Whitehaven

Blackwater North Extension Project

Appendix G
Greenhouse Gas Management and Abatement Plan



Executive Summary

Overview

The Blackwater Mine (BWM) is an existing, open cut metallurgical coal mine located approximately 20 kilometres (km) south-west of Blackwater in the Bowen Basin, Queensland (QLD).

Whitehaven Blackwater proposes to develop the Blackwater North Extension Project (the Project), which would extend the current open cut mining development at the BWM to within Surface Area (SA) 7 on Mining Lease (ML) 1762 and SA 10 on ML 1759. The Project is expected to optimise mining operations at BWM allowing ongoing employment and economic benefits from the BWM to the local area, region, and State of Queensland.

The Project would include the following activities:

- extension of open cut operations into SA 7 on ML 1762 and SA 10 on ML 1759 to allow mining of additional coal reserves to approximately 2055;
- extraction of an additional 200 million tonnes (approximately) of run-of-mine (ROM) coal;
- continued extraction of up to 19 million tonnes per annum of ROM coal;
- continued use of existing BWM infrastructure (e.g. coal handling and preparation plant, thermal coal plant, ROM and product coal stockpiles, train load-out, water management, tailings management and other supporting infrastructure);
- construction and operation of new water management and water storage infrastructure in support of extended mining operations;
- development of waste rock emplacement areas;
- continued co-disposal of coarse rejects with waste rock and disposal of tailings into an approved tailings storage facility or in-pit void;
- construction of semi-permanent tailings cells to be utilised for the disposal of fine rejects;
- progressive rehabilitation of the Project;
- ongoing exploration activities in the Project area; and
- other associated infrastructure, equipment and activities.

This Greenhouse Gas Management and Abatement Plan (GMAP) has been prepared by Whitehaven Blackwater to detail predicted greenhouse gas emissions at BWM for the proposed Project, as well as greenhouse gas management and abatement measures proposed for the Project. The GMAP considers both Scope 1 and 2 emissions.

Emissions Context

Fugitive emissions in this GMAP have been estimated on the *National Greenhouse and Energy Reporting Act 2007* (NGER) Method 1 basis, as site specific fugitive gas emission estimates and supporting documentation for NGER Method 2 approach (which involves collation of site-specific gas data) are not yet available.

RWDI Australia Pty Ltd (RWDI) (2026) undertook greenhouse gas calculations in accordance with the *Greenhouse Gas Emissions Guideline – Version 1.02 – ESR/2024/6819* (Queensland Department of the Environment, Tourism, Science and Innovation, 2026). The Project would produce an average 0.27 million tonnes of carbon dioxide equivalent per year (Mt CO_2-e per year) of Scope 1 emissions. Along with an average of 0.004 and 7.91 Mt CO_2-e per year of Scope 2 and 3 emissions, respectively.

The approved facility specific Emissions Intensity Determination (EID) for BWM is 0.0527 tonnes of carbon dioxide equivalent per tonne of ROM coal (CER, 2025b). This ranks the BWM as having the 29th lowest emissions intensity among approximately 68 Australian coal mining facilities with published EIDs. Further, the emissions intensity at BWM is lower than the industry default value of 0.0653 t CO_2-e / t ROM, as specified under the Safeguard Rule.

Scope 1 emissions at the BWM (including the Project) are predicted to constitute 47.19 percent (%) fugitive emissions and 49.33% is predicted to be stationary diesel; the other approximately 3.48% of emissions originating from vegetation clearing, explosives and other Scope 1 sources.

Consistent with Whitehaven's adopted greenhouse gas policy, the adopted net emission goals for the Project are reflective of predicted Project net emission reduction targets under the Commonwealth Safeguard Mechanism. The BWM'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 Whitehaven's implementation of various mitigation measures to minimise the overall generation of greenhouse gas emissions from the Project would result in greenhouse gas emissions being maintained within any varied Safeguard Mechanism baseline emissions value.

Three-Year Plan

Whitehaven would implement adaptive management of greenhouse gas emissions over the life of the BWM, consistent with Australia's emissions reduction requirements as set out under the Safeguard Mechanism.

As part of detailed engineering design and feasibility assessment further quantitative evaluations would be conducted. Such analysis would be undertaken post-approval, and as such a Three-Year Action Plan has been developed to guide these decisions and would be subject to regular reviews, based on the technological, economic, regulatory and Project context at the time.

The Three-Year Action Plan has been developed to align with the current stage of the Project (i.e. environmental approvals) and the information that is presently available for the BWM. The Three-Year Action Plan would be revisited during the course of the Project as the regulatory, operational, technological and commercial context evolves.

The Three-Year Action Plan focuses on activities that increase site-specific information, including targeted trials, and feasibility assessments that enable Whitehaven to identify measures that are reasonable and feasible.

SCOPE 1 – METHANE GAS CAPTURE AND ABATEMENT

Table ES-1 sets out the three-year work program for fugitive emissions management for the Project. Fugitive emissions are a material Scope 1 source at the BWM, but site-specific characterisation and feasibility work for BWM remains at an early stage and would be progressively refined in future GMAP revisions.

Accordingly, the actions in Table ES-1 prioritise establishing a baseline and assess whether gas drainage, capture and abatement options (for example surface-to-inseam drilling and methane flaring or utilisation pathways) are reasonable and feasible for the Project's operational context.

Technology adoption timing and engineering solutions are subject to further feasibility assessment, technology maturation and operational planning considerations.

Table ES-1
Three-Year Action Plan – Fugitive Emissions

Measure	Year 1^	Year 2	Year 3	Rationale
Transition to NGER Method 2 Fugitive Emissions Basis	Transition of the BWM fugitive emissions estimates to a NGER Method 2 basis (as updated modelling inputs and supporting documentation become available).	Incorporate fugitive emissions forecasting outputs into the Project fugitive emissions methodology and assumptions.	N/A	Transitioning the Project's fugitive emissions estimates to an NGER Method 2 basis would enhance the accuracy of fugitive emissions estimation. This higher resolution would support more detailed feasibility assessments. In addition, Method 2 will provide a basis to account for gas capture and abatement.
Methane Pre-Drainage Capture and Abatement	Undertake a concept assessment of methane pre-drainage capture and abatement opportunities within the 5-year mine plan, informed by available gas reservoir data and development of the Method 2 gas model. Develop forward work plan for methane gas capture, including field validation if appropriate.	Progress shortlisted concepts through technical and economic feasibility assessment informed by updated gas reservoir information and Method 2 fugitive emissions estimates as appropriate.	Where feasibility assessment supports and recommends progression, arrange a pilot trial program (subject to regulatory requirements) to validate feasibility assumptions or fill data gaps for methane capture and abatement options.	Methane capture and abatement opportunities at BWM are highly site specific and dependent on gas reservoir characteristics, mine sequencing, and operational factors. Subject to outcomes of the concept assessment, feasibility assessment and pilot trial, integrate preferred methane pre-drainage into the next Three-Year Action Plan, considering the mine plan progress and appropriate regulatory approval pathways for development. The staged assessment approach provides a progression from gas modelling to concept development and feasibility screening with emerging industry practice in the Bowen Basin.

^ Year 1 is indicatively financial year 2027

SCOPE 1 – DIESEL COMBUSTION

Table ES-2 sets out the three-year work program in relation to the Project's diesel emissions, recognising diesel combustion is a major contributor to the Project's Scope 1 emissions profile and is strongly influenced by haulage requirements and operational practices (e.g. use of draglines instead of diesel haul trucks). The actions in Table ES-2 aim to build operational understanding, including evaluation of near-term fuel substitution options where practicable and assessment of market available hybrid and battery electric alternatives as part of replacement decisions within the equipment procurement cycle.

