Limited additional new drill purchases expected around 2028 to 2029.
- **Dozers**: No major new dozer acquisitions are anticipated within the Modification period.
- **Loaders**: One additional loader purchase is anticipated around 2026, with a potential replacement unit around 2028 to 2029.
- **Excavators**: One additional excavator purchase is anticipated around 2027.
- **Graders**: No major new grader purchases are anticipated within the Modification timeframe.
- **Haul Trucks**: Limited additional new truck purchases are anticipated from 2026 to 2027 only.

Final fleet composition, procurement timing, and associated emissions profiles/technology decisions will be determined by MACH's evaluation of reasonable and feasible equipment selection at the relevant decision-points. MACH's procurement process for major capital mobile equipment will continue to include consideration of reasonable and feasible greenhouse gas emission reduction opportunities and particulate emissions.

2.6 KEY POTENTIAL ABATEMENT OPPORTUNITIES TRIALLED TO DATE

MACH and its mining contractor (Thiess) have trialled a number of emission abatement technologies, the results of which have informed the following evaluations. A summary of these trials and outcomes is provided below.

Equipment Eco-Mode

MACH and Thiess have trialled the Caterpillar (CAT) 24 grader eco-mode (at the Mount Pleasant Operation) and the Komatsu 930E reduced-horsepower mode (at an alternative site) to evaluate the feasibility of employing energy-efficient operating modes provided as an option by these manufacturers.

Both emission reduction trials were discontinued following evaluation due to unacceptable impacts on grading performance and material movement productivity (measures in bank cubic metres per hour). Measured comparative changes in fuel consumption observed were only modest. Notwithstanding, MACH will continue to investigate alternative operating modes for on-site heavy mine equipment when additional opportunities/systems become available.

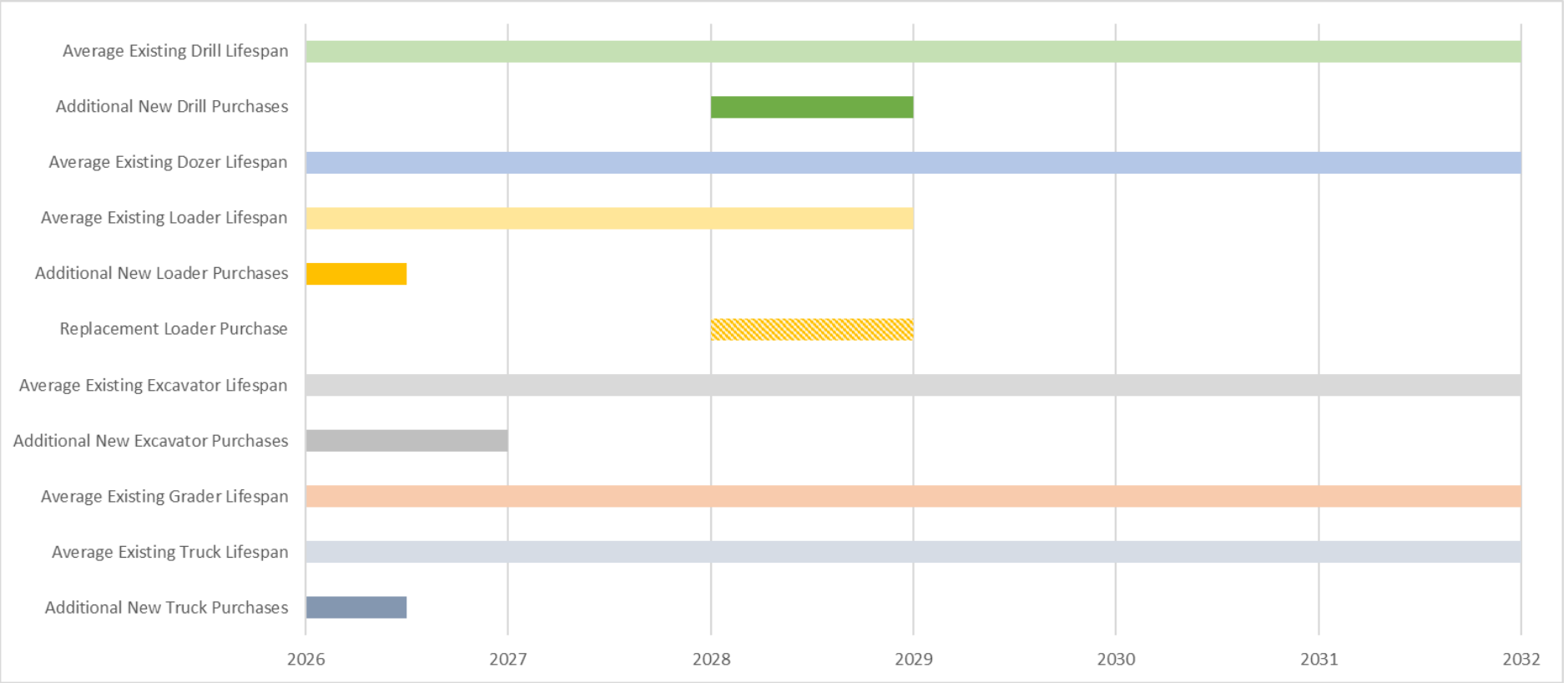


Figure 9
Indicative Fleet Procurement and Replacement Timeline Under the Proposed Modification

Hydrogen-Powered Genset

MACH and Thiess conducted a trial at the Mount Pleasant Operation using a small hydrogen-fuelled generator to power a cribbing and refuelling facility near the active pit. The generator ran continuously throughout the trial and demonstrated that hydrogen can reliably support low-demand site services.

However, broader rollout was not pursued. The trial highlighted that securing a consistent, affordable supply of hydrogen (and particularly green hydrogen) remains a significant barrier, limiting the practical application of this technology.

Hydrogen Trickle-feed

Thiess has previously trialled hydrogen trickle-feed technology across several assets, including two CAT 793D haul trucks at Prominent Hill (2023) and one CAT MD6310 drill rig at a NSW mine site (2024). The system generates hydrogen on-board using alternator power and injects small volumes of hydrogen into the engine air-intake to improve combustion efficiency. The technology is marketed as providing a 5–13% reduction in diesel consumption, reduced particulate emissions, and minimal safety risks, as no hydrogen is stored onboard.

During the trials, Thiess assessed safety impacts, diesel reduction potential, downtime requirements, oil contamination risk, system reliability and the verifiability of any carbon reduction benefits. Although no significant operational or safety concerns were identified, measured fuel savings and carbon abatement were indeterminate, and the system's performance could not be reliably validated in heavy mining applications. Based on current cost, uncertainty in measurable abatement, and insufficient evidence of financial viability, the technology was not considered suitable for adoption at this time.

MACH will continue to monitor broader market experience, particularly in long-haul transport applications where the technology may mature further and potential modest efficiency gains can be more readily quantified.

Natural Gas as Co-Fuel in Haul Trucks

Thiess has undertaken a dual-fuel (compressed natural gas [CNG]-diesel) program on CAT 793F haul trucks at a mine site in Queensland, evaluating the potential for natural gas or fugitive methane to reduce diesel and associated Scope 1 emissions. Stage 1 of the program (2023) involved one 793F with a high-compression engine, but substitution rates were below target due to engine compatibility issues.

A more detailed Stage 2 trial was undertaken from May to November 2024 on two CAT 793F trucks with low-compression engines, using CNG transported to site via a pipeline. Stage 2 recorded significantly improved performance, achieving an average 71% net diesel substitution and a measured emissions reduction of approximately 19%. No material safety or operability issues were encountered, and operators reported no discernible change in truck performance.

Key constraints identified relate to gas supply logistics and financial viability. For the Mount Pleasant Operation specifically, the feasibility would require access to local methane gas to avoid the costs and complexities of transporting CNG long distances. Thiess notes that the system can be adapted to other truck types (e.g. 793D), and that a trial program could be a logical next step should local gas availability or fugitive-gas capture opportunities be applicable.

At present, wider adoption is not considered commercially viable for the Mount Pleasant Operation due to the lack of local gas supply. However, MACH will continue to monitor developments in fugitive methane availability, and, pending the outcome of the Fugitive Gas Data Programme this technology may be investigated further (Section 2.8.2).

2.7 EXISTING REASONABLE AND FEASIBLE MITIGATION MEASURES

Key existing reasonable and feasible mitigation measures implemented at the Mount Pleasant Operation are discussed below, disaggregated by the mitigation hierarchy outlined by the NSW EPA in Figure 4. The existing mitigation measures described below primarily relate to energy efficient operations and practices.

2.7.1 AVOID

Mobile Fleet/Plant Maintenance

MACH and its contractors implement measures to maintain the fleet in good operating order, including:

- servicing all machinery in accordance with maintenance contracts and adopting Original Equipment Manufacturer (OEM) recommendations for maintenance;
- targeted maintenance, as far as reasonably practical, equipment remains fit for purpose over its whole life cycle; and
- define failure modes, effects and criticality which helps to minimise potential equipment failure.

MACH and/or its mining contractor have remote access to monitor many on-site individual major mobile plant items, where fuel usage statistics and other operational performance data can be accessed and are reviewed regularly. Aberrations in fuel consumption or other operational performance measures can then be used to prioritise equipment maintenance.

Body Selection and Optimisation

The Mount Pleasant Operation optimises truck body selection to maximise efficiency, with Cat 793s featuring a combo body for transporting both waste and coal and Komatsu 930Es featuring a lightweight waste-specific body type. Lightweight of tray design and construction increases potential truck payloads by up to 15 t per load and correspondingly avoids unnecessary fuel consumption by optimising truck payload and productivity.

Mobile Fleet Operation

The Mount Pleasant Operation undertakes a range of emission reduction avoidance measures that are aimed at avoiding unnecessary diesel emissions, including:

- optimising truck payloads to maximise productivity and efficiency;
- reducing idling (non-productive) time;
- sequencing routes and necessary driver activities/breaks to minimise off-haulage (non-productive) path activities; and
- scheduling activities so that equipment and vehicle operation and maintenance is optimised.

For waste movement particularly, mining teams receive ongoing training and information sharing to reinforce the importance of efficient loading, tipping and material placement, consistent with site cost and productivity principles.

Mine Planning

Emissions are eliminated or avoided by removing unnecessary activities in the development of an efficient design of the mine and its progression over time, whilst balancing constraints including safety and environmental considerations and the types of equipment available commercially that are reasonable and feasible to adopt.

Vegetation Clearing

A Vegetation Clearance Protocol (VCP) has been implemented to minimise native vegetation clearing at the Mount Pleasant Operation.

The VCP includes a range of pre-clearance and clearance control measures, such as targeted ecological surveys, salvage of habitat material, and clearly defined disturbance boundaries. Disturbance of vegetation is restricted to the approved disturbance footprint, and the area cleared at any given time is generally limited to what is required for the subsequent 12 months of operations. This staged approach minimises unnecessary disturbance of vegetated areas. These clearance restrictions contribute to the avoidance of greenhouse gas emissions by minimising the disturbance of existing vegetation and carbon sinks that would otherwise be lost through land clearing.

Progressive rehabilitation at the Mount Pleasant Operation is discussed in Section 2.7.4.

2.7.2 REDUCE

Under the NSW greenhouse gas mitigation hierarchy (Figure 4), reduction measures target a decrease in diesel fuel consumption or electricity consumption per unit of productive output through optimised fleet utilisation, monitoring, and operational refinements that enhance efficiency without eliminating the activity.

At the Mount Pleasant Operation, these strategies are employed to minimise the energy intensity of core hauling, loading, and support equipment cycles.

Mine Planning

Mine planning is a key mechanism for maximising operational efficiency and reducing energy consumption (i.e. diesel burn) and associated greenhouse gas emissions. Effective planning and scheduling activities include:

- Optimising pit and dump sequencing to minimise rehandling, reduce haul distances, and maximise the use of in-pit dumping and backfilling opportunities.
- Designing efficient haul routes to minimise travel distances, gradients and intersections, and to avoid unnecessary stops or idling.
- Configuring loading, transit and unloading areas to streamline truck movements and reduce waiting or queuing times.
- Implementing payload management systems to optimise payload for each cycle, maximising fuel efficiency and reducing total truck hours.
- Maintaining haul roads in good condition to minimise rolling resistance, fuel burn and tyre wear.

At the Mount Pleasant Operation, mine planning processes incorporate detailed cost–benefit analyses on materials handling options, including the planning, installation and use of cross-pit bridges to reduce haul distances and truck operating hours (Plate 1).

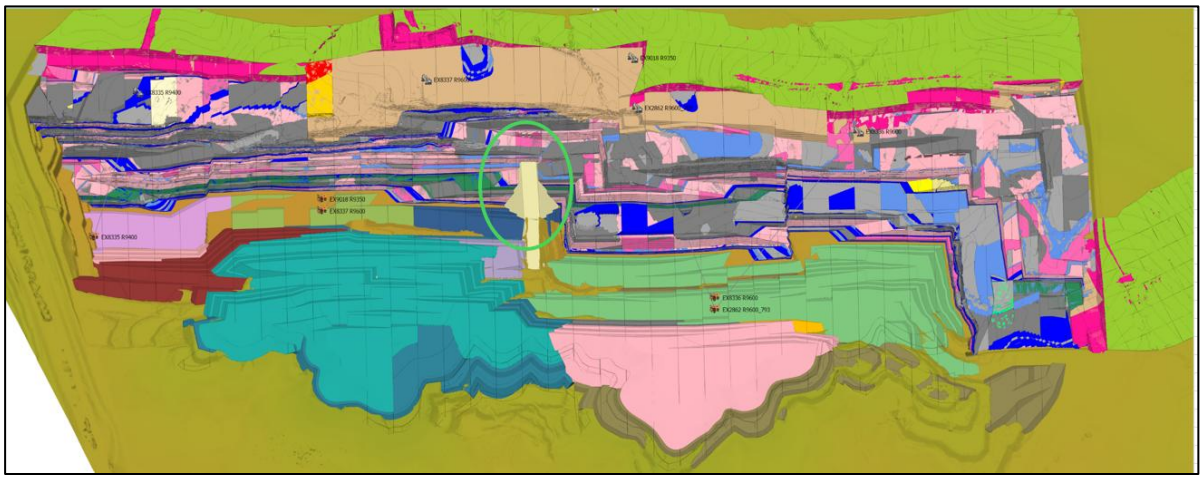


Plate 1
Example planned cross-pit bridge design to optimise haulage lengths from Q1 2026

The Mount Pleasant Operation is also currently in the process of implementing a fleet management system project that will integrate real-time ROM bin level data to optimise haul truck dispatching and minimise waiting times and back-hauls between alternative ROM pad destinations. This system is expected to deliver reductions in idle time and fuel usage through improved coordination of the coal haulage fleet.

Fleet Planning and Monitoring

Fleet planning and monitoring at the Mount Pleasant Operation focus on real-time data capture, circuit-based workflows, and targeted interventions to cut non-productive fuel burn.

Key actions include:

- Idle, queue and hang time management using onboard telematics with auto shut-down protocols.
- Maintaining the fleet in good operating order, including:
  - servicing all machinery in accordance with maintenance contracts and adopting OEM recommendations for maintenance;
  - targeted maintenance, as far as reasonably practical, equipment remains fit for purpose over its whole life cycle; and
  - define failure modes, effects and criticality which helps to minimise potential equipment failure.
- Service metre unit erosion tracking and reporting to manage unproductive work time and associated diesel consumption.
- Circuit-based operational efficiency focus (e.g. on-circuit parking areas, operator swap-out on-circuit, refuelling and night-shift second meal breaks conducted on-route to eliminate empty (non-productive) travel).
- Improved fuel monitoring via a smart tag radio frequency identification (RFID) rollout (Section 2.8.1).
- Daily pre-start inspections and OEM-compliant maintenance to sustain peak fuel economy.

Scope 2 Energy Efficiency

Electricity consumption across the Mount Pleasant Operation is currently monitored via a single point meter, with estimates used to apportion consumption between the CHPP and other site activities such as water management.

A 99 kW solar system was installed and commissioned at the Mount Pleasant Operation Mine Infrastructure Area in 2023, contributing a small proportion of the site's overall electricity requirements. In addition, a range of smaller solar-powered units are in use across the site, including lighting, communications and camera systems.

Several concept or pre-feasibility studies have been undertaken since MACH purchased the asset to consider the potential of larger-scale renewable generation at the site, including floating solar installed on the mine water dam, a 50 MW solar farm adjacent to the mine, and additional solar installations within the Mine Infrastructure Area. These studies each concluded that such projects were not economically viable based on the significant payback period, capital cost and associated risks at the time the analyses were conducted.

Progressive lighting efficiency upgrades are also ongoing, with a progressive conversion to LED lighting at the Mine Infrastructure Area expected to be completed by mid-2026.

2.7.3 SUBSTITUTE

Mobile Fleet Procurement and Planning

The procurement of fuel-efficient mining vehicles and equipment remains an important aspect of operational management. Prioritising machinery with improved fuel efficiency and lower engine emissions helps reduce both greenhouse gas emissions and operating costs ahead of the widespread availability of low- and zero-emission alternatives.

The NSW EPA intends to place conditions on all coal mine licences requiring that new large (>560 kW) non-road diesel machinery meet the United States EPA Tier 4 emission standards (or better) (NSW EPA, 2024).

MACH undertook a heavy mining equipment procurement review in 2025, covering key excavator and haul truck fleets at the Mount Pleasant Operation. As part of this assessment, lifecycle costs, productivity, fleet synergies, engine specifications, particulate matter emissions and diesel consumption performance were evaluated to inform some key purchasing decisions and mobile fleet planning. The review identified (for example) that Tier 4-compliant engines have significantly lower particulate emissions without compromising fuel efficiency relative to other engine configurations.

Following this review MACH identified that Tier 4 engine platforms would preferentially be pursued at the Mount Pleasant Operation in reasonable and feasible purchasing decisions for these major fleet items. However, additional exhaust after-treatment was not considered to be a reasonable and feasible mitigation measure, given the additional cost of operation with nominal benefit compared with the Tier 4 engine platforms with in-cylinder treatment.

A watching brief on commercially available engine emission reduction technologies will continue to be maintained, with identified potential to repower any MACH-owned trucks with higher efficiency power trains where these are available and would represent a reasonable and feasible mitigation measure at major fleet/engine replacement cycles.

Fixed Plant Procurement and Planning

Consideration of energy efficiency is undertaken at the procurement of new major (or major replacement) electrical equipment.

Fuel Efficient Site Vehicles

Consideration of fuel efficiency is undertaken in selecting new vehicles.

2.7.4 OFFSETS

Consistent with the Safeguard Mechanism, MACH surrenders Australian Carbon Credit Units and/or Safeguard Mechanism Credits when the Mount Pleasant Operation total covered emissions exceed its baseline emission requirements. The adoption of carbon offsets (i.e. Australian Carbon Credit Units [ACCUs] in this context) will occur where it is the most reasonable and feasible solution to address difficult to abate emissions while lower-emission technologies and fuels remain cost prohibitive.

MACH will continue to use carbon credits as may be required to meet its obligations as part of its broader strategy to manage emissions and maintain compliance with the Mount Pleasant Operation's emission reduction trajectory under the Safeguard Mechanism.

Progressive Rehabilitation

The Mount Pleasant Operation progressively rehabilitates disturbed areas as they become available (typically within 6 months of becoming available). Temporary rehabilitation, including hydro-mulching and seeding of temporary landforms (e.g. mine access roads etc.), is undertaken across the site to mitigate visual impacts, dust impacts, as well as erosion and sediment management.

Progressive rehabilitation stabilises landforms and facilitates the early re-establishment of vegetation carbon uptake. This approach assists in offsetting a portion of emissions associated with land clearing by restoring vegetation and soil carbon sinks over the life of the operation. This includes the salvage and reuse of woody materials to create habitat features in rehabilitation (Plate 2).

In accordance with the Rehabilitation Management Plan and consistent with the Mount Pleasant Operation Commonwealth approval (*Environment Protection and Biodiversity Conservation Act 1999* 2011-5795), MACH is also required to establish 1,000 hectares of White Box-Yellow Box–Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community within the Mount Pleasant Operation.

Future revisions of this Air Quality Greenhouse Gas Management Plan may utilise available Commonwealth Government (e.g. Clean Energy Regulator) online tools to estimate the carbon sequestered (i.e. land clearing emissions offset) by on-site rehabilitation activities.

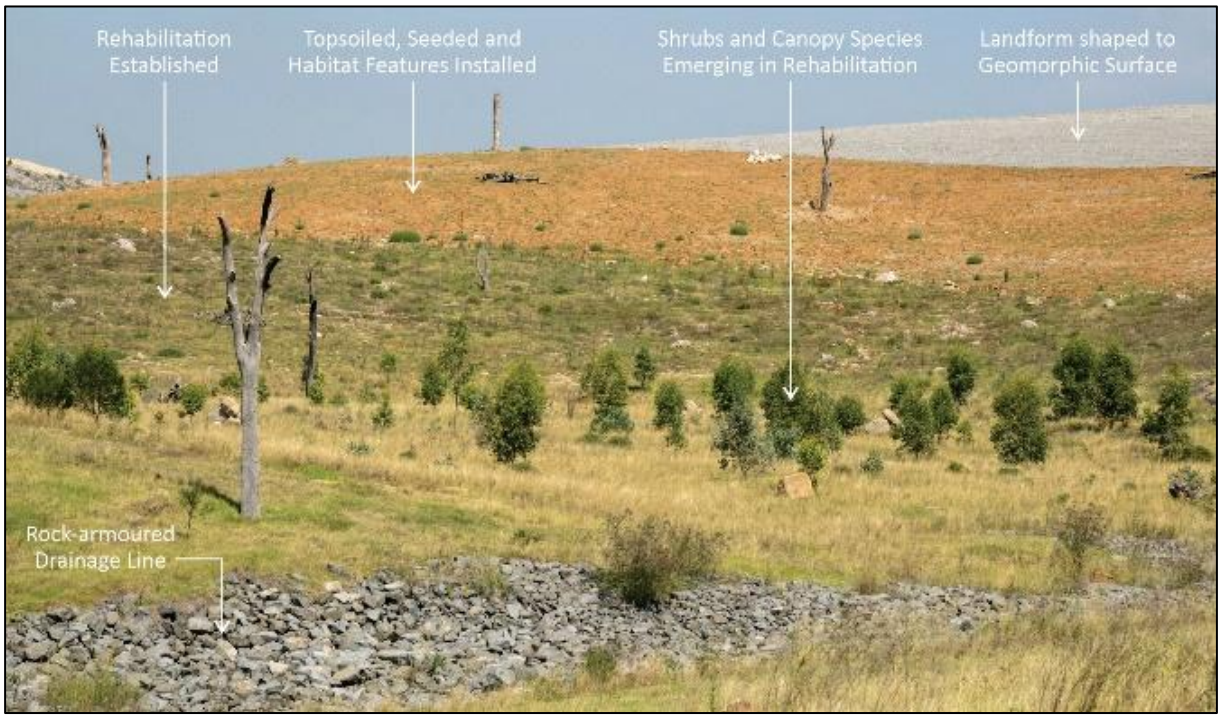


Plate 2
Mount Pleasant Operation Progressive Rehabilitation

2.8 ADDITIONAL DATA COLLECTION PROGRAMMES

The Mount Pleasant Operation has identified that further data relating to the two key sources of life-of-mine emissions (diesel consumption and fugitive emissions) would assist in applying quantitative evaluation of future emission reduction opportunities (e.g. completion of marginal abatement cost curves, feasibility studies on potentially reasonable and feasible measures etc).

Two current additional data collection programmes are described below that have commenced at the Mount Pleasant Operation and are expected to provide important sources of new granular information to inform MACH's future studies.

2.8.1 DIESEL CONSUMPTION DATA PROGRAMME

The Mount Pleasant Operation is progressively implementing detailed fuel monitoring via a smart tag RFID rollout to gather more detailed data on diesel fuel consumption, broken down by individual fleet/plant item, with the potential to increase data granularity for future analysis.

The programme is being implemented in two key stages:

- Stage 1 (completed in 2025) RFID systems were installed on light vehicles and refuelling trailers; and
- Stage 2 (scheduled for completion Quarter [Q] 1 2026) will extend the system to all heavy mine equipment.

The RFID fuel usage data is expected to provide significantly improved data on relative fuel consumption by fixed plant and mobile plant, and provide opportunities to improve fuel efficiency measures on-site. The plan to integrate the RFID fuel consumption data with existing educational programmes is discussed in Section 4.1.