Table ES-2
Three-Year Action Plan – Diesel Combustion Emissions

Measure	Year 1^	Year 2	Year 3	Rationale
Biodiesel/ Renewable Diesel	Conduct cost and efficiency review of potential diesel fuel alternatives and review transferability of Maules Creek Coal Mine trial outcomes to the BWM.	Undertake site specific applicability assessment for biodiesel and renewable diesel at the BWM, including fleet compatibility, fuel quality requirements, storage and handling constraints.	Review potential feasibility including the marginal abatement cost of partial implementation.	Moderate trial opportunity, low-risk implementation and potential to modestly reduce diesel fuel emissions.
Hybrid Diesel Equipment	Consult with original equipment manufacturers (OEMs) on the availability and practicability of hybrid diesel equipment alternatives for haul trucks, dozers and loaders, including capital, operating and fuel consumption data	Conduct a procurement evaluation of currently available hybrid diesel equipment vs conventional diesel equipment based on life-of-plant financial and productivity analysis.	Determine potential feasibility of adoption of hybrid equipment in consideration of the BWM replacement schedule. Undertake a review of the readiness of large mining battery electric vehicles and associated infrastructure, to inform future emission reduction plans.	Hybrid diesel/electric equipment has potential to materially reduce diesel combustion emissions.
Tethered Equipment Study	Consult with OEMs on the availability and practicability of electrical tethered equipment as a replacement for existing diesel powered equipment, including capital, operating and electricity consumption data.	Considering the previous consultation, identify the tethered equipment that may be suitable for use at the Project and evaluate the applicable site electrical supply and distribution requirements and any key constraints to adoption.	Determine potential feasibility of adoption of previously identified tethered equipment in consideration of any site constraints and procurement requirements.	The use of electrical equipment would reduce Scope 1 emissions through the displacement of diesel and other direct fuel combustion sources.

^ Year 1 is indicatively financial year 2027

SCOPE 2 – ELECTRICITY FROM MAIN GRID

Table ES-3 sets out the three-year work program for Scope 2 emissions management. The actions in Table ES-3 prioritise improved understanding of electricity demand and efficiency opportunities, alongside a staged review of practicable renewable electricity contracts consistent with broader corporate considerations.

Table ES-3
Three-Year Action Plan – Scope 2 Emissions

Measure	Year 1^	Year 2	Year 3	Rationale
Site Electricity Supply – offset Scope 2 emissions	Assess available options and consult with existing suppliers (e.g. GreenPower is currently used for Whitehaven's NSW operations) or alternative renewable electricity providers regarding opportunities to offset Scope 2 emissions at the BWM.	Determine whether it would be reasonable and feasible to offset Scope 2 emissions associated with the site electricity supply (agreement extension or alternative supplier).	Implement extended or new site electricity supply agreement (if applicable).	As the electricity grid is progressively decarbonised, Scope 2 emissions would correspondingly fall.

^ Year 1 is indicatively financial year 2027

Potential Impacts of GHG Emissions on Environmental Values

In Australia, the climate is generally projected to become warmer and drier. Climate change may result in changes to rainfall patterns, run off patterns and river flow.

The Project's contribution to Australian emissions would be relatively small, as estimated annual average Scope 1 and 2 emissions would represent:

- approximately 0.09% and 0.41% in 2030 and 2035 respectively of the estimated total greenhouse gas emissions in QLD from (133 and 48 Mt CO_2-e in 2030 and 2035 respectively); and
- approximately 0.03% and 0.11% of Australia's projected greenhouse gas emissions in 2030 and 2035 respectively (349 and 184 Mt $CO_{2\text{-}e}$ in 2030 and 2035 respectively).

If the Project is approved and proceeds, the Project's contribution to global climate change would be proportional to its contribution to global greenhouse gas emissions. Greenhouse gases directly generated at the Project (i.e. Scope 1 emissions) and indirect emissions associated with the on-site use of electricity (i.e. Scope 2 emissions) have together been estimated at approximately 0.28 Mt CO_2-e per year during operations. These emissions would be small in the context of global greenhouse gas emissions.

However, based on a conservative approach that assumes that the Project's emissions are wholly additive, the Project'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 degree Celsius (°C) (Scope 1, 2 and 3), as follows:

- total Scope 1 and 2 Emissions - Global Surface Temperature Change 0.000008356°C (8.4 millionths of a °C); and
- total Scope 1, 2 and 3 Emissions - Global Surface Temperature Change 0.0002469°C (0.25 thousandths of a °C).

Given the above, the project's incremental contribution to temperature change would be sufficiently minor that no additional impacts on the environmental values would arise.

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1
OVERVIEW 1
EMISSIONS CONTEXT 1
THREE-YEAR PLAN 2
Scope 1 – Methane Gas Capture and abatement 2
Scope 1 – Diesel Combustion 3
Scope 2 – Electricity from main grid 4
POTENTIAL IMPACTS OF GHG EMISSIONS ON ENVIRONMENTAL VALUES 5
1 INTRODUCTION 1
1.1 PURPOSE OF THIS DOCUMENT 1
1.2 PROJECT OVERVIEW 1
1.2.1 Blackwater Mine 1
1.2.2 Project Summary 1
1.3 LIMITATIONS 4
1.4 CURRENT VERSIONS 4
1.5 PREVIOUS VERSION 4
1.6 APPLICANT DETAILS 4
1.7 STRUCTURE OF THIS DOCUMENT 5
2 KEY GUIDANCE MATERIAL 6
2.1 GLOBAL 6
2.2 COMMONWEALTH – AUSTRALIAN GOVERNMENT 6
2.2.1 Assessment 7
2.2.2 Reporting 7
2.2.3 Mitigation 8
2.2.4 Offsets 13
2.3 STATE – QUEENSLAND GOVERNMENT 14
2.3.1 Mitigation 14
2.4 RESOURCES INDUSTRY 17
2.5 OTHER KEY GUIDANCE AND INDUSTRY REVIEW 17
2.6 WHITEHAVEN COAL LIMITED 18
2.6.1 Emissions Reduction 19
2.6.2 Carbon Abatement Opportunities and Initiatives 19
3 GREENHOUSE GAS EMISSIONS CONTEXT 20
3.1 PREDICTED GREENHOUSE GAS EMISSIONS 20
3.2 PREDICTED GREENHOUSE GAS EMISSIONS INTENSITY 21
3.3 WHITEHAVEN EMISSIONS REDUCTION OBJECTIVE 23
3.4 BLACKWATER EMISSION REDUCTION TARGETS 23
3.5 ELECTRICITY SUPPLY CONTEXT 24
3.6 LIFE-OF-MINE CONTEXT 25
3.7 MINING EMISSIONS CONTEXT 25
3.7.1 Diesel Consumption 25
3.8 MINING FLEET DEMANDS AND SCHEDULING 26
3.9 EXISTING REASONABLE AND FEASIBLE MITIGATION MEASURES 28
4 REASONABLE AND FEASIBLE GREENHOUSE GAS EVALUATION 29
4.1 QUALITATIVE EVALUATION OF REASONABLE AND FEASIBLE MITIGATION MEASURES 29
4.1.1 Qualitative Evaluation Methodology 29
4.1.2 Evaluation of Reasonable and Feasible Mitigation Measures 29
4.2 KEY PROSPECTIVE TECHNOLOGIES FOR THE SITE 39
4.2.1 Scope 1 – Gas Capture and Drainage Options 39
4.2.2 Scope 1 – Diesel Combustion 39
4.2.3 Scope 2 – Electricity from Main Grid 40
5 THREE-YEAR ACTION PLAN 41
5.1 SCOPE 1 – GAS CAPTURE AND DRAINAGE OPTIONS 41

5.2 SCOPE 1 – DIESEL COMBUSTION 42
5.3 SCOPE 2 – ELECTRICITY FROM MAIN GRID 43
6 MONITORING, REPORTING AND REVIEW 45
6.1 MONITORING 45
6.2 NATIONAL GREENHOUSE AND ENERGY REPORTING 45
6.3 REVIEW 45
7 POTENTIAL IMPACTS OF GREENHOUSE GAS EMISSIONS ON ENVIRONMENTAL VALUES 46
7.1 CLIMATE CHANGE PROJECTIONS GLOBALLY 46
7.2 CLIMATE CHANGE PROJECTIONS FOR AUSTRALIA 47
7.3 CLIMATE CHANGE PROJECTIONS FOR QUEENSLAND 47
7.4 POTENTIAL IMPACTS OF THE PROJECT 49
8 CONCLUSION 50
8.1 EMISSIONS CONTEXT 50
8.2 THREE-YEAR PLAN 50
8.3 POTENTIAL IMPACTS OF GHG EMISSIONS ON ENVIRONMENTAL VALUES 50
9 REFERENCES 52