2.8.2 FUGITIVE GAS DATA PROGRAMME

A gas domain model was developed by CoalBed (2023) to inform mine planning and fugitive emissions estimation for the Mount Pleasant Operation. Projected fugitive emissions in the absence of any additional reasonable and feasible mitigation are discussed in Section 2.4.

Gas content within the mine shell is typically below 4 m^3/t (and averages much less), with methane content increasing from largely CO_2 to approximately 100% CH_4 at 200 m depth (Figures 10 and 11) (CoalBed, 2023).

While the measured gas content is relatively low in comparison to most NSW underground mines, MACH considers that the relatively high proportion of methane observed at depths of around 200 m from the surface justifies further investigation of the physical characteristics of the gas reservoir.

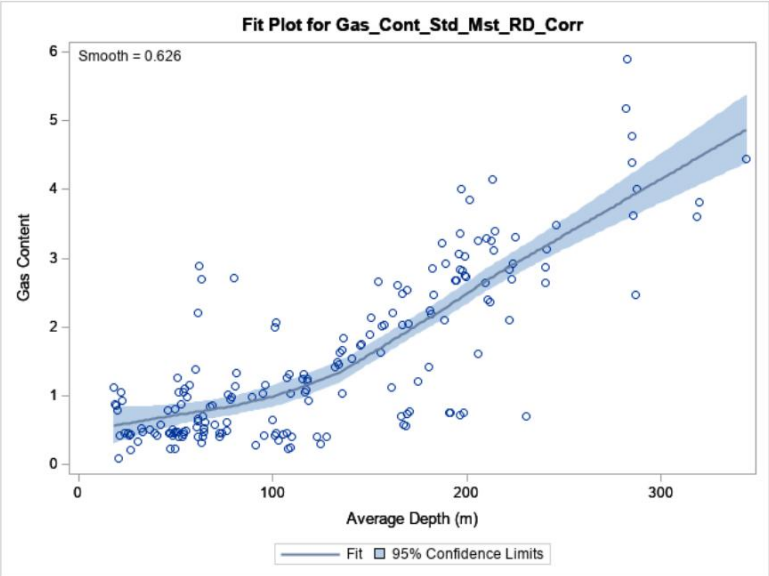


Figure 10
Mount Pleasant Operation Gas Content

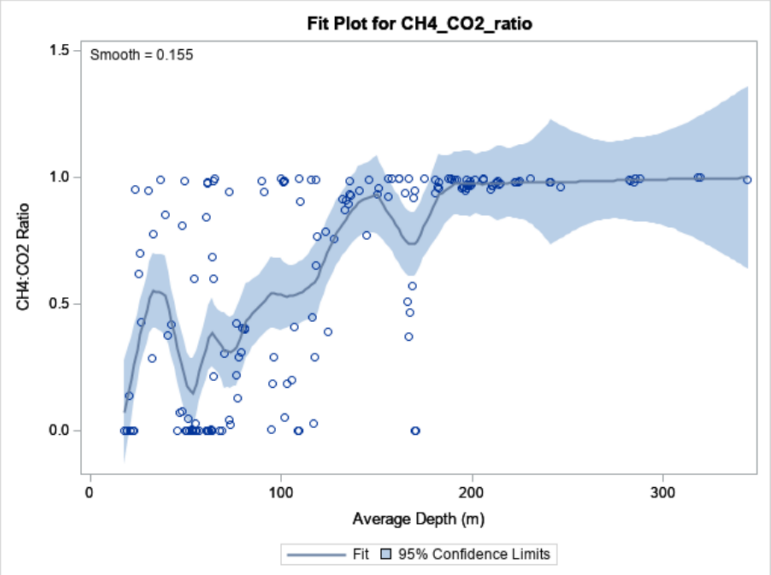


Figure 11
Mount Pleasant Operation Gas Composition

Previous consideration of the potential practical difficulties of potentially draining open cut fugitive gas at the Mount Pleasant Optimisation Project (MACH, 2022) indicated:

> *The potential feasibility of draining in-situ gas from coal seams in advance of the Project would therefore face the following contextual facts:*
>
> - *the variable gas content of shallow coal seams suggests any mitigation efforts would necessarily need to be directed towards deeper coal seams with higher proportions of methane and higher gas contents (i.e. more conducive to flaring or beneficial use);*
> - *any pre-drainage efforts would need to focus on areas of the Project open cut extent that are more distant from the depressurisation effects of the existing and approved Mount Pleasant Operation and Bengalla Mine advancing open cut pits;*
> - *vertical extraction wells would need to be developed, utilizing suitable available technology to drain the relevant coal seams with each well;*
> - *low gas contents and low gas saturation will require implementation of relatively high levels of advance depressurization and stimulation (i.e. advance dewatering and hydraulic fraccing) in order to stimulate sufficient gas liberation;*
> - *the physical limitations of propagating fraccing, depressurization and gas liberation from each well will require many such vertical wells to be developed (i.e. a large-scale pre-drainage programme would be required), to provide sufficient drainage to materially reduce in-situ gas levels across the Project domain; and*
> - *the inherently low gas contents and low gas saturation will result in a relatively high proportion of the in-situ gases still remaining locked in the coal matrix (relative to the effectiveness of extraction from a high-gas and highly saturated coal seam) to be liberated during mining, irrespective of the level of fraccing and advance dewatering employed.*
>
> *Given MACH's understanding of current drilling, fraccing, gas extraction and associated management costs, such an activity would be very capital-intensive with currently available technology (i.e. anticipated to cost $millions for each individual gas extraction well).*

The above considerations align with broader industry experience, particularly in shallow coal seams (<100 m) where gas contents are typically too low to make pre-drainage practical. In circumstances where drainage is attempted (in deeper coal seams), extraction wells may be drilled either vertically or using medium-radius directional drilling to intersect and follow target seams. However, medium-radius drilling is substantially more capital-intensive and generally only applied in high-productivity gas reservoirs. Even with advance depressurisation and stimulation, a significant proportion of in-situ gas would remain in the coal matrix and not be liberated, as seams reach 'abandonment pressure' where further gas recovery is no longer viable. Overall, these factors indicate that large-scale pre-drainage at the Mount Pleasant Operation is likely to be both technically challenging and costly.

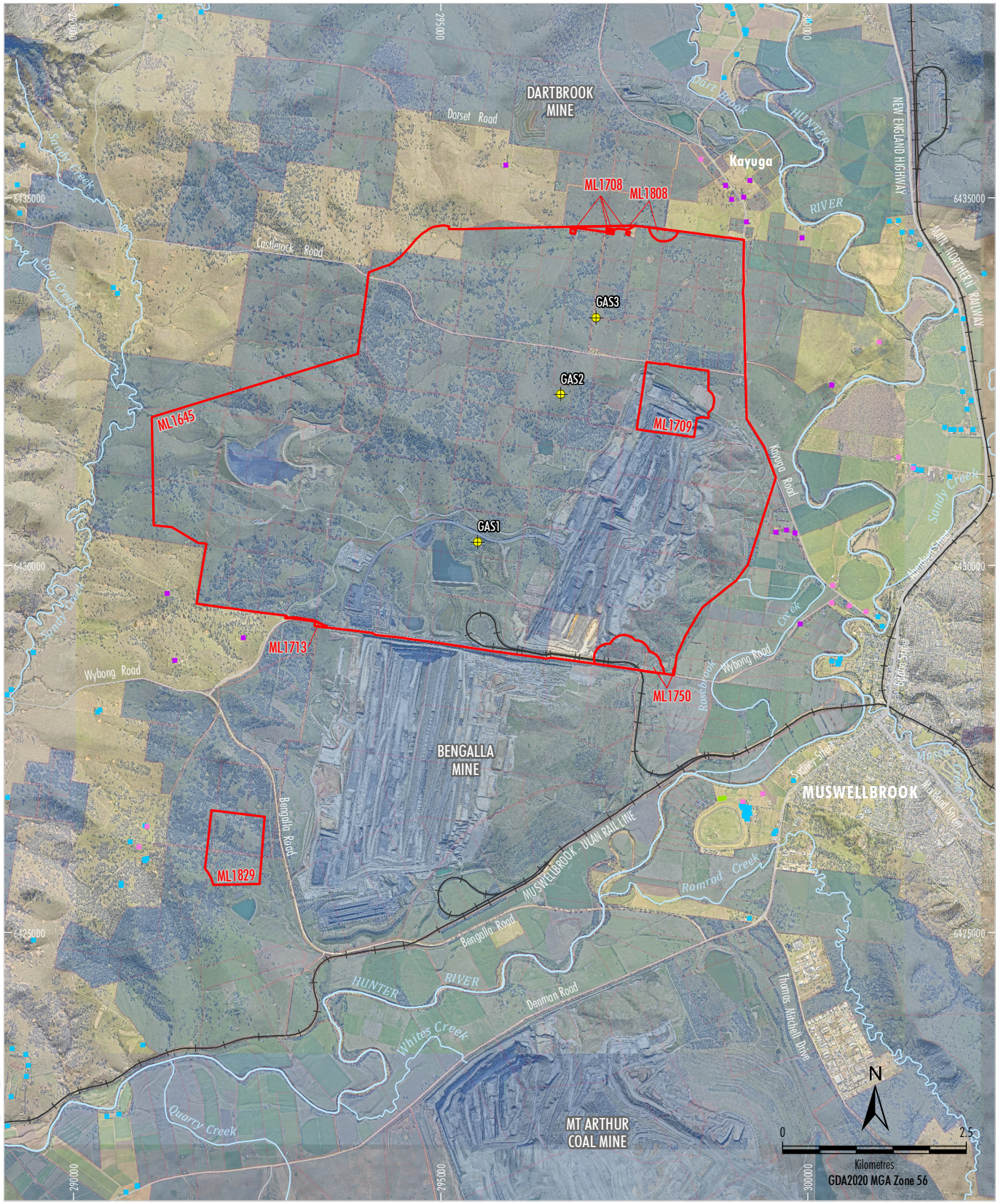
Notwithstanding these reservations, MACH is undertaking an additional fugitive gas testwork programme in conjunction with the 2025 exploration drilling schedule to collect specific in-field data on potential gas production characteristics in an area to the west of the current operations where both gas and methane contents are predicted to be relatively higher at depths of around 200 m (e.g. 3-4 m^3/t in-situ gas content and up to 100% methane).

It is noted that under the Modification the depth of mining in North Pit would be restricted to the Vaux Seam, which would reduce estimated fugitive emissions as some deeper seams approved to be extracted under SSD 10418 would remain un-mined under this scenario.

Three exploration gas boreholes are being developed in Q4 2025, ranging from approximately 200 m to 250 m in depth and each of these boreholes would be monitored using a proprietary (Yabby) gas production (and water) borehole monitoring system. The monitoring system would act like small gas production wells and allow MACH to gather data on potential gas production in the absence of conducting hydraulic fracturing.

The data obtained through the fugitive investigation boreholes (Figure 12) will be used to (Section 4.3):

- estimate potential gas and water production rates from coal and non-coal bearing strata within the borehole;
- support potential reasonable and feasible assessments of fugitive gas destruction or fugitive gas capture technologies that may be conducted in future; and
- inform potential operational planning on fugitive emission abatement opportunities and associated Safeguard Mechanism obligations.



MAC-18-03A MP2025_AQ&GHG_204A

LEGEND

- Mining Lease Boundary (Mount Pleasant Operation)
- Mine-owned Land
- Railway
- Fugitive Emissions Test Borehole

Category of Rural Residence under DA92/97

- Privately-owned - Acquisition on Request
- Privately-owned - Mitigation on Request
- Privately-owned - Mitigation/Acquisition on Request*
- Other Privately-owned

* Mitigation on Request - rail noise/Aquisition on Request - air quality. MACH is only required to acquire and/or install air quality mitigation measures at this property if not reasonably achievable under a separate approval for the Bengalla Mine.

Source: MACH (2025); NSW Spatial Services (2025)
Orthophoto: MACH (Jun 2025)

MACHEnergy

MOUNT PLEASANT OPERATION

Fugitive Gas Borehole Sites

Figure 12

3 REASONABLE AND FEASIBLE GREENHOUSE GAS EVALUATION

3.1 QUALITATIVE EVALUATION OF REASONABLE AND FEASIBLE MITIGATION MEASURES

3.1.1 GREENHOUSE GAS ABATEMENT AND TECHNOLOGY WORKSHOP

A greenhouse gas abatement workshop was conducted on 6 November 2025 with key stakeholders from MACH and its mining/technical/environmental specialists (Table 6) to document current and previous trials and investigations, current operational programmes, potential applicability of abatement measures to the Mount Pleasant Operation, and proposed extensions to current greenhouse gas management and efficiency practices in the next three-years.