LIST OF TABLES

Table 1 Safeguard Baseline Decline Rate
Table 2 Key Mining Haulage and Equipment Emissions Reduction Levers
Table 3 Indicative Actions under the Resources Sector Plan
Table 4 Guideline Greenhouse Gas Emissions – Application Requirements
Table 5 Content Requirement of a Greenhouse Gas Abatement Plan
Table 6 Key Whitehaven Emissions Abatement Initiatives
Table 7 Summary of Estimated Emissions per Scope of All Scenarios
Table 8 Indicative BWM (including the Project) Annual Scope 1 Net Emissions Target
Table 9 Summary of Identified Potential Scope 1 and 2 Mitigation Measures
Table 10 Evaluation Matrix
Table 11 Three-Year Action Plan – Fugitive Emissions
Table 12 Three-Year Action Plan – Diesel Combustion Emissions
Table 13 Three-Year Action Plan – Scope 2 Emissions
Table 14 Climate Change Projections for the East Coast South Sub-cluster, Eastern Australia – Percentage Change in Rainfall (relative to 1995)
Table 15 Climate Change Projections for the Central Highlands Region, Queensland – Change in Rainfall (mm/d)
Table 16 Climate Change Projections for the Central Highlands Region, Queensland – Change in Mean Temperature (°C)

LIST OF FIGURES

Figure 1 Regional Location
Figure 2 Project General Arrangement
Figure 3 Prospective Decarbonisation Pathways for Mining and Haulage Equipment
Figure 4 DISR Resources Sector Plan

LIST OF CHARTS

Chart 1 Australian ROM Coal Emissions Intensity Determinations and Estimated Project Average ROM Coal Emissions Intensity
Chart 2 BWM (Including the Project) Gross Emissions and Net Scope 1 Emissions Target
Chart 3 Breakdown of Total Predicted Scope 1 Emissions for the Project by Source
Chart 4 Breakdown of Mobile Fleet Diesel Consumption for the Project
Chart 5 Breakdown of Projected Annual Diesel Consumption for the Project
Chart 6 Indicative Fleet Procurement and Replacement Timeline
Chart 7 Technical Readiness and Commercial Readiness Level Schematic (ARENA, 2014)

LIST OF APPENDICES

Appendix A Summary of Existing and Emerging Scope 1 and 2 Mitigation Measures at Surface Mines
Appendix B Greenhouse Gas Calculations Report
Appendix C Loop Decarbonisation Services Peer Review

1 Introduction

1.1 Purpose of this Document

This Greenhouse Gas Management and Abatement Plan (GMAP) has been prepared by Whitehaven Blackwater Pty Ltd (Whitehaven Blackwater) to detail predicted greenhouse gas emissions at Blackwater Mine (BWM) for the proposed Blackwater North Extension Project (the Project), as well as greenhouse gas management and abatement measures proposed for the Project. The GMAP considers both Scope 1 and 2 emissions.

It is noted that this GMAP does not estimate the actual or potential greenhouse gas emission reductions arising from the potential adoption of any identified emission abatement opportunity. Rather, this GMAP is a review of currently available and emerging advanced technologies, to inform Whitehaven Blackwater's identification of reasonable and feasible greenhouse gas emission controls that could potentially be adopted over the life of the Project. Whitehaven Blackwater would revisit these potential emission abatement opportunities prior to the commencement of and during the course of the Project.

1.2 Project Overview

1.2.1 BLACKWATER MINE

The BWM is an existing, open cut metallurgical coal mine located approximately 20 kilometres (km) south-west of Blackwater in the Bowen Basin, Queensland (QLD) (Figure 1).

The BWM has been in operation since 1967 and operates in accordance with, amongst other authorisations, Environmental Authority (EA) EPML00717813, granted under the Queensland *Environmental Protection Act 1994* (EP Act).

The existing BWM comprises a series of open-cut mining pits along an approximate 80 km long strike length. The BWM extracts coal using drill and blast methods, draglines, dozers and truck and shovel fleets for overburden removal and haulage.

Existing infrastructure at BWM includes two rail spurs and balloon loops from the Bauhinia Railway Line, a coal handling and preparation plant (CHPP), thermal coal plant (TCP), product stockpiles, run-of-mine (ROM) coal stockpiles, tailings storage facility, in-pit spoil (i.e. waste rock) dumps, train-load out facilities, water management infrastructure and other supporting infrastructure (e.g. haul roads, access roads, laydown areas, electricity transmission lines, workshops and offices).

1.2.2 PROJECT SUMMARY

Whitehaven Blackwater proposes to develop the Project, which would extend the current open cut mining development at the BWM, within Surface Area (SA) 7 on Mining Lease (ML) 1762 and SA 10 on ML 1759 (Figures 1 and 2). The Project is expected to optimise mining operations at BWM allowing ongoing employment and economic benefits from the BWM to the local area, region and State of Queensland.

The Project would include the following activities:

- extension of open cut operations into SA 7 on ML 1762 and SA 10 on ML 1759 to allow mining of additional coal reserves to approximately 2055;
- extraction of an additional 200 million tonnes (Mt) (approximately) of ROM coal;
- continued extraction of up to 19 million tonnes per annum (Mtpa) of ROM coal;
- continued use of existing BWM infrastructure (e.g. CHPP, TCP, ROM and product coal stockpiles, train load-out, water management, tailings management and other supporting infrastructure);
- construction and operation of new water management and water storage infrastructure in support of extended mining operations;
- development of waste rock emplacement areas;
- continued co-disposal of coarse rejects with waste rock and disposal of tailings into an approved tailings storage facility or in-pit void;
- construction of semi-permanent tailings cells to be utilised for the disposal of fine rejects;



WHC.24-101_EA Amendment SR GHG_201A

Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Geoscience Australia (2018)

LEGEND

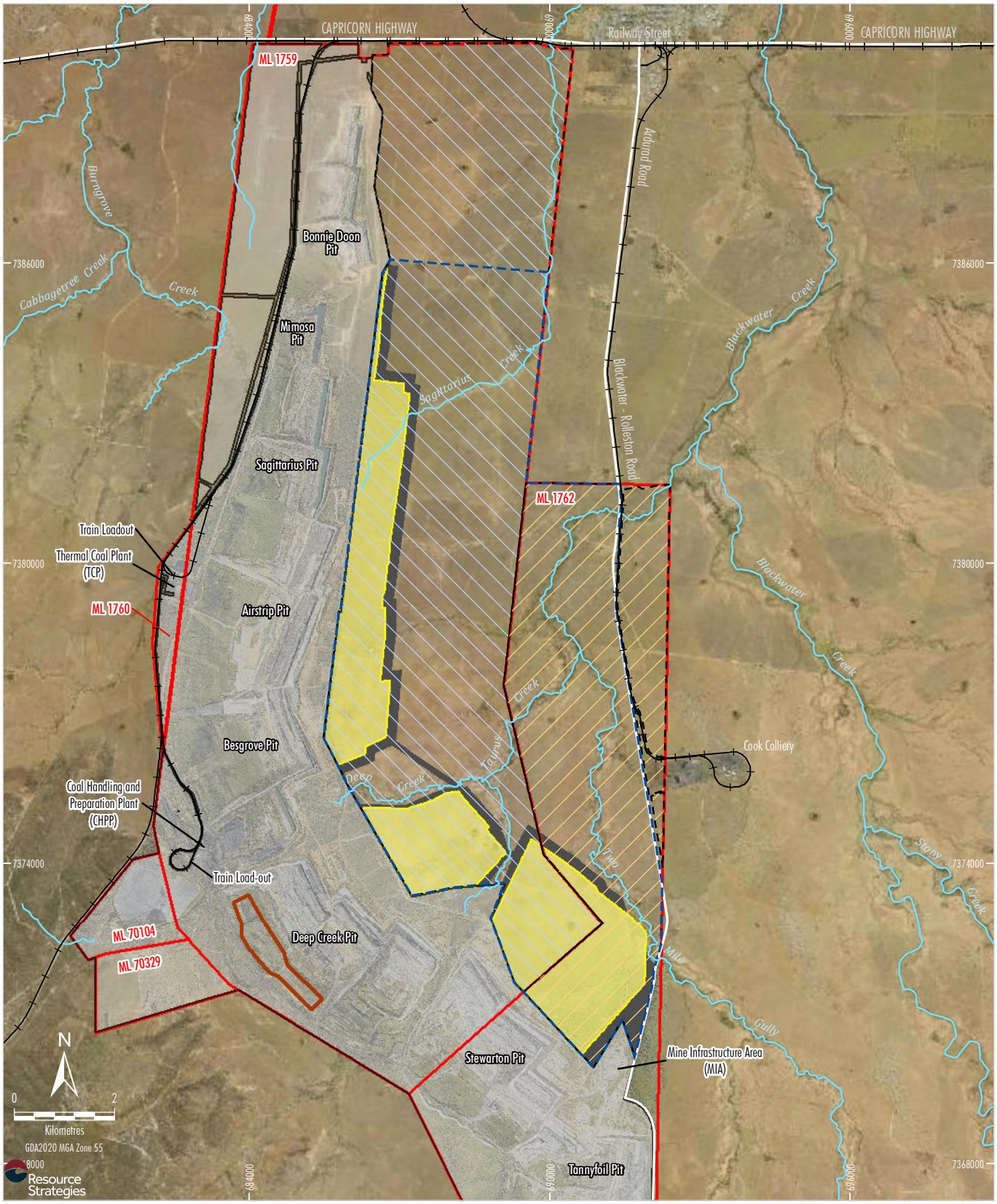
- Road
- Railway
- Coal Terminal
- Blackwater North Extension Project

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BLACKWATER NORTH EXTENSION PROJECT

Regional Location

Figure 1



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint
- SA 7
- SA 10

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area
- Potential Semi Permanent Tailings Cell

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

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BLACKWATER NORTH EXTENSION PROJECT

Project General Arrangement

Figure 2

- progressive rehabilitation of the Project;
- ongoing exploration activities in the Project area; and
- other associated infrastructure, equipment and activities.