Table 6
2025 Greenhouse Gas Abatement Workshop Participants

Company	Participant	Role
MACH	Michael Redman	General Manager – Mount Pleasant Operation
	Chris Lauritzen	General Manager – Resource Development
	Paul Oloughlin	Technical Service Manager
	James Leayr	Senior Mining Engineer
	Thomas Wilson	CHPP Manager
	Lisa Richards	Environment and Community Manager
	Matthew Page	Head of Commercial
Thiess	Simon Mewing	Group Manager – Fugitive Emissions
	Ryan Fox	Mount Pleasant Project Manager
	Shane Kowald	Maintenance Manager
CoalBed	Duncan Thomson	Director
Resource Strategies	Stirling Bartlam	Executive Manager - Approvals
	Daniel Jovanovic	Project Manager

The key outcomes of the greenhouse gas abatement workshop are discussed below in Sections 3 and 4.

3.1.2 QUALITATIVE EVALUATION METHODOLOGY

MACH has qualitatively assessed identified potential emission abatement measures in seven categories:

- **Technology Readiness** – The stage of a technology's development, ranging from feasibility studies to technology demonstrations.
- **Commercial Readiness** – The stage of a technology's commercial application, ranging from small-scale trials to widespread industry adoption. Considers the likelihood of the technology becoming commercially viable over the project life.
- **Capital Expenditure** – Anticipated capital investment required to implement the technology at the Mount Pleasant Operation.
- **Operational Expenditure** – Anticipated ongoing costs to operate the technology at the Mount Pleasant Operation when compared to current mining activities and relative carbon offset costs.

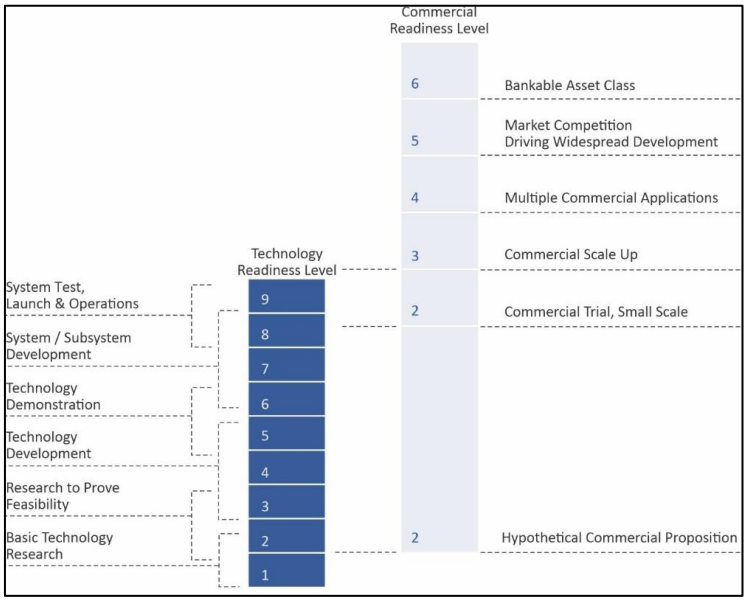
- **Abatement Effectiveness** – Anticipated greenhouse gas abatement achieved when compared to current mining activities.
- **Site Specific** – Considers the technology's suitability based on Mount Pleasant Operation's geology, terrain, mine plan under the Modification and the likely marginal cost of abatement.
- **Trial Opportunity** – Considers all of the above categories and if the technology could reasonably and feasibly integrate into the Mount Pleasant Operation under the Modification, with the opportunity of a trial (either on or off site) to gather additional data or practical experience to further evaluate potential feasibility.

Further explanation is provided below.

Technology and Commercial Readiness

Standardised technology readiness terminology was originally developed by the National Aeronautics and Space Administration for its development programmes, and has since been adopted by many organisations, including Australia's Defence Force. To standardise the description of the technology readiness and commercial readiness of alternative potential greenhouse gas mitigation technologies, MACH has adopted the Australian Renewable Energy Agency (ARENA) (2014) Technology Readiness Levels for Renewable Energy Sectors terminology.

This terminology not only describes nine technology readiness levels from basic research to operations, it also helpfully outlines how these technology readiness levels typically relate in practice to commercial readiness levels, which naturally follow after the resolution of technological challenges. A schematic illustration is reproduced from ARENA (2014) in Figure 13 below.



Source: ARENA, 2014

Figure 13
Technology Readiness and Commercial Readiness Level Schematic

Where practical, MACH has used these descriptions to assist in classifying the technology readiness levels and commercial readiness levels of mitigation measures that may potentially be applicable to the Mount Pleasant Operation greenhouse gas emission reduction opportunities. It is noted that MACH can potentially be involved at all levels of the technology readiness and commercial readiness levels development pathway of a greenhouse gas mitigation measure. However, MACH is unlikely to commit to the adoption of a greenhouse gas mitigation measure until commercial readiness is at either level 4, or above (i.e. at which time the potential financial implications of its adoption can be estimated).

Evaluation Key

The qualitative key for the seven categories assessed, as adopted by MACH for this evaluation is provided in Table 7.

Table 7
Qualitative Evaluation Colour-Coded Key

Colour Key	Technology Readiness	Commercial Readiness	Capital Expenditure	Operational Expenditure	Potential Abatement Effectiveness	Site Specific	Trial Opportunity
	Level 1-2 (Figure 13)	Level 1 (Figure 13)	Major capital investment required, prohibitively expensive.	Ongoing operational costs would significantly outweigh potential benefits.	Limited or unproven greenhouse gas emissions reduction potential.	Technically not feasible for deployment at this site.	Technically not feasible to trial at this site.
	Level 3-4 (Figure 13)	Level 2-3 (Figure 13)	Capital cost materially exceeds expected value, unlikely to be competitive versus alternatives.	Ongoing operational costs outweigh potential benefits.	Some abatement potential but uncertain or inconsistent outcomes.	Not suitable, due to at least one material adverse factor that precludes adoption (i.e. unlikely to be suitable over project life).	Not suitable to trial based on current state.
	Level 5 (Figure 13)	Level 4 (Figure 13)	Capital requirements are potentially feasible but may be highly sensitive to market conditions.	Additional operating costs potentially manageable with optimised implementation.	Reasonable potential to result in a minor reduction in site emissions intensity.	Combination of positive and negative factors in play (i.e. could become more suitable over project life - timing of developments would be critical).	Situation would need to change to consider a trial.
	Level 6-7 (Figure 13)	Level 5 (Figure 13)	Competitive cost relative to alternatives, would require further economic testing.	Manageable increase in operational costs.	Significant potential to materially reduce site emissions intensity, subject to validation.	On balance is more positive than negative, but at least one clear obstacle currently precludes adoption (e.g. price/availability). Potential to be suitable over project life, but timing of developments, and/or extra data collection would be critical.	Trial may help inform further detailed evaluation/consideration, but relatively low priority (potential to trial in future evaluation period).
	Level 8-9 (Figure 13)	Level 6 (Figure 13)	Minimal incremental capital cost or strong return on investment.	Neutral or positive OPEX impact.	Proven and material abatement potential in comparable operations.	On balance is considered positive (i.e. potentially reasonable and feasible, subject to detailed site-specific economic or engineering evaluation and/or site-specific data collection/trials to inform MACH decision making).	Site-specific trial or detailed analysis of industry trials is suggested to inform near-future (next 3 years) quantitative evaluation and decision making.

3.1.3 EVALUATION OF REASONABLE AND FEASIBLE MITIGATION MEASURES

Key potential mitigation measures that have been identified and considered by MACH are described and briefly discussed in Table 8.

Following discussion during the greenhouse gas abatement workshop and subsequent review of abatement opportunities, Table 9 provides a colour-coded summary of the outcomes of the qualitative mitigation measures assessment by MACH. The colour coding in Table 9 represents MACH's evaluation of relative positive and negative factors for each opportunity, where dark green is the most positive colour and dark red is the most negative colour adopted (Table 7). The intent of the colour-coded rating system is to illustrate the opportunities that MACH has rated more positively or negatively across many factors when considering potential application to the Mount Pleasant Operation.

Key potential abatement opportunities that are considered to warrant further site-specific data gathering, analysis or a trial are discussed in further detail in Section 3.2.

Table 8
Summary of Identified Potential Scope 1 and 2 Mitigation Measures

Mitigation Measure	Mitigation Hierarchy	Summary Description of Mitigation Measure	Potential Effectiveness at the Mount Pleasant Operation
Scope 1 – Diesel (Fuel)			
Premium Diesel Fuel Supply (MPO-Diesel-11/25-1)	Reduce	Contract site premium diesel supply to improve fuel efficiency.	Premium diesel is diesel augmented with fuel-efficiency additives to help keep the fuel system clean, minimise corrosion and reduce friction on moving parts in the fuel delivery system. Reported efficiency gains vary from a 2% to 14% reduction in fuel consumption (AMPOL Australia, 2024). Other sources indicate fuel savings of up to 3% (Viva Energy, 2025). Premium diesel is typically marginally more expensive (approximately 0.5% increase relative to conventional diesel) than diesel without any additives, however, the relative cost can vary depending on the supplier and the nature of the supply contract. May be unsuitable for blasting use (separate storage required). Recent changes to Australian fuel standards (effective December 2025) and the introduction of separate specifications for paraffinic diesel emphasise density, cetane number and sulphur content as the key drivers of fuel performance. However, available information indicates that premium diesel does not differ materially from standard diesel in terms of density, cetane rating or sulphur limits, and instead relies on additive packages for potential efficiency improvements. As such, any emission reductions would stem solely from reduced diesel consumption rather than lower-carbon fuel chemistry. Efficiency gains are potentially very small (e.g. 2%) but premium diesel can be broadly applied to all diesel engines (diesel emissions contribute 45% to total Scope 1 emissions).
Carbon-Neutral Diesel Fuel Supply (MPO-Diesel-11/25-2)	Offset	Purchase diesel with carbon offsets secured by the fuel supplier or site.	The greenhouse gas emissions associated with the consumption of conventional hydrocarbon-derived diesel are offset via retirement of carbon credits (e.g. ACCUs) by the fuel supplier or MACH. The fuel supplier can certify the product, which leaves the fuel consumer with a net carbon-neutral diesel fuel supply. As carbon-neutral diesel is conventional hydrocarbon derived diesel with an associated certified carbon offset, there would be no additional infrastructure requirements associated with the introduction of carbon-neutral diesel. While MACH cannot claim an emissions reduction under National Greenhouse and Energy Reporting Scheme (NGERS) at the facility arising from the use of an opt-in carbon-neutral fuel, offsets are likely considered the most cost-efficient way to reduce emissions from diesel consumption on site.
Renewable Diesel Fuel Supply (MPO-Diesel-11/25-3)	Substitute	Augment site diesel supply with a proportion of renewable diesel.	Renewable diesel (i.e. hydrogenated vegetable oil) can be manufactured from a variety of feedstocks, is already commercially available globally, and is present in small volumes in the Australian fuel market. Reported emission reduction rates for renewable diesel, compared to conventional diesel, range from 75% to 90% (Neste, 2024; Volvo Penta, 2024). However, these reductions are highly variable and depend largely on the feedstock used (United States EPA, 2024). Current supply options are limited and cost prohibitive, but costs may improve with Australian industry development.