1.3 Limitations

This GMAP has been prepared based on the information that is currently available to Whitehaven Blackwater and its associated technical advisors at the date of publication with respect to both the Project description, available emissions reduction technology and fugitive emission estimates.

Emission reduction opportunities described in this GMAP are reflective of current understanding of key abatement technologies and techniques. Where available, Whitehaven Blackwater has also made reference to international, national and state information sources of particular relevance to emission abatement opportunities of relevance to the sector.

Fugitive emissions in this GMAP have been estimated on the *National Greenhouse and Energy Reporting Act 2007* (NGER Act) Method 1 basis (i.e. default method), as site specific fugitive gas emission estimates and supporting documentation for National Greenhouse and Energy Reporting (NGER) Method 2 approach (which involves collation of site specific gas data) are not yet available. Specialist modelling is progressing and once the Method 2 model is complete , the GMAP would be updated. Until then, this GMAP and associated decarbonisation study on fugitive mitigation measures have been undertaken on that same Method 1 basis.

Detailed engineering design form part of the ongoing adaptive management of greenhouse gas emissions over the life of the mine, consistent with the mine's emissions reduction requirements as set out under the Safeguard Mechanism (Commonwealth Department of Climate Change, Energy, the Environment and Water [DCCEEW], 2025a), and to meet any applicable approval conditions.

Given the Project is subject to approvals and the timeframe between obtaining them and on-ground commencement, it is difficult to predict potential changes in abatement technology, cost/economic context, and the Project regulatory environment (e.g. Safeguard requirements) that may arise.

Further analysis would be undertaken in subsequent revisions of the GMAP, based on the technological, economic and regulatory context at the time of each quantitative review over the life of the Project. This would allow Whitehaven Blackwater to consider the technological, economic and regulatory context at the time of each quantitative review and hence adopt reasonable and feasible emission reduction opportunities that are available at that juncture of the Project's life.

1.4 Current Versions

This is the first version of the GMAP. This version of the GMAP also includes preliminary consideration of potential greenhouse gas emissions abatement opportunities. This section would be updated as part of future revisions.

1.5 Previous Version

This is the first version of the GMAP.

1.6 Applicant Details

The BWM is a joint venture between Whitehaven Coal Limited (Whitehaven) (70 percent [%]), Nippon Steel Corporation (20%) and JFE Steel Corporation (10%). Whitehaven Blackwater, a wholly owned subsidiary of Whitehaven, is the operator of the BWM.

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1.7 Structure of this Document

This GMAP consists of the following sections:

Section 1: Introduction

Section 2: Key Guidance Framework

Section 3: Greenhouse Gas Emissions Context

Section 4: Reasonable and Feasible Greenhouse Gas Evaluation

Section 5: Three-Year Action Plan

Section 6: Monitoring, Reporting and Review

Section 7: Potential Impacts of Greenhouse Gas Emissions on Environmental Values

Section 8: Conclusion

Appendix A: Summary of Existing and Emerging Scope 1 and 2 Mitigation Measures at Surface Mines

Appendix B: Greenhouse Gas Calculations Report

Appendix C: Loop Decarbonisation Services Peer Review

2 Key Guidance Material

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 Project, as well as any Scope 2 and 3 emissions related to the Project that would 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 in the end-use, overseas jurisdictions would be accounted for and managed in accordance with the laws that have been adopted in those jurisdictions to implement their NDCs.

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-carbon dioxide (CO_2) greenhouse gas emissions, including methane (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 Commonwealth – Australian Government

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 Whitehaven Blackwater to implement measures to reduce, avoid and monitor greenhouse gas emissions. Nevertheless, the Climate Act is considered and addressed in this GMAP.

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 to 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.

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, 2025c) is the latest such publication and has been used to calculate the Project emission projections (Appendix B).

2.2.2 REPORTING

National Greenhouse and Energy Reporting Scheme

The Commonwealth 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 tonnes of carbon dioxide equivalent (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 double counting of emissions per the UNFCCC rules, the NGER Act does not cover Scope 3 emissions.

Whitehaven Blackwater currently reports all energy production and consumption and greenhouse gas emissions (Scope 1 and Scope 2) from its activities under the NGER Act. Whitehaven Blackwater would continue to comply with its obligations under the NGER Act, including reporting any emissions and energy production and consumption from the Project.

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 tonnes of carbon dioxide equivalent per year (t CO_2-e per year) of covered Scope 1 emissions, which currently includes the existing BWM and would extend to include the Project, 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 Clean Energy Regulator (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, 2024) 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 BWM 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 (FY).

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, 2024) in combination with other greenhouse gas reduction measures in the economy.

At the end of each year, BWM's baseline would 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, 2024).

Table 1
Safeguard Baseline Decline Rate

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 would 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.

From 2030 onwards, Safeguard Mechanism decline rates will be set in five year blocks to align with Australia's NDCs. The Safeguard Mechanism is subject to periodic statutory review, including a scheduled review in FY2027, through which post 2030 decline rates may be amended. As BWM's emissions baseline is directly tethered to the applicable decline rate, any future tightening adopted through these review processes would translate to lower facility baselines and progressively lower net emissions outcomes over time.

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 BWM (and the Project) is production of ROM coal. A second production variable (Mine Rehabilitation) does not yet apply to BWM, as it only applies to final rehabilitation activities. The Mine Rehabilitation production variable may 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 BWM'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.

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). Whitehaven Blackwater has an approved EID for the BWM, which was originally developed when fugitive emissions were reported using Method 1 (0.0527 t CO_2-e per tonne of ROM). Whitehaven Blackwater is now transitioning to a higher-order NGER Act reporting method for fugitive emissions (Method 2). The GMAP would be updated to reflect any future EID updates.

Sector Pathways

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 Project 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).

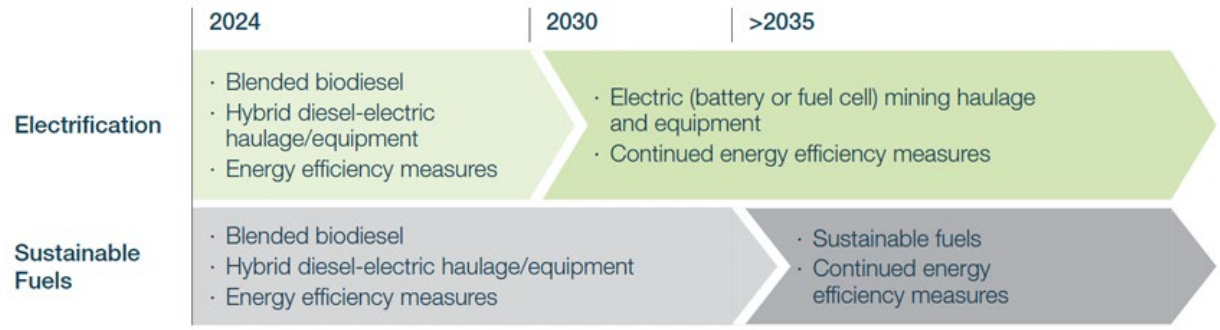
Key emission reduction levers for reducing emissions from mining haulage and equipment, summary readiness and potential barriers to adoption as identified by the CCA (2024a) are reproduced in Table 2.