Table 8 (Continued)
Summary of Identified Potential Scope 1 and 2 Mitigation Measures

Mitigation Measure	Mitigation Hierarchy	Summary Description of Mitigation Measure	Potential Effectiveness at the Mount Pleasant Operation
Biodiesel Fuel Supply (MPO-Diesel-11/25-4)	Substitute	Augment site diesel supply with a proportion of biodiesel.	Biodiesel is fuel derived from organic feedstocks and is manufactured through a process of transesterification. It is typically blended with conventional diesel in proportions such as 5% biodiesel (B5) or 20% biodiesel (B20) as diesel vehicles (in particular large mining haul trucks) compatibility with biodiesel varies significantly (Australian Clean Energy Finance Corporation and the Minerals Research Institute of Western Australia, 2022). While compatible with many existing diesel engines, higher blends may require equipment modifications or enhanced maintenance protocols. Renewable diesel has largely supplanted biodiesel as the preferred drop-in fuel prospect for the mining industry, primarily due to its chemical similarity to conventional diesel. Biodiesel is currently cost-prohibitive and is less likely to be a long-term solution relative to renewable diesel.
Hydrogen Derived Fuel Supply (MPO-Diesel-11/25-5)	Substitute	Utilise alternative hydrogen-derived fuel for a proportion of mobile equipment.	Hydrogen-derived fuels require integration with compatible fuel cells or modified combustion engines to enable effective use. MACH considers it is highly unlikely that Australian green hydrogen production and associated hydrogen derived fuel technologies (including cost of supply, fuel transport, safety controls, hydrogen derived fuel technology) would be reasonably and feasibly available within the next decade. Commercial readiness, energy conversion efficiency limitations and the infrastructure required remain significant limitations for hydrogen-derived fuels.
Hydrogen Trickle-Feed (MPO-Diesel-11/25-6)	Substitute	Augment diesel engines to introduce hydrogen trickle-feed supply.	This parasitic trickle-feed technology has recently become commercially available for a wide range of diesel engine sizes, including light vehicles, heavy on-road trucks, offroad heavy equipment and stationary engines (Alpha H2, 2025). These hydrogen trickle-feed systems are designed to be retrofitted to existing diesel engines by mounting the new system on the existing vehicle, connecting to the existing low-voltage electrical system and introducing the hydrogen trickle-feed supply to the diesel engine air intake. Once fitted, the only material ongoing input is distilled water (Hydi, 2025; Alpha H2, 2025). Alpha H2 reports that third-party testing of its parasitic hydrogen trickle-feed system on a heavy semi-trailer and commercial vehicle has verified improvements in performance of approximately 17-25% reduction in fuel usage (Alpha H2, 2024a; 2024b). However, recent trials undertaken by Thiess at Mt Arthur indicate that verifiable efficiency improvements may not warrant the additional capital, maintenance and consumable (distilled water) costs.

Table 8 (Continued)
Summary of Identified Potential Scope 1 and 2 Mitigation Measures

Mitigation Measure	Mitigation Hierarchy	Summary Description of Mitigation Measure	Potential Effectiveness at the Mount Pleasant Operation
Methane Fuel Supply (MPO-Diesel-11/25-7)	Substitute	Augment diesel engines to introduce methane feed supply.	The use of methane as a combustion fuel for mobile mining equipment was recently trialled by Thiess in Queensland. Conversion of diesel engines to operate on methane (dual-fuel systems) requires high-pressure gas storage, injection hardware and on-site gas handling infrastructure. As identified in Section 3.2.1, the Thiess trials demonstrated that dual-fuel systems can achieve high diesel-substitution rates and measurable emission reductions under the right engine configurations, however the effectiveness of the technology is heavily dependent on access to a consistent and local gas supply.
Scope 1 – Diesel (Equipment)			
Hybrid (Diesel-Kinetic Storage-Electric) Loaders (MPO-Diesel-11/25-8)	Reduce	Reduce diesel consumption through regenerative braking - loaders.	Diesel-kinetic storage-electric wheeled loaders are equipped with regenerative braking or retarding systems and are an emerging technology in Australia, designed to improve fuel efficiency by recovering energy during deceleration. It has been reported that the addition of regenerative braking to an electric drive diesel powered loader can reduce fuel consumption by up to 45% compared to a conventional diesel powered mechanical-drive loader (Komatsu, 2024). However, loaders currently have limited application on-site (e.g. at the ROM pad).
Hybrid (Diesel-Battery-Electric) Haul Trucks (MPO-Diesel-11/25-9)	Reduce	Reduce diesel consumption through regenerative braking - trucks.	Diesel-battery-electric haul trucks typically feature a primary diesel engine supported by a supplementary electric motor-generator system that can recover energy through regenerative braking and provide additional power during high-demand periods, such as uphill haulage and acceleration. It has been reported that the addition of regenerative braking to an electric-drive, diesel-powered ultra-class haul truck could reduce fuel consumption and carbon emissions by up to 25% (First Mode, 2024). Diesel-hybrid-electric trucks therefore have the potential to materially reduce fuel burn through energy recovery and hybrid energy-storage technologies, although these systems may introduce new safety considerations that require assessment. At the Mount Pleasant Operation, Thiess is progressing a trial involving a Flanders-modified CAT 793D hybrid haul truck, which incorporates a battery system, high-voltage electrical cabinet and an electric traction motor installed in place of part of the drive shaft. The hybrid system functions as a “driver-assistance” technology, supplying additional torque during uphill operation while recharging the onboard batteries during downhill travel, flat running and other low-load conditions. The system does not require external charging and integrates with existing Caterpillar engine, transmission and braking controls.

Table 8 (Continued)
Summary of Identified Potential Scope 1 and 2 Mitigation Measures

Mitigation Measure	Mitigation Hierarchy	Summary Description of Mitigation Measure	Potential Effectiveness at the Mount Pleasant Operation
Hybrid (Diesel-Electric/Kinetic/Hydraulic) Ancillary/Other Fleet (MPO-Diesel-11/25-10)	Reduce	Reduce diesel consumption through regenerative braking - ancillary fleet.	Larger ancillary or supporting mine fleet items featuring regenerative braking or retarding are a technology that is not currently widely commercially available in Australia (noting that regenerative braking loaders are becoming available as discussed above). It is however noted that hybrid diesel-electric, diesel-kinetic and diesel-hydraulic hybrid powertrain systems for multiple scales of truck/equipment are being developed by various powertrain manufacturers, including Cummins (2024a; 2024b) and Perkins (Perkins, 2025; 2019). The potential introduction of hybrid diesel-powered ancillary fleet with energy recovery systems would not require the installation of any additional supporting infrastructure, as the primary engine would remain conventionally diesel powered, and potential improvements in fuel efficiency would be gained by on-board regenerative braking or other energy recovery and re-use systems such as kinetic storage.
Dig Unit Electrification – Dragline (MPO-Diesel-11/25-11)	Substitute	Replace a proportion of diesel excavators with an electric dragline.	Draglines are a potential avenue for emissions reduction, as a large electrically powered excavation tool designed for highly productive bulk overburden removal in surface mining operations (CAT, 2024; Major Projects Group Pty Ltd, 2020). While draglines typically offer a lower bulk material unit rate, their application in the complex multi-seam geology of the Mount Pleasant Operation formation could also result in high rehandle volumes. Previous investigations of the potential application of draglines at the Mount Pleasant Operation has indicated this technology is not considered to be reasonable and feasible.
Dig Unit Electrification – Excavator (MPO-Diesel-11/25-12)	Substitute	Replace a proportion of diesel excavators with electric excavators.	Mining-scale grid-connected excavators, powered by electricity, are currently being trialled and developed in Australia (BHP, 2024; Liebherr, 2023a; Liebherr, 2023b). These excavators require reliable access to grid power and the installation of substantial supporting infrastructure, including high-voltage supply lines, transformers, power outlets, and cable management systems. Compared to conventional diesel units, grid-connected excavators may also result in reduced operational flexibility due to their fixed power source. Grid connected electrical hydraulic excavators would require major capital-intensive infrastructure and has implications for site electrical demand and distribution.
Dig Unit Electrification – Shovel (MPO-Diesel-11/25-13)	Substitute	Replace a proportion of diesel excavators with electric shovels.	Electric rope shovels are a mature, reliable technology that eliminate diesel emissions during operation and can reduce overall mining costs where suitable. However, they have a more limited range of movement compared to hydraulic excavators and are best suited to consistent, uniform mining geometries. Implementation would require substantial investment in electrical infrastructure (e.g. substations, cable handling, and power distribution upgrades) and would introduce operational coordination challenges with other fleets.

Table 8 (Continued)
Summary of Identified Potential Scope 1 and 2 Mitigation Measures

Mitigation Measure	Mitigation Hierarchy	Summary Description of Mitigation Measure	Potential Effectiveness at the Mount Pleasant Operation
Haulage Electrification - Trolley Assist (Overhead) (MPO-Diesel-11/25-14)	Substitute	Replace a proportion of diesel haul trucks with a trolley truck system.	Trolley-assist haul trucks are specialised mining vehicles designed to draw power from an overhead or side electrical supply, supplementing their conventional diesel-electric propulsion systems. By electrifying key segments of the haul route (particularly during energy-intensive activities such as uphill hauling) trolley-assist systems can reduce overall diesel consumption, lower greenhouse gas emissions, and improve haulage efficiency. The feasibility of trolley-assist systems is highly dependent on mine layout and topography. These systems require significant capital investment and are subject to operational constraints and not suitable in dynamic mining contexts. Implementation also has implications for site-wide electrical demand and power distribution infrastructure.
Haulage Electrification – Rail Assist (Side) (MPO-Diesel-11/25-15)	Substitute	Replace a proportion of diesel haul trucks with a rail assist truck system.	
Haulage Electrification – Battery-Electric Trucks (MPO-Diesel-11/25-16)	Substitute	Replace a proportion of diesel haul trucks with battery-electric trucks.	Battery electric haul trucks are fully electric vehicles that operate without a diesel engine, relying instead on onboard batteries recharged via mobile or static charging systems. By replacing diesel engines with electric motors, these trucks eliminate diesel exhaust emissions and particulates, offer higher energy efficiency and reduced maintenance requirements due to fewer moving parts (noting new specialised maintenance personal may be required). Battery-electric haulage equipment is not currently a commercially available technology, however CCA (2024a) suggests the adoption of battery-electric technology is likely to become commercially viable by 2030. As the technology becomes commercial, long procurement lead times and global supply-chain bottlenecks are expected, limiting the availability of equipment. In-pit charging also poses major operational challenges as it would require significant upgrades to electrical reticulation and grid capacity, introduce large and variable power loads, and demand frequent relocation of charging infrastructure in dynamic mine settings such as open cut coal mines.
Haulage Electrification – In-pit-crushing and conveying (MPO-Diesel-11/25-17)	Substitute	Replace a proportion of diesel haul trucks with in-pit-crushing and conveying.	In-pit-crushing and conveying systems are a mature technology with a long history of use in hard rock open cut mining that offers an alternative to conventional truck haulage systems (but not typically utilised in Australian coal mines). The feasibility of implementing in-pit-crushing and conveying systems is context-dependent (i.e. favoured for operations with longer and more stable haul routes) and implementation requires substantial civil works and associated detailed mine planning and design to accommodate the linear conveyor systems. Would require investment in electrical infrastructure to support the additional conveyor drives and associated on-site supply and electricity distribution systems. Existing mines like the Mount Pleasant Operation which have an established haul truck fleet and mine geometry (including ramps) optimised for conventional truck haulage would present significant barriers of entry.
Automation – Major Plant Items (MPO-Diesel-11/25-18)	Avoid	Replace manned major plant items with automated plant items, to improve productivity and reduce fuel consumption and downtime.	Automation of major plant items (e.g. haul trucks, excavators) can improve productivity and fuel efficiency through optimised operation and reduced idle time. However, automation at the Mount Pleasant Operation would have limited suitability due to geologically complexity and the multi-seam environment. The displacement of roles is also a sensitive topic within the region given the recent closure of two coal mines (Muswellbrook Coal & Liddell Coal), the Liddell Power Station and the impending closure of the Mount Arthur and Mangoola Coal Mines. These closures impact regional employment numbers.