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 3.

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.

Source: (CCA, 2024a).
^ Uptake of sustainable fuels is also constrained by OEM warranty limits.



Source: (CCA, 2024a).

Figure 3 Prospective Decarbonisation Pathways for Mining and Haulage Equipment

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.*

Net Zero Plan

Australia's *Net Zero Plan* (Commonwealth DCCEEW, 2025d) sets the national policy framework for achieving net zero greenhouse gas emissions by 2050, supported by legislated interim targets under the Climate Act. The Australian Government adopted the CCA's recommendation to reduce national emissions by 62 to 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.

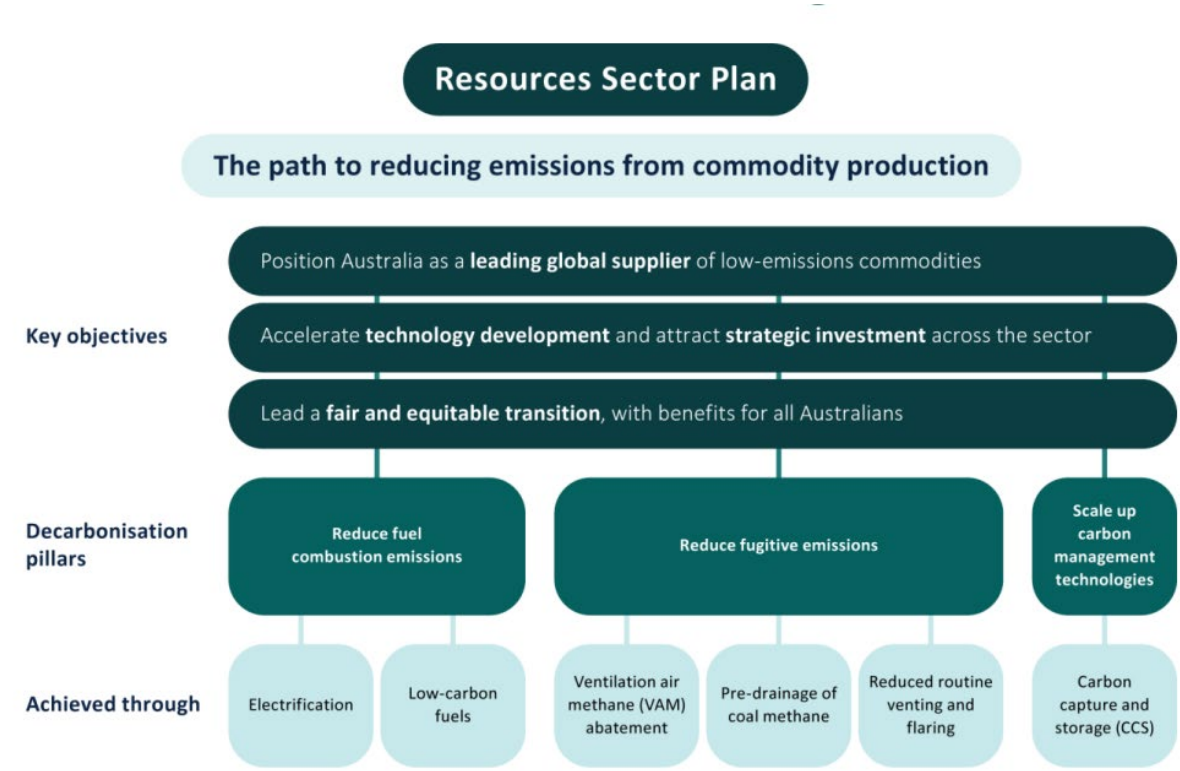
The Net Zero Plan (Commonwealth DCCEEW, 2025c) also provides sector-specific pathways for electricity, transport, industry, resources, agriculture and the built environment. These pathways recognise differing technological readiness and expected rates of decarbonisation. Further discussion on the Resource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

Resource 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 4). 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.

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 in provided in Table 3.



Source: (Commonwealth DISR, 2025).

Figure 4 DISR Resources Sector Plan

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.

Source: (Commonwealth DISR, 2025).
Notes: VAM = Ventilation air methane, CCS = Carbon Capture Storage.

2.2.4 OFFSETS

The Commonwealth CCA's *Targets, Pathways and Progress* (2024b) 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 would 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 would 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, 2025d):

> *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 – Queensland Government

2.3.1 MITIGATION

The Queensland Government previously released the *Pathways to a Clean Growth Economy – Queensland Climate Transition Strategy* (Queensland Climate Transition Strategy) (Department of Environment and Heritage Protection [DEHP], 2017a), which outlined how QLD would transition to a clean growth economy and achieve its target of net-zero emissions by 2050.

Since the release of the Queensland Climate Transition Strategy (DEHP, 2017a), the former Labor Queensland Government also legislated a stronger intermediate emissions reduction target of 75% by 2035 (referred to as '75% by 2035') through the passing of the *Clean Economy Jobs Act 2024*. The timeframe of sector-specific emissions reduction plans to meet the 2035 targets legislated in the *Clean Economy Jobs Act 2024* has been delayed by the current Queensland Government for the foreseeable future. However, QLD's emissions are currently 35% below 2005 levels, which exceeds the first interim emissions reduction target of 30% by 2030 (Queensland Treasury, 2025a).

The Queensland Government also announced that the *Net Zero Roadmap* is in development (Queensland Treasury, 2025a), which would provide a revised pathway for QLD to meet the revised emissions reduction targets legislated in the *Clean Economy Jobs Act 2024*. This roadmap would include new industry specific emissions reduction plans, including a plan for the resources sector.

The *Queensland Climate Adaptation Strategy* (DEHP, 2017b) is also under review by the current Queensland Government (Queensland Treasury, 2025b). Future versions of the strategy would be considered in future revisions of this GMAP.

This GMAP has been produced with consideration of the Queensland *Greenhouse Gas Emissions Guideline – Version 1.02 – ESR/2024/6819* (QLD GHG Guideline*)* which outlines existing application requirements under the EP Act for new and existing EAs, and details how to meet these requirements in relation to greenhouse gas emissions (Queensland Department of the Environment, Tourism, Science and Innovation [DETSI], 2026). Future versions of the QLD GHG Guideline would be considered in future revisions of this GMAP. Whitehaven Blackwater understands this guideline is currently in the process of being updated, however, this GMAP has been developed in accordance with Version 1.02 of the guideline. It is noted that, with reference to the GHG Guideline and predicted emissions in Section 3, the Project is considered to be a medium to high emitter.

The QLD GHG Guideline sets out the minimum expectations for GHG emissions information to be provided with applications for new EAs and applications to amend existing EAs. The requirements for development applications, and where they are addressed in this report are summarised in Table 4.

Table 5 shows the content requirements for a GHG Abatement Plan under the QLD GHG Guideline and where each requirement has been addressed in this GMAP.

Table 4
Guideline Greenhouse Gas Emissions – Application Requirements

Requirement	Addressed Within this GMAP
Details of GHG emissions likely to be generated by the activities of the project over its life.	Section 3.1, Appendix B.
An emissions inventory identifying the GHGs to be emitted and the stage of the project at which the emissions will occur, with a breakdown of GHG emissions by source, that: - Estimate the projected annual Scope 1 and Scope 2 CO2-e emissions over the life of the project. Include both unabated emissions and emissions after all avoidance and abatement measures (as outlined in section 3.3) have been accounted for. - Provide an estimate of annual Scope 3 emissions and total Scope 3 emissions over the life of the project.	Section 3, Appendix B.
A determination as to whether the application meets the threshold for medium to high GHG emission category emitting applications, where: - Applications with expected GHG emissions (Scope 1 and Scope 2) of 25,000 tonnes CO2-e or more per year (at any time during the life of the project) are considered medium to high emitters - Applications with expected GHG emissions (Scope 1 and Scope 2) of less than 25,000 tonnes CO2-e per year are considered low emitters.	Section 3.1, Appendix B.
Details of the management practices proposed to be implemented to prevent or minimise adverse impacts in line with the GHG abatement hierarchy and requirements for a GHG abatement plan (for medium to high emitters).	Section 5.
A risk assessment that outlines the scale of expected GHG emissions from the activity and how they are expected to contribute to climate change impacts on Queensland's environmental values.	Section 7.
Applications for activities that meet the medium to high emission category at any point during the carrying out of the authorised activity will be required to include a GHG abatement plan.	This GMAP.

Source: (DETSI, 2026).