Table 8 (Continued)
Summary of Identified Potential Scope 1 and 2 Mitigation Measures

Mitigation Measure	Mitigation Hierarchy	Summary Description of Mitigation Measure	Potential Effectiveness at the Mount Pleasant Operation
Dozers – Diesel Electric Drive (MPO-Diesel-11/25-19)	Reduce	Diesel powered dozer with an electric drive train significantly reduces fuel consumption.	Caterpillar has developed and prototyped a diesel powered, electric drive-train D11 dozer (i.e. the D11 XE) (CAT, 2021). Caterpillar's promotional materials indicate that the use of an electric drive train in the D11 would reduce fuel consumption by up to 25% (CAT, 2021). Mount Pleasant Operation currently employs approximately 3 CAT D11 dozers on-site. The site dozer fleet (currently predominantly made up of Komatsu D475A and CAT D10 and D11 dozers) are projected to use approximately 12% of on-site diesel over the life of the Mount Pleasant Operation (Figure 6). A 25% reduction applied to the fleet category that represents 12% of total diesel consumption results in a meaningful overall decrease in fuel use across the mine life.
Incidental Electricity Generation – Hybrid/Hydrogen Genset Installations (MPO-Diesel-11/25-20)	Reduce	Hybrid genset installations reduce diesel consumption and engine maintenance requirements with battery storage and solar panels.	The potential introduction of hybrid genset installations would not require the installation of any additional supporting infrastructure, as the generator remains conventionally diesel-powered, and potential reductions in fuel-demand would occur due to the increased generator efficiency associated with changing supplementary battery storage, and/or solar panels to produce power during the daytime. Emissions from genset operation would not result in a material overall reduction in site fuel consumption. Thiess and Mitsubishi Heavy Industries have proposed a broader hybrid renewable microgrid concept that couples solar generation, battery storage and gas-fuelled generation using captured coal-seam methane to reduce reliance on diesel and grid power. While this system can provide reliable low-carbon energy for continuous mining operations and convert waste methane into a usable fuel, its effectiveness is highly dependent on the availability of drainable methane and the viability of installing solar and battery capacity at scale. At present, such a system is not considered practical for Mount Pleasant.
Scope 1 – Fugitive			
Methane - Coal Seam Pre-Drainage and/or Energy Generation (MPO-Fugitive-11/25-1)	Reduce	Conduct pre-mining drainage and destruction of methane.	Coal seam pre-drainage is the process of extracting high-purity gas, primarily methane, through various drainage methods and transporting it to the surface via a network of pipelines. Methane would then be utilised or destroyed via flaring. The gas domain at the Mount Pleasant Operation may have concentrations and volume of methane that would allow coal seam pre drainage subject to further investigation.
On-site Carbon Sequestration (MPO-Fugitive-11/25-2)	Offset/Reduce	Increase vegetative carbon sequestration on-site, to offset some emissions.	Vegetative carbon sequestration can offset a portion of emissions by enhancing carbon storage within rehabilitated or supplementary planting areas. The Mount Pleasant Operation already undertakes progressive rehabilitation, which provides a foundation for expanded carbon sequestration initiatives. Offset potential is modest compared to total Scope 1 emissions.

Table 8 (Continued)
Summary of Identified Potential Scope 1 and 2 Mitigation Measures

Mitigation Measure	Mitigation Hierarchy	Summary Description of Mitigation Measure	Potential Effectiveness at the Mount Pleasant Operation
Scope 2 – Electricity Emissions			
Site Electricity Supply – Solar Farm (MPO-Electricity-11/25-1)	Substitute	Augment current electrical supply systems with a solar farm to provide a proportion of daytime electricity demand.	Electricity consumption accounts for 2% of the Scope 1 and 2 emissions at the Mount Pleasant Operation. Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2024) projects ongoing decarbonisation of the NSW electricity grid, with emission factors expected to be 0.51, 0.15, and 0.03 t CO_2-e per megawatt-hour by 2025, 2030, and 2040 respectively (i.e. the benefits of establishing a solar farm or a carbon-neutral electricity supply contract will decline over time as the grid is progressively decarbonised).
Site Electricity Supply – Carbon-Neutral Contract (MPO-Electricity-11/25-2)	Substitute	Offset electricity supply with carbon neutral contract.	

Table 9
Qualitative Assessment of Reasonable and Feasible Mitigation Measures

Opportunity Name	No.	TR	CR	CAPEX	OPEX	Effect.	Site Specific	Trial Opp.	Key Notes
Premium Diesel Fuel Supply	MPO-Diesel-11/25-1								Efficiency gains are potentially small but premium diesel can be broadly applied to all diesel engines for modest additional cost. May be unsuitable for blasting use (separate storage required).
Carbon-Neutral Diesel Fuel Supply	MPO-Diesel-11/25-2								Diesel emissions are offset via retirement of carbon credits by the fuel supplier – not suitable for Safeguard Facilities.
Renewable Diesel Fuel Supply	MPO-Diesel-11/25-3								Current supply options are limited and is currently cost-prohibitive. Cost may improve with Australian industry development. Any blending proportion is acceptable.
Biodiesel Fuel Supply	MPO-Diesel-11/25-4								The effectiveness of biodiesel in reducing greenhouse gas emissions is limited by safe engine blend limits. Australian biodiesel industry in decline, subject to many previous trials across industries and is currently cost-prohibitive.
Hydrogen Derived Fuel Supply	MPO-Diesel-11/25-5								Low CR, energy conversion efficiency limitations, and lack of supply chains and associated infrastructure required remain significant limitations for hydrogen-derived fuels.
Hydrogen Trickle Feed	MPO-Diesel-11/25-6								Retrofitting existing diesel engines with a parasitic hydrogen trickle-feed system may reduce both fuel consumption and particulate emissions. Technology trialled by Thiess off site.
Dual Fuel - Partial Methane Substitution	MPO-Diesel-11/25-7								Retrofitting existing diesel engines with a dual fuel system to allow methane fuel consumption may reduce both fuel consumption and particulate emissions. Local or on-site supply would be required. Technology trialled by Thiess off site.
Hybrid (Diesel-Kinetic Storage-Electric) Loaders	MPO-Diesel-11/25-8								Hybrid loaders can reduce fuel consumption through regenerative braking. However, loaders currently have limited application on-site.
Hybrid (Diesel-Battery-Electric) Haul Trucks	MPO-Diesel-11/25-9								Diesel-hybrid-electric haul trucks can reduce fuel consumption through regenerative braking or other hybrid energy storage technology. Safety implications unknown.

Table 9 (Continued)
Qualitative Assessment of Reasonable and Feasible Mitigation Measures

Opportunity Name	No.	TR	CR	CAPEX	OPEX	Effect.	Site Specific	Trial Opp.	Key Notes
Hybrid (Diesel-Electric/Kinetic/Hydraulic) Ancillary/Other Fleet	MPO-Diesel-11/25-10								Diesel-hybrid-electric ancillary fleet can reduce fuel consumption through regenerative braking or other hybrid energy storage technology. Safety implications unknown.
Dig Unit Electrification – Dragline	MPO-Diesel-11/25-11								Draglines present an alternative extraction method with the potential to reduce emissions however, their applicability is constrained by mine compatibility and capital cost. Has implications for site electrical demand and distribution.
Dig Unit Electrification - Excavator	MPO-Diesel-11/25-12								Grid connected electrical hydraulic excavators would require major capital-intensive infrastructure and has implications for site electrical demand and distribution.
Dig Unit Electrification - Shovel	MPO-Diesel-11/25-13								Electric shovels can move large quantities of overburden but are restricted by compatibility. Would add to mining complexity, could not complete all excavator passes. Has major capital implications for site electrical demand and distribution.
Haulage Electrification - Trolley Assist (Overhead)	MPO-Diesel-11/25-14								Trolley assist can reduce haul truck emissions and improve haulage efficiency, but its feasibility depends on the mine layout. High capital outlay and operational limitations. Has implications for site electrical demand and distribution.
Haulage Electrification – Rail Assist (Side)	MPO-Diesel-11/25-15								Rail assist systems likely to offer similar benefits to traditional trolley assist systems, but with reduced complexity and cost. Has implications for site electrical demand and distribution.
Haulage Electrification – Battery-Electric Trucks	MPO-Diesel-11/25-16								Could eliminate diesel emissions and particulates. However, commercial full-scale implementation is not available, major on-site infrastructure changes required and electricity demand and distribution implications.

Table 9 (Continued)
Qualitative Assessment of Reasonable and Feasible Mitigation Measures

Opportunity Name	No.	TR	CR	CAPEX	OPEX	Effect.	Site Specific	Trial Opp.	Key Notes
Haulage Electrification – In-pit-crushing and conveying	MPO-Diesel-11/25-17								Intergovernmental Panel on Climate Change systems can reduce the need for conventional truck haulage and associated costs, but is a poor fit for dynamic operations, particularly for an existing mine designed for haul trucks. Has implications for site electrical demand and distribution.
Automation – Major Plant Items	MPO-Diesel-11/25-18								Dependent on geological and operational complexity. Not likely to be applicable to Mount Pleasant Operation.
Dozers – Diesel Electric Drive	MPO-Diesel-11/25-19								Diesel-electric drive dozers enhance fuel efficiency without requiring additional supporting infrastructure. Not yet commercially available for key dozers used on-site.
Incidental Electricity Generation - Hybrid/Hydrogen Genset Installations	MPO-Diesel-11/25-20								Additional battery storage and/or solar panels reduces fuel demand and reduces generator maintenance. However, incidental electricity generation is currently limited.
Methane - Coal Seam Pre-Drainage and/or Energy Generation	MPO-Fugitive-11/25-1								Relatively low in-seam methane content at the Mount Pleasant Operation until later years when compared to other Australian open cut coal mines. Could be some potential for flaring or utilisation in later years.
On-site Carbon Sequestration	MPO-Offset-11/25-1								Limited by available land for material reductions, however already being undertaken by MACH at the Mount Pleasant Operation (Section 2.7.4).
Site Electricity Supply – Solar Farm	MPO-Electricity-11/25-1								Renewable solar farm can reduce Scope 2 emissions. Grid decarbonisation reduces future value. Feasibility assessment proved long return on investment period. Not relevant to Safeguard obligations.
Site Electricity Supply – Carbon-Neutral Contract	MPO-Electricity-11/25-2								Opportunity to supply carbon-neutral electricity from locality. Not relevant to Safeguard obligations or NSW net zero targets.

3.2 KEY PROSPECTIVE TECHNOLOGIES FOR THE SITE

3.2.1 SCOPE 1 – DIESEL AND ASSOCIATED ALTERNATIVES

The Proposed Mitigation Guide requires licensees to target a minimum 5% adoption of low-carbon alternatives to fossil diesel by July 2030 (where it is reasonable and feasible to do so).

MACH has considered several conventional diesel replacement/alternative/substitution options, including:

- Premium Diesel Fuel Supply (MPO-Diesel-11/25-1);
- Carbon-Neutral Diesel Fuel Supply (MPO-Diesel-11/25-2);
- Renewable Diesel Fuel Supply (MPO-Diesel-11/25-3);
- Biodiesel Fuel Supply (MPO-Diesel-11/25-4);
- Hydrogen Derived Fuel Supply (MPO-Diesel-11/25-5);
- Hydrogen Trickle Feed (MPO-Diesel-11/25-6); and
- Dual Fuel – Partial Methane Substitution (MPO-Diesel-11/25-7).

Details on alternative fuels are discussed below and further actions proposed in the Three-Year Action Plan period are described in Section 4.2.

Premium Diesel Fuel Supply

MACH is considering the relative cost and potential fuel efficiency gains of adopting a premium diesel product at the Mount Pleasant Operation. However, it is understood that EMM (2025) considers that premium diesel does not offer significant fuel efficiency benefits.

Carbon-Neutral Diesel Fuel Supply

While carbon-neutral diesel fuel offers a potentially cost-efficient alternative method to abate diesel emissions, it is currently not recognised by the Safeguard Mechanism and therefore would not reduce the consuming facility's Safeguard Mechanism obligations.

Renewable Diesel Fuel Supply

Renewable diesel is commercially available in NSW, imported in limited volumes and is technically suitable as a "drop-in" replacement for conventional diesel. Renewable diesel is chemically very similar to conventional diesel and can be used directly in existing diesel engines at blend rates up to 100% without modification, unlike traditional biodiesel (International Energy Agency [IEA], 2021).

Renewable diesel is typically produced from an oil feedstock (vegetable oil such as soybean, palm or rapeseed, or waste oils such as animal fats and used cooking oils) which is reacted with hydrogen in the presence of a catalyst to modify the hydrocarbons to produce renewable diesel (IEA, 2024). Many manufacturers of major mining equipment/engines have already endorsed the use of renewable diesel at blend rates up to 100% (Cummins, 2023; Cummins, 2024a; Neste, 2024; Liebherr, 2024).

Domestic production capacity of renewable diesel is currently very limited, with supply dependent on imports or the development of new Australian facilities. Transport for NSW summarises the potential benefits and status of renewable diesel as follows (Transport for NSW, 2024):

- *Depending on the feedstock used, renewable diesel can reduce lifecycle greenhouse gas emissions by 60-80% per unit of energy, and tailpipe emissions by around 4%. …*
- *Although there is a growing number of biorefineries proposed, particularly in Western Australia, there are still significant challenges to renewable diesel production or supply in Australia.*

Given the limited domestic production capacity and the growing interest in renewable diesel across various sectors, any additional supply that enters the market is likely to be shared across multiple industries. This includes not only road transport but also maritime, aviation and other sectors exploring decarbonisation pathways. Importantly, the Australian Government has recently committed $1.1 billion to support and stimulate domestic production of low carbon liquid fuels, which includes renewable diesel, sustainable aviation fuels, and e-fuels, as well as explicitly recognising that mining is one of the "hard-to-abate" sectors (Commonwealth DCCEEW, 2025).