Table 5
Content Requirement of a Greenhouse Gas Abatement Plan

Requirement	Description	Addressed Within this GMAP
a) Project details	– Applicant. – Project name and description (including location).	Section 1.
b) Emissions projections and commencing abatement measures	– Emission inventory and estimates as developed in section 3.1 of the guideline. – Management practices proposed to be implemented at commencement to reduce GHG emissions as per section 3.3 of the guideline.	Section 3, Section 4 and Section 5.
c) GHG emissions reference point	– Outline the level of emissions against which ongoing reduction of GHG emissions will be assessed throughout the life of the project (reference point). – This is based on projected GHG emissions prior to implementation of the GHG abatement plan and may include multiple reference points developed for each stage of the activity. – For projects captured by the Commonwealth Safeguard Mechanism, the reference points may be determined by the Safeguard Mechanism (referred to as baseline). – Provide justification for the reference points proposed.	Section 2, Section 3 and Appendix B.
d) Emission reduction targets	– Identify interim Scope 1 and Scope 2 GHG emission reduction targets to be applied throughout the life of the project. – Identify long-term overall Scope 1 and Scope 2 GHG emission reduction targets. – Targets may be set at intervals of up to 5 years to take into account emerging technologies over that period and allow for production variability, provided they result in a reduction of GHG emission at the end of the period. – For projects captured by the Commonwealth Safeguard Mechanism, the emission reduction targets may be determined by the Safeguard Mechanism. – Provide justification for the emission reduction trajectory and targets proposed and how they support the Queensland Government's greenhouse gas emission reduction targets.	Section 3.
e) GHG emission reduction program	– A program that details the GHG emission reduction measures for Scope 1 and 2 that will be implemented throughout the life of the project, as developed in section 3.3 of the guideline and outlined in Part B below.	Section 5
f) Advancing technologies and opportunities	– Provisions for regularly reviewing new technologies to identify opportunities to further reduce emissions and energy efficiency.	Section 4
g) Monitoring and auditing	– A program for monitoring GHG emissions and auditing against GHG emission reduction targets.	Section 6
h) Reporting	– A program for periodic public reporting on progress towards the GHG emission reduction targets outlined in the GHG abatement plan including details about how public reporting will be undertaken. – There is no intent to duplicate reporting requirements. Where companies are already reporting GHG emissions under another framework, this section can refer to that reporting. However, reporting must be against the emission reduction targets stated in the GHG abatement plan and must be publicly available. – Where the GHG abatement plan includes commercial-in-confidence information, the applicant may request that specific details are treated as confidential and are not made publicly available, with justification to support this request.	Section 6

Source: (DETSI, 2026).

It is noted that Appendix C of the QLD GHG Guideline provides some useful guidance of how to apply the guideline to an Environmental Authority Amendment (as is the case for the Project). The Guideline notes:

- *projected GHG emissions as per section 3.1 need only to refer to GHG emissions that will be generated as a result of the proposed amendment, including the determination of the GHG emission category for the application.*
- *proposed management practices as per section 3.3 are only applicable to the GHG emissions that will be generated as a result of the proposed amendment. This includes any GHG abatement plan that may be required for GHG emissions generated by the proposed amendment.*
- *the description of risks and likely magnitude of impacts to environmental values as per section 3.4 only needs to address the risks associated with the GHG emissions that would be generated by the proposed amendment.*

To address this, the "Project only" scenario is identified in Section 3 and abatement opportunities would be evaluated in the context of the Project (Sections 4 and 5).

2.4 Resources Industry

The Minerals Council of Australia released the *Climate Action Plan* in 2020 which details the mineral industry's commitment to the goal of net zero emissions and its actions, among others, on renewable energy investments at mine sites and collaborations with partners on low-emissions technologies and processes. The *Climate Action Plan* outlines a series of actions focused on three key themes: support developing technology pathways to achieve significant reductions in Australia's greenhouse gas emissions, increased transparency on climate change reporting and informed advocacy and knowledge sharing of the sector's responses to addressing climate change. Whitehaven is a member of the Minerals Council of Australia.

Since the release of the *Climate Action Plan* in 2020, the Minerals Council of Australia has also released three annual progress reports for 2021, 2022 and 2023 which tracks the progress toward completing the actions set in the *Climate Action Plan* (Minerals Council of Australia, 2025). Most notably, the 2023 progress report marked the completion of the initial three-year work program, identifying new prospects, accelerating existing actions, and creating lasting pathways toward the industry's ambition of net-zero emissions by 2050 (Minerals Council of Australia, 2023).

In 2021, Whitehaven also became a signatory to the World Coal Association's *Responsible Coal Principles*, which acknowledges the impact of climate change and importance of mitigating emissions from coal, committing to actively supporting low emission coal technologies, investment and innovation (Whitehaven, 2022).

2.5 Other Key Guidance and Industry Review

EMM Consulting Pty Limited (EMM) (2025) undertook a literature review and industry scan of New South Wales (NSW) mines. Although, BWM is outside of NSW, the technical information which came as a result of this report currently forms the most up to date abatement evaluation for surface coal mines in Australia and therefore is relevant to this GMAP. 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 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.

Whitehaven Blackwater has considered the literature review undertaken by EMM (2025) as a source of contemporary advice available for coal mines in the development of this GMAP. However, Whitehaven Blackwater has not limited its consideration of potential abatement opportunities to those listed in EMM's (2025) literature review. Existing mitigation measures for Scope 1 and 2 emissions identified by EMM (2025) relevant to surface mines have been reproduced in Table A-1 (Appendix A). Similarly, emerging Scope 1 and 2 mitigation measures for surface mines identified by EMM (2025) have been summarised in Table A-2 (Appendix A).

Most notably, QLD has emerged as the primary Australian jurisdiction where advanced methane measurement and abatement approaches are being actively trialed and progressed at scale, particularly within the Bowen Basin. Recent work supported by the United Nations Environment Programme's International Methane Emissions Observatory has focused on improving the empirical understanding of methane emissions from coal operations in QLD, including targeted studies in the Surat Basin and ongoing investigations in the Bowen Basin (EMM, 2025).

Recent federal funding commitments of $37 million have also supported the deployment of regenerative thermal oxidation technology at the Kestrel Coal Mine in QLD (EMM, 2025). Similarly, Stanmore Resources' Low Emissions Investment Partnerships funded project at the South Walker Creek open cut coal mine is trialing the capture of fugitive coal seam methane and its conversion to on-site electricity generation via a 20MW gas-fired power station.

2.6 Whitehaven Coal Limited

Whitehaven recognises and supports the long-term goal of the *Paris Agreement* to limit global average temperature increases to below 2°C compared to pre-industrial levels, consistent with Australia's national commitments under the accord (Whitehaven, 2025).

Paris-aligned Decarbonisation Goals

Whitehaven recognises and supports the long-term goal of the *Paris Agreement* to limit global average temperature increases to below 2°C compared to pre-industrial levels, consistent with Australia's national commitments. Accordingly, all of Whitehaven's direct-sale customer countries are signatories to the *Paris Agreement* or, in the case of Taiwan, have domestic energy policies that are aligned with the *Paris Agreement* (Whitehaven, 2025). This would also be the case for all of Whitehaven's direct-sale customer countries for the Project's product coal.

Emission Intensity Reduction Targets

Whitehaven recognises and supports Australia's commitment to achieving net zero carbon emissions by 2050 and has aligned its decarbonisation goals and business practices with the emissions reduction obligations outlined under the reformed Safeguard Mechanism.

Emissions intensity reduction obligations, as set by the Safeguard Mechanism, apply to four of Whitehaven's operating assets, namely the BWM, Daunia Mine, Narrabri Mine and Maules Creek Coal Mine (MCCM). Together in FY25, these mines accounted for 92% of Whitehaven's total Scope 1 emissions (Whitehaven, 2025). Whitehaven's operating assets covered by the Safeguard Mechanism would be required to reduce their 'baseline' emissions intensity based on a facility-specific ratio and the default 4.9% per year emissions intensity reduction through to FY30 (i.e. Safeguard facilities with a high facility-specific emissions intensity would have to reduce emissions more aggressively compared to facilities with lower historical emissions intensity).

The emissions intensity reduction obligations set by the Safeguard Mechanism at present to the BWM would apply to the Project as well, given that it is intended for the Project to become part of the BWM for Safeguard Mechanism compliance purposes should the Project be approved. Table 6 identifies key existing and potential emissions abatement initiatives Whitehaven have identified for sites under their ownership, along with indicative timing and the abatement potential of each decarbonisation initiative (Whitehaven, 2025).

Table 6
Key Whitehaven Emissions Abatement Initiatives

Abatement Initiative	Description	Indicative Timing	Abatement Potential
Open cut pre-mining gas drainage to flare or generate electricity	Preliminary scoping work into pre-mining gas drainage at QLD mines to abate emissions through methane gas capture to flare and/or generate electricity. Potential opportunity to adapt gas drainage technologies which have historically been implemented at underground mines to apply to an open cut mine setting.	FY25-FY30	Significant
Enhance longwall sealing of goafs	Improve the sealing of goafs (i.e. previously mined areas) in the northern area of the Narrabri Mine, indicatively reducing the release of fugitive emissions into the atmosphere.	FY25-FY30	Minor
Flare pre-mining drainage methane	Narrabri Mine operations have shifted to a new longwall series in the southern section of the mine, where methane concentrations are sufficient to enable flaring of pre-mining drainage methane.	FY25-FY30	Minor
Gas separation and purification	Potential to treat pre-drainage gas through practical use of technologies to increase available concentrations of methane, to flare or beneficially utilise for electricity generation.	FY25-FY30	Moderate
Gas sequestration	Exploring the feasibility of carbon capture and storage of fugitive emissions at the Narrabri Mine. The gas captured would be injected into geological strata, effectively sealing it in those strata.	FY25-FY30	Significant

Table 6 (Continued)
Key Whitehaven Emissions Abatement Initiatives

Abatement Initiative	Description	Indicative Timing	Abatement Potential
Ventilation air methane (VAM) abatement	Underground mines historically emit methane in high volumes and low concentrations. Existing VAM mitigation technology cannot handle the low concentration emitted by the Narrabri Mine, however viable technology may become available.	FY30-FY40	Unknown
Reducing Diesel Emissions	Technologies to reduce diesel emissions in the short term, including technologies to improve operational efficiencies, and investigating diesel substitution options. A trial of renewable diesel was undertaken at the Maules Creek Coal Mine.	FY25-FY30	Moderate
Biological carbon capture and use (CCU) technology	harnesses bacteria and microbial algae to consume carbon emissions at the source, producing saleable by-products such as lipids and proteins for use in renewable diesel production, sustainable aviation fuel, agricultural nutrition, fertilisers and bioplastics.	FY30–FY40	Unknown

Source: (Whitehaven Coal, 2025).

2.6.1 EMISSIONS REDUCTION

Whitehaven currently offsets Scope 2 emissions for its NSW assets and has commenced a process to consider offsetting Scope 2 emissions on a whole-of-portfolio basis (i.e. NSW and QLD). Whitehaven has also committed to a net Scope 1 emissions intensity reduction target for operating mines of 32% by FY30 (Whitehaven, 2025) as implied by the Safeguard Mechanism, which would be revised in line with future revisions of the Safeguard Mechanism and changes to its mine portfolio. A review of the Safeguard Mechanism is scheduled for 2026-27.

Furthermore, consistent with Australian and QLD targets, Whitehaven is undertaking an exercise to explore the decarbonisation potential within the business, including having regard to issues such as capital intensity, complexity and timing. Relevant outcomes from this process would be included in future revisions of this GMAP.

2.6.2 CARBON ABATEMENT OPPORTUNITIES AND INITIATIVES

Whitehaven has identified potential greenhouse gas abatement opportunities through a range of sources, including:

- Existing technical experience and exposure to emerging abatement measures and technologies on other mine sites, including open cut coal mines and other open cut mining sectors.
- Reference to international greenhouse gas abatement documentation.
- Reference to Australian and interstate publications on greenhouse gas abatement.
- Consultation with key consumable suppliers on the status, availability and potential price of low-emission alternatives (e.g. renewable fuels).
- Consultation with key Original Equipment Manufacturers (OEMs) on the development status, availability and potential price of emerging low-emission equipment or technology.
- Participating in industry working groups and committees and attending industry forums and conferences focused on decarbonisation opportunities.
- Obtaining independent subject matter advice.
- Site-specific greenhouse gas abatement opportunity analysis and workshops conducted by Whitehaven.

3 Greenhouse Gas Emissions Context

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

3.1 Predicted Greenhouse Gas Emissions

RWDI (Appendix B) undertook greenhouse gas calculations in accordance with the QLD GHG Guideline.

In order to quantify the incremental greenhouse gas emissions of the Project, three scenarios have been assessed:

- **Baseline Scenario** (Approved BWM Scenario): Approved life of mine (LOM) as approved by EA EPML00717813 excluding the Project. This scenario assumes continued operations of the BWM at a maximum mining rate of 19.0 Mtpa of ROM coal until 2090 (at an average ROM coal mining rate of approximately 12.8 Mtpa).
- **Project Scenario** (Amended BWM Scenario): Proposed LOM with the Project, incorporating the proposed extension of open-cut mining on SA 7 on ML 1762 and SA 10 on ML 1759. This scenario would extract an additional 200 Mt of ROM coal when compared to the Baseline Scenario, extending operations to approximately 2093 with continued maximum annual ROM coal extraction rate of 19.0 Mtpa (at an average ROM coal extraction rate of approximately 15.0 Mtpa).
- **Project Only Scenario** (Amendment Scenario): This scenario evaluates the net change in emissions resulting from the Project extension by comparing the emissions from Project Scenario against those from Baseline Scenario, thereby quantifying the incremental impact of the proposed amendment.

It should be noted that, as the Project Only Scenario represents the mathematical difference between the Project scenario and the Baseline scenario and as a result of this, some individual years may report negative values for production metrics such as ROM coal or waste movement while some material consumption (e.g. diesel consumption) remains positive in those years. These values are an artefact of comparing two independently optimised mine plans and reflect differences in mining sequence, pit development, haulage requirements and scheduling between the scenarios. The Project Only Scenario should not be taken as a standalone or physically achievable mining schedule as it is only used to isolate the greenhouse gas emissions attributable to the Project.

For example, the Project changes the mine plan and life of mine schedule. As a result, activities such as overburden emplacement, haulage, rehabilitation, construction, decommissioning, clearing and other operations may occur at different times between the Baseline and Project scenarios and are not directly linked to annual ROM coal production or waste movement (i.e. even if ROM coal or waste are negative or 0 in the Project Only Scenario, it does not mean the same ROM coal or waste has been moved between the Baseline and Project Scenarios).

The greenhouse gas emissions estimated by RWDI (Appendix B) for each scenario are summarised in Table 7.

Table 7
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	0.71	0.047	26.30
	Project Scenario	0.99	0.051	34.21
	Project Only Scenario	0.27	0.004	7.91
Total	Baseline Scenario	47.89	3.14	1,761.93
	Project Scenario	66.18	3.41	2,292.09
	Project Only Scenario	18.30	0.27	530.16

Source: (RWDI, 2026).
Note: million tonnes of carbon dioxide equivalent. (Mt CO_2-e)