Biodiesel Fuel Supply (MPO-Diesel-11/25-4)

Biodiesel is generally blended with conventional diesel in ratios such as B5 and B20. Compatibility with diesel engines, particularly large mining haul trucks, varies considerably, and OEM warranty treatment of the use of biodiesel can vary depending on the blend and the manufacturer.

MACH is of the view that the use of biodiesel as a low-carbon fuel replacement for mining applications is not a viable long-term strategy for NSW. The percentage of biodiesel that can be safely used in existing, conventional diesel engines is inherently limited (and may also have implications for fuel efficiency as it typically has a lower calorific value). Given the ongoing, very significant existing capital investment in conventional diesel equipment with long operational lives (i.e. typically >10 years and up to 25 years inclusive of rebuilds), using a low carbon fuel alternative that cannot be used at high blend rates in conventional engines would naturally lead to an implementation dead-end, while only achieving modest carbon abatement.

Hydrogen Derived Fuel Supply

Renewable hydrogen utilisation technology remains at a relatively earlier stages of commercial readiness for the mining industry, requiring significant infrastructure, cost reductions, and supply chain development before it could support broadscale deployment.

Hydrogen Trickle-Feed

Thiess has already trialled hydrogen trickle-feed technologies in haul trucks (Section 2.6).

Dual Fuel – Partial Methane Substitution

Methane utilisation technology to replace diesel consumption in engines remains at relatively earlier stages of commercial readiness for the mining industry, requiring significant infrastructure, cost reductions, and supply chain development before broadscale deployment.

3.2.2 SCOPE 1 – MAJOR DIESEL EQUIPMENT ALTERNATIVES AND AUGMENTATION

The Proposed Mitigation Guide requires licensees to target 75% of major mobile equipment to be zero emissions by 2040 (where it is reasonable and feasible to do so).

Based on its understanding of the current state of development of zero-emission equipment, MACH is of the view that these proposed requirements would not be reasonable and feasible at the Mount Pleasant Operation within this timeframe.

Further, the proposed Modification would cease mining operations in 2032, well before the EPA's provisional 2040 75% zero-emissions equipment target.

MACH notes that the CCA indicates that irrespective of which prospective CCA decarbonisation pathway is followed (i.e. electrification or sustainable fuels pathways), the initial stage of each is likely to involve some combination of blended fuels, hybrid diesel-electric equipment and energy efficiency measures (Figure 3).

MACH has considered a wide range of diesel equipment alternatives and/or augmentations, including:

- Hybrid (Diesel-Kinetic Storage-Electric) Loaders (MPO-Diesel-11/25-8);
- Hybrid (Diesel-Battery-Electric) Haul Trucks (MPO-Diesel-11/25-9);
- Hybrid (Diesel-Electric/Kinetic/Hydraulic) Ancillary/Other Fleet (MPO-Diesel-11/25-10);

- Dig Unit Electrification – Dragline (MPO-Diesel-11/25-11);
- Dig Unit Electrification – Excavator (MPO-Diesel-11/25-12);
- Dig Unit Electrification – Shovel (MPO-Diesel-11/25-13);
- Haulage Electrification - Trolley Assist (Overhead) (MPO-Diesel-11/25-14);
- Haulage Electrification – Rail Assist (Side) (MPO-Diesel-11/25-15);
- Haulage Electrification – Battery-Electric Trucks (MPO-Diesel-11/25-16);
- Haulage Electrification – In-pit-crushing and conveying (MPO-Diesel-11/25-17);
- Automation – Major Plant Items (MPO-Diesel-11/25-18); and
- Dozers – Diesel Electric Drive (MPO-Diesel-11/25-19).

MACH and Thiess have identified an opportunity to trial hybrid diesel/electric haul truck technology in the next three-years at the Mount Pleasant Operation. Further actions proposed in the Three-Year Action Plan period are described in Section 4.4 below.

3.2.3 SCOPE 1 – FUGITIVE EMISSIONS

The Proposed Mitigation Guide currently requires licensees to target gas drainage and destruction at underground mines, but is also considering extending these requirements to surface mines (where it is reasonable and feasible to do so) (Section 1.2.2).

Based on geology and gas reserve data, MACH has commenced a fugitive gas investigation to gather additional data to inform potential abatement opportunities (e.g. methane destruction or utilisation).

Further actions proposed in the Three-Year Action Plan period are described in Section 4.3 below.

3.2.4 SCOPE 2 – ELECTRICITY SUPPLY

The Proposed Mitigation Guide currently encourages mining companies to implement energy efficiency measures and reduce their emissions intensity of grid electricity consumption. As discussed in Section 2.7.2, MACH has previously investigated major solar installations, but they were not considered reasonable and feasible to pursue.

MACH has an existing electricity retail agreement in place with an energy generation company that extends to 2027; surrender of mandatory Large-scale Generation Certificates is part of this agreement. Further lower emission intensity opportunities for the site electricity supply at the cessation of the current agreement period will be investigated in the next three-year period (Section 4.6).

4 THREE-YEAR ACTION PLAN

4.1 RFID DATA COLLECTION AND OPERATIONAL EFFICIENCY PACKAGE

Building upon the RFID rollout that is expected to be completed in Q1 2026, MACH anticipates having access to significantly increased granularity on fuel consumption (Section 2.8.1).

The mining contractor (Thiess) already has a wide range of efficiency and productivity measures that are summarised in Section 2.7.

Given the planned additional availability of by-unit and by-shift equipment fuel consumption data in 2026, MACH will use the completion of the RFID rollout to conduct a review and consolidation of all existing and additional reasonable and feasible operational efficiency measures aimed at improving mining efficiency and reducing diesel consumption on-site.

To this end, MACH/Thiess will develop an Operational Efficiency Training package that details best practices for various activities with a focus on minimising fuel burn through mine planning, operational discipline, payload monitoring and selecting optimal heavy mining vehicle bodies.

This package will include operator competency training and where practical will extend to feedback to individual operators where RFID fuel consumption data indicates aberrations in fuel usage that are not linked to equipment maintenance issues.

The Operational Efficiency Package will also include initiatives focused on energy-efficient electrical demand behaviours such as switching off lighting and air conditioning when not in use across the mine site.

These actions are summarised in Table 10.

Table 10
Three-Year Action Plan – RFID and Operational Efficiency Training Package

Measure	2026	2027	2028	Rationale
Fuel RFID Rollout	• Complete rollout of RFID system (Stage 2). • Test system and educate operators and supervisors on the availability of new detailed fuel usage data.	• Integrate additional RFID fuel data use in monthly operational performance reviews. • Investigate any aberrations in site fuel usage that warrant further investigation and can act as potential training opportunities.	• Extend RFID data granularity for future analysis. • Integrate use of additional RFID fuel data in training aspects of Operational Efficiency Package.	Builds upon existing efficiency and fuel usage data systems to provide better granularity and feedback.
Operational Efficiency Package	• Collate all relevant operational procedures and techniques and identify gaps and improvements. • Prepare Operational Efficiency Training Package.	• Complete rollout of new Operational Efficiency Training Package (Stage 1).	• Integrate use of additional RFID fuel consumption data in Operational Efficiency Training Package with operators (Stage 2).	Builds upon existing efficiency programmes to formalise and build upon existing procedures.

Any outcomes or learnings arising over the three-year programme will be incorporated into the site's updated Climate Change Mitigation and Adaptation Plan following the conclusion of the three-year period.

4.2 DIESEL FUEL ALTERNATIVES

In consideration of the NSW EPA's expectation of achieving 5% adoption of low-carbon diesel alternatives by 2030, MACH will undertake the following actions on alternative fuels in the Three-Year Action Plan (Table 11).

Table 11
Three-Year Action Plan – Alternative Fuels

Measure	2026	2027	2028	Rationale
Premium Diesel (MPO-Diesel-11/25-1)	• Conduct cost and efficiency review.	• Consider site-specific trial of selected premium diesel product if evidence supports benefit.	• Prepare cost–benefit analysis if trial is positive. • Determine potential feasibility.	Moderate trial opportunity, low-risk implementation and potential to modestly reduce fuel consumption.
Renewable Diesel (MPO-Diesel-11/25-3)	• Secure supply options. • Develop trial protocol. • Evaluate OEM warranty alignment.	• Conduct controlled on-site trial on select fleet assets. • Complete operational assessment.	• Review potential feasibility and price reduction required to consider partial implementation (e.g. 5%).	Future drop-in compatibility up to 100%, pending domestic supply growth and significant price improvement.
Biodiesel (MPO-Diesel-11/25-4)	• Monitor for State and National policy and OEM warranty changes.		• Determine whether more detailed reconsideration of biodiesel is warranted.	Limited long-term suitability for mining fleet at high blend-rates.
Dual Fuel - Partial Methane Substitution (MPO-Diesel-11/25-7)	• Complete Fugitive Investigation Programme (including the Yabby Program) to inform potential supply quantities and methane content.			Early-stage site-specific investigations, very high technical uncertainty.

MACH proposes a three-year staged programme focused on progressing the two most viable near-term options (premium diesel and renewable diesel) while continuing to monitor the development of emerging low-carbon fuels. This includes undertaking a controlled renewable diesel trial on site to confirm operational compatibility and supply reliability. The staged approach allows MACH to make evidence-based decisions, maintain fleet reliability, and position the operation to collect data in advance of the NSW EPA's 2030 expectation for commencement of 5% low-carbon fuel adoption.

Note that the Mount Pleasant Operation under the Modification would not be required to meet the NSW EPA's proposed 10% low-carbon fuel uptake by 2035 given the Modification would cease ROM coal mining in 2032.

Any outcomes or learnings arising over the three-year programme will be incorporated into the site's updated Climate Change Mitigation and Adaptation Plan following the conclusion of the three-year period.

4.3 FUGITIVE EMISSIONS

MACH will undertake the following actions on fugitive emissions in the Three-Year Action Plan (Table 12).

Any outcomes or learnings arising over the three-year programme will be incorporated into the site's updated Climate Change Mitigation and Adaptation Plan following the conclusion of the three-year period.

Table 12
Three-Year Action Plan – Fugitive Emissions

Measure	2026	2027	2028	Rationale
Methane - Coal Seam Pre-Drainage and/or Energy Generation (MPO-Fugitive-11/25-1)	• Complete fugitive borehole investigation programme. • Collate data, model gas reservoir characteristics and identify potentially applicable gas drainage technologies.	• Conduct an initial concept assessment for on-site fugitive gas extraction (for destruction or utilisation).	• Determine potential feasibility of destruction or utilisation options in consideration of Safeguard Obligations.	Early-stage site specific investigations, high technical and regulatory uncertainty.

4.4 HYBRID AND ELECTRIC DRIVE MAJOR EQUIPMENT

MACH will undertake the following actions on major hybrid and electric drive mining equipment in the Three-Year Action Plan (Table 13).

Table 13
Three-Year Action Plan – Hybrid and Electric Drive Equipment

Measure	2026	2027	2028	Rationale
Hybrid (Diesel-Battery-Electric) Haul Trucks (MPO-Diesel-11/25-9)	• Develop concept and identify preferred supplier for hybrid (retrofit) haul truck trial. • Conduct risk assessments and refine trial parameters, trial period and objectives.	• Install and test hybrid equipment to confirm compatibility with site conditions. • Conduct controlled trial on a minimum of two major haul trucks (Stage 1).	• Analyse trial results. • Identify learnings, opportunities and limitations, consider potential for Stage 2 trial extension.	Hybrid diesel/electric equipment has potential to materially reduce fuel consumption and improve cycle times.
Hybrid (Diesel-Kinetic Storage-Electric) Loaders (MPO-Diesel-11/25-8)	• Consult with OEMs on capital, operating and fuel consumption data on alternative loader configurations (including hybrid technologies).	• Conduct a procurement evaluation of hybrid vs conventional loaders based on life-of-plant financial and productivity analysis.	• Determine potential feasibility of adoption of hybrid loaders in consideration of the site loader replacement schedule.	
Dozers – Diesel Electric Drive (MPO-Diesel-11/25-19)^	• Consult with OEMs on capital, operating and fuel consumption data on diesel-electric drive and conventional dozer configurations.	• Conduct a procurement evaluation of electric drive vs conventional mechanical drive dozers based on life-of-plant financial and productivity analysis.	• Determine potential feasibility of adoption of electric drive dozers in consideration of the replacement schedule.	Diesel/electric drive dozers have potential to materially reduce fuel consumption and improve cycle times.

^ While no new dozer purchases are currently proposed under the Modification approval timeframe (i.e. to 2032), this measure has been retained as MACH will continue to progress outcomes of the Abatement Evaluation and Three-Year Action Plan prepared for the Mount Pleasant Operation AQGGMP under SSD 10418 until it is confirmed which consent pathway applies.

Any outcomes or learnings arising over the three-year programme will be incorporated into the site's updated Climate Change Mitigation and Adaptation Plan following the conclusion of the three-year period.

4.5 ZERO EMISSIONS TECHNOLOGY

In consideration of Proposed Mitigation Guide requirements for licensees to target 75% of major mobile equipment to be zero-emissions by 2040 (where it is reasonable and feasible to do so), MACH will undertake the following actions on zero-emissions mining equipment in the Three-Year Action Plan (Table 14).

Table 14
Three-Year Action Plan – Zero Emission Plant

Measure	2026	2027	2028	Rationale
Tethered Equipment Study^	• Consult with OEMs on capital, operating and electricity consumption data on electrical tethered excavators and/or drills.	• Evaluate site electrical supply and distribution requirements to support tethered excavators and/or drills and any key constraints to adoption.	• Determine potential feasibility of adoption of tethered excavators and/or drills in consideration of any site constraints and procurement requirements.	Major tethered equipment will become zero-emission as the electricity grid is progressively decarbonised.

^ This measure reflects longer-term zero-emissions planning under SSD 10418. As the Modification would cease coal production in 2032, It is very unlikely that pursuing tethered equipment would be a reasonable and feasible mitigation measure.

Any outcomes or learnings arising over the three-year programme will be incorporated into the site's updated Climate Change Mitigation and Adaptation Plan following the conclusion of the three-year period.

4.6 SITE ELECTRICITY SUPPLY

MACH will undertake the following actions on Scope 2 emission reduction opportunities in the Three-Year Action Plan (Table 15).

Table 15
Three-Year Action Plan – Scope 2 Emissions

Measure	2026	2027	2028	Rationale
Site Electricity Supply – Carbon-Neutral Contract (MPO-Electricity-11/25-2)	• Consult with current electricity supplier on options to reduce emission intensity under the current supply agreement (to 2027).	• Obtain alternative Power Purchase Agreement (PPA) or Large-scale Generation Certificates (LGC) pricing data from alternative electricity suppliers. • Determine whether it would be reasonable and feasible to reduce Scope 2 emissions associated with the site electricity supply (agreement extension or alternative supplier).	• Implement extended or new site electricity supply agreement or PPA.	As the electricity grid is progressively decarbonised, Scope 2 emissions will fall naturally. MACH is obliged to minimise Scope 2 emissions by using electricity generated by renewable or carbon neutral sources where reasonable and feasible.
Additional By Activity Electricity Consumption Data Collection	• To identify key electricity usage activity centres on-site.	• Review additional data on key usage centres, consumption fluctuations and identify any potential efficiency opportunities.	• Commence targeted efficiency programme.	Reduce Scope 2 emissions and electricity consumption.

Any outcomes or learnings arising over the three-year programme will be incorporated into the site's updated Climate Change Mitigation and Adaptation Plan following the conclusion of the three-year period.

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ATTACHMENT C
INDEPENDENT PEER REVIEW – GREENHOUSE GAS ABATEMENT EVALUATION AND THREE-YEAR ACTION PLAN (REPORT)

POWERED BY Mitchell TALISMAN

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Subject: Independent Peer Review – Greenhouse Gas Abatement Evaluation and Three-Year Action Plan (Report)

Project: Mount Pleasant Operation Modification 8 to DA 92/97

Date: 12 December 2025

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1. Introduction

At the request of MACH Energy, I have undertaken an independent peer review of the *Mount Pleasant Greenhouse Gas Abatement Evaluation and Three-Year Action Plan* prepared for the *Mount Pleasant Operation Modification 8 to DA 92/97* (the Project).

This peer review evaluates the Report's methodology, technical soundness, and regulatory alignment with both current and emerging greenhouse gas (GHG) mitigation expectations in New South Wales and under Commonwealth frameworks, specifically the NSW EPA *NSW Guide for Large Emitters*. It is acknowledged that this is a qualitative evaluation appropriate to the current environmental assessment phase of the Project.

I confirm that I am suitably qualified and independent to conduct this review, as detailed in Appendix A and B. My experience in the field of decarbonisation across industry and academia in policy, strategy and project execution qualifies me as an expert in this field. In addition to working in the mining and energy industries for 15 years, I am currently a PhD candidate at the University of Queensland, and have authored over 22 publications, including 9 peer reviewed journal articles on climate and energy transition. I have worked both in house for a major mining company and in consulting, advising mining companies, government, industry bodies, and universities on best practice emissions reduction in the mining and energy sectors.

2. Scope of Peer Review

This peer review process focused on:

- The methodology used for identifying and prioritising mitigation options;
- Consistency with Commonwealth and State emissions reduction legislation and regulations, environmental assessment and sectoral guidance, specifically consideration of the NSW EPA *NSW Guide for Large Emitters*;
- Consideration of current and emerging technologies, including commercial and technological readiness;
- Evaluation of opportunities for abatement focused on Scope 1 and 2 emissions;

- Adaptive management intent, including future quantitative analysis and clearly articulated projects;
- Provision of feedback on draft Report for inclusion in final Report.

3. Summary of Findings

3.1. Qualitative Evaluation Framing

The Report is explicitly framed as a qualitative assessment of emissions abatement options, appropriate to the Project's current approvals stage. The document recognises the limitations of projecting specific abatement outcomes at this point and commits to ongoing refinement via a future Climate Change Mitigation and Adaptation Plan, in line with NSW EPA expectations.

This framing is appropriate and reflects best practice for large infrastructure and resources projects under development.

3.2. Methodology and Hierarchy Alignment

The evaluation approach is comprehensive and aligns well with the NSW GHG mitigation hierarchy: avoid, reduce, substitute, offset. The Report clearly categorises proposed measures and integrates policy references from the NSW EPA, Climate Change Authority, and other industry best-practice documents.

The evaluation appropriately contextualises the mine-level opportunities. The GHG abatement workshop adds significant rigour and demonstrates organisational ownership of the mitigation strategy.

The incorporation of a multifaceted evaluation approach is a notable strength representing the reality of operations, balancing cost, technology readiness, and site constraints, among other considerations.

3.3. Forward Planning and Quantitative Commitments

The proposed Three-Year Action Plan focuses on high-value, feasible and near-term opportunities, including:

- expansion of RFID fuel-use monitoring and driver efficiency initiatives,
- evaluation of renewable diesel and hybrid equipment when availability improves,
- targeted fugitive gas data acquisition to enable future feasibility analysis, and continued optimisation of mine planning and haulage efficiency.

This plan is realistic, defensible, and proportionate to the mine's timeframe and emissions profile.

Where mitigation technologies were not recommended (e.g. large-scale electrification, trolley assist, hydrogen fuel cell trucks), the report provides clear technical, economic, or safety-based justification, reflecting a balanced and objective evaluation.

3.4. Scope of Mitigation Options and Technical Maturity

The analysis appropriately considers operational, geological and commercial realities, particularly the limited mine life to 2032, constrained fleet replacement windows, lack of alternative fuels supply, low fugitive gas availability at relevant depths, and limited firmed renewable electricity supply.

A comprehensive range of mitigation opportunities is presented, including fuel substitution (e.g., renewable diesel), fugitive emissions abatement, electrification of ancillary and major fleet, energy efficiency, and operational efficiencies. The Report evaluates each option's feasibility with regard to Technology Readiness Levels (TRL) and Commercial Readiness Levels (CRL), which is consistent with ARENA and industry frameworks.

4. Provision of Feedback on Draft Report

Feedback was provided during the peer review process on the draft Report to MACH Energy. The focus of the feedback related predominately to TRLs and CRLs of technology and operational implications. The comments and suggestions made to MACH Energy were adequately addressed and included in the final Report.

5. Conclusion

The *Greenhouse Gas Abatement Evaluation and Three-Year Action Plan* represents a well-structured and policy-aligned foundation for the Project's future climate planning. The qualitative approach is appropriate to this approvals stage and demonstrates MACH Energy's commitment to exploring reasonable and feasible mitigation options.

The Report is robust and meets the expectations of a peer-reviewed mitigation planning document under NSW guidance.

Yours sincerely,

Steph Byrom
General Manager, Decarbonisation
Loop Decarbonisation Services

Appendix A: Declaration of Independence

Declaration of Independence

I declare that:

- I have no financial interest in MACH Energy or the Mount Pleasant Project;
- I have not participated in the preparation of this Report or any related EIS documentation;
- I have no affiliations with any party that may be directly or indirectly affected by the outcomes of this review.

POWERED BY Mitchell TALISMAN

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Steph Byrom

General Manager, Decarbonisation Services

SUMMARY

Steph is a dedicated professional with over fourteen years of experience in the field of decarbonisation and policy, currently serving as the General Manager of Decarbonisation at Loop Decarbonisation Services. Loop, a JV between Talisman Technical and Mitchell Services, is at the forefront of providing strategic and technical solutions for the mining industry, where Steph plays a pivotal role in helping clients to operationalise their decarbonisation strategies. Her work involves identifying opportunities for emissions reduction and implementing innovative and cost-effective projects to accelerate the transition to a low-carbon economy. Through her career, Steph has focused on translating strategy related to ESG and decarbonisation into tangible actions.

EDUCATION

PhD Candidate (Australian Climate and Energy Policy)
University of Queensland
Master of Sustainable Systems (Environmental Markets)
University of Queensland
Bachelor of Arts (International Relations)
University of Queensland

PROFESSIONAL MEMBERSHIPS

Fellow of AusIMM

PROFESSIONAL EXPERIENCE

General Manager, Decarbonisation Services

Loop Decarbonisation Solutions, Brisbane, Australia, 2023 – Present

Leads end-to-end decarbonisation solutions for mining operations, combining technical innovation with regulatory compliance.

Key Achievements:

- Co-developed an innovative gas management solution for open cut coal mines with JV partner Mitchell Services.
- Led first deployments of a decarbonisation drill rigs to pre-drain fugitive emissions from open cut highwalls.
- Integrated decarbonisation strategies across corporate and operational levels.

General Manager, Decarbonisation Services

Palaris, Brisbane, Australia, 2022 – 2023

Built and scaled the Decarbonisation Services business unit to support mining clients with net zero pathways.

Key Achievements:

- Created frameworks to guide clients in electrification and emissions reduction.
- Delivered concept and pre-feasibility studies across commodities and mine types.

Senior Manager, Climate Change and Energy Transition

KPMG, Brisbane, Australia, 2021 – 2022

Provided strategic decarbonisation and ESG advice to clients in energy and natural resources.

Key Achievements:

- Founded the Women in ESG Community of Practice.
- Participated in "Leading with Pride" leadership program for emerging LGBT+ leaders.
- Developed a mining sector decarbonisation framework with holistic ESG integration.

Principal Consultant, Energy Technology and Policy

Gamma Energy Technology, Brisbane, Australia, 2015 – 2021

Delivered technical analysis and policy advice on electricity systems and decarbonisation.

Key Achievements:

- Presented research at major industry conferences (IEAGHGT, APPEA, SPE Asia Pacific).
- Co-developed the Surat Basin CCS Hub and contributed to CCS hub studies.
- Served as subject matter expert for AEMO and CSIRO studies.

Analyst, Product and Technology

Rio Tinto Energy, Various Locations, 2011 – 2015

Various roles, including Analyst – Product & Technology, Environment Operations Graduate, and Product Stewardship Graduate.

Key Achievements:

- Supported climate reporting under the Clean Energy Act and NGERS.
- Built a greenhouse and energy data tool for efficient regulatory compliance.
- Advised senior leadership and represented Rio Tinto in industry associations.