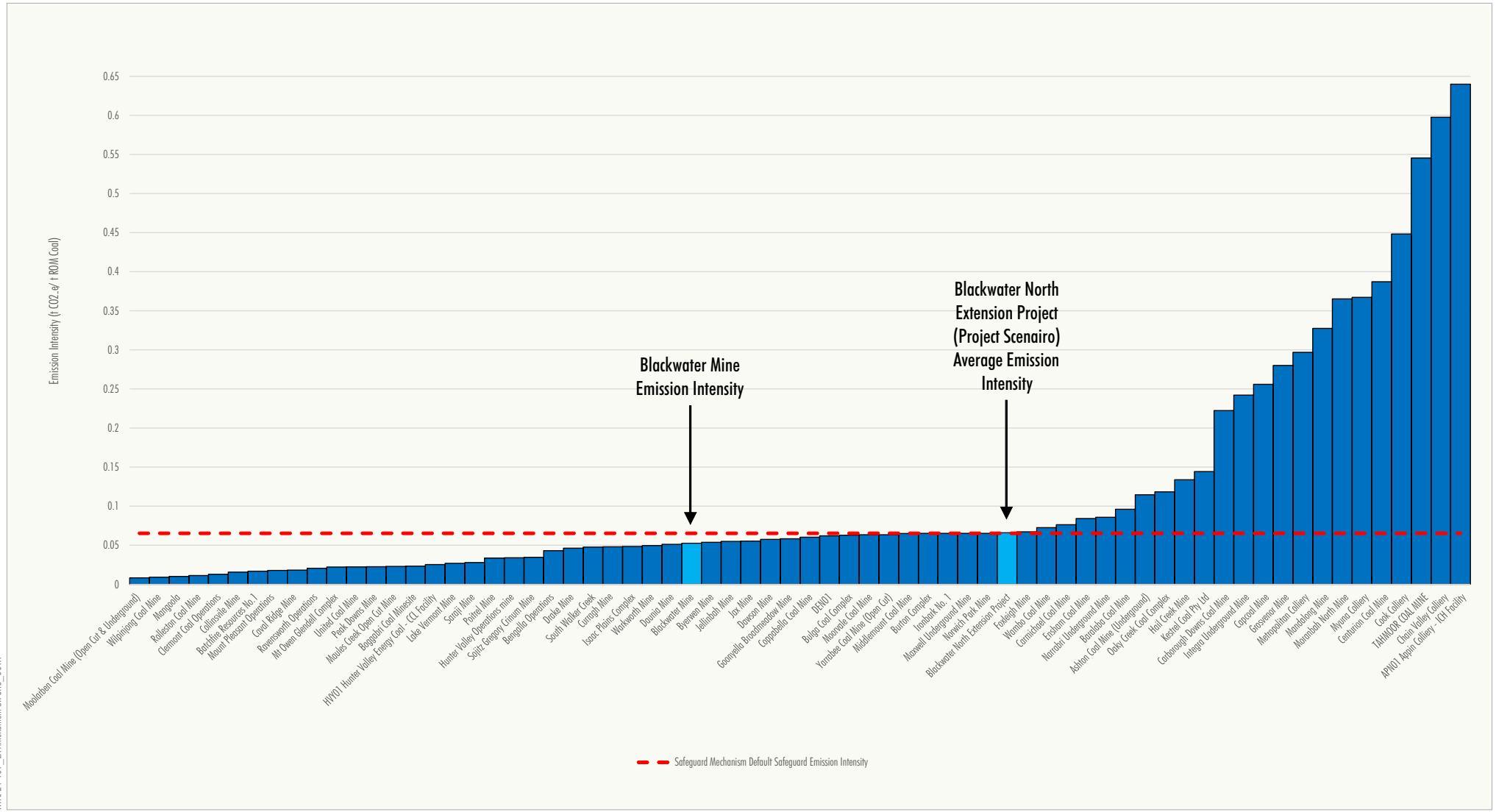
The Project is therefore considered a medium to high emitter under the QLD GHG Guideline.

Note that while the three-year action plan (Section 5) commits to various data collection, trials and operational improvements, the greenhouse gas calculations prepared by RWDI (Appendix B) conservatively exclude any potential emission reductions that may be achieved. For further information regarding calculation methodology and annual emission estimates, refer to Appendix B.

3.2 Predicted Greenhouse Gas Emissions Intensity

The approved facility specific EID for BWM is 0.0527 t CO_2-e / t ROM (CER, 2025b). This ranks the BWM as having the 29th lowest emissions intensity among approximately 68 Australian coal mining facilities with published facility specific EIDs (Chart 1).

The emissions intensity at BWM is lower than the industry default value of 0.0653 t CO_2-e / t ROM, as specified under the Safeguard Rule.



Source: CER (2026); RWDI (2026)

WHC-24-101 _ EA Amendment SR GHG_001A

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Australian ROM Coal Emissions Intensity Determinations and Estimated Project Average ROM Coal Emissions Intensity

Chart 1

Under the Project Scenario, the BWM average emissions intensity would increase as mining progresses further and deeper into the pits (approximately 0.066 t CO_2-e / t ROM). Relative to other current Australian ROM coal EIDs, the BWM (including the Project) would rank approximately 44th lowest (excluding the existing BWM) out of approximately 68 facilities (based on historical data determinations) (Chart 1). This increase reflects geological conditions, with deeper target seams requiring greater energy input and less efficient emissions outcomes, and would occur regardless of whether the Project proceeds, as it is inherent to the ongoing progression of mining.

The BWM emissions intensity determinations are currently based on fugitive emissions estimated using NGER Method 1. Accordingly, Method 1 uncertainty should be applied to the reported EIDs. Whitehaven Blackwater is currently progressing toward a site-specific Method 2 determination for fugitive emissions at BWM.

3.3 Whitehaven Emissions Reduction Objective

Whitehaven recognises and supports Australia's commitment to achieving net zero carbon emissions by 2050 and has aligned its decarbonisation goals and business practices with the emissions reduction obligations outlined under the reformed Safeguard Mechanism. Whitehaven operates four facilities that are subject to the Safeguard Mechanism, including BWM, Narrabri Mine, MCCM and Daunia Mine.

Whitehaven would manage each of its major facilities to comply with the reformed Safeguard Mechanism. Where a facility exceeds its Safeguard baseline in a relevant National Greenhouse and Energy Reporting System (NGERS) period, Whitehaven would retire SMCs or ACCUs to achieve the Commonwealth net emission reduction requirements.

3.4 Blackwater Emission Reduction Targets

Consistent with Whitehaven's adopted greenhouse gas policy, the adopted net emission goals for the Project are reflective of predicted Project net emission reduction targets under the Commonwealth Safeguard Mechanism.

The BWM'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 Whitehaven's implementation of various mitigation measures to minimise the overall generation of greenhouse gas emissions from the Project would result in greenhouse gas emissions being maintained within any varied Safeguard Mechanism baseline emissions value.

The anticipated Safeguard Mechanism baseline is shown graphically on Chart 2 and numerically on Table 8.

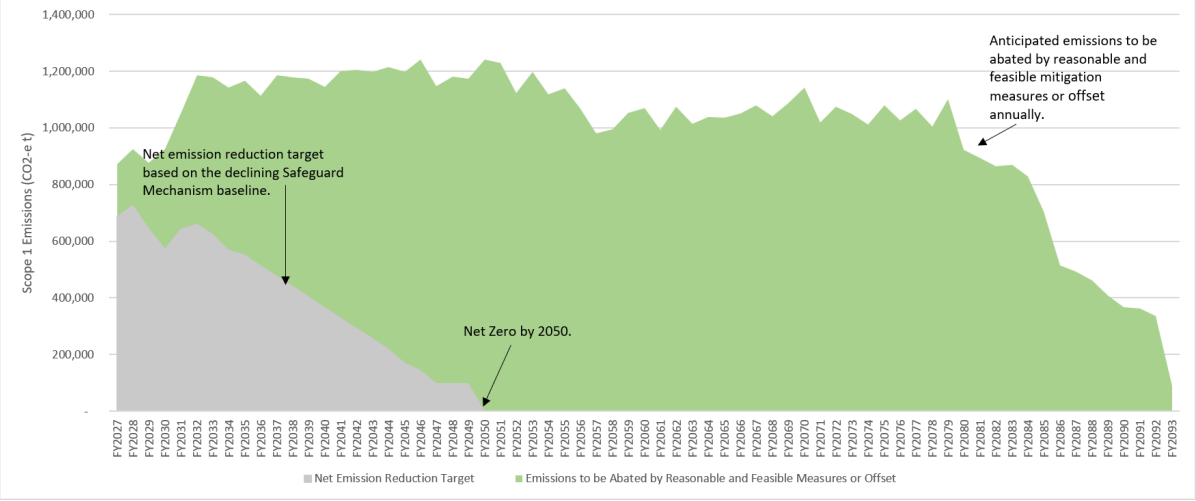


Chart 2 BWM (Including the Project) Gross Emissions and Net Scope 1 Emissions Target

Table 8
Indicative BWM (including the Project) Annual Scope 1 Net Emissions Target

Financial Year	ROM Coal (t)	Anticipated Safeguard Emission Intensity Baseline Forecast (t CO_2-e/t ROM)	Anticipated Safeguard Baseline Forecast (t CO_2-e)
FY2027	15,500,000	0.044	688,152
FY2028	17,100,000	0.043	729,185
FY2029	15,900,000	0.041	648,155
FY2030	14,800,000	0.039	573,692
FY2031	17,500,000	0.037	644,435
FY2032	19,000,000	0.035	662,847
FY2033	19,000,000	0.033	626,022
FY2034	18,400,000	0.031	570,591
FY2035	19,000,000	0.029	552,373
FY2036	19,000,000	0.027	515,548
FY2037	19,000,000	0.025	478,723
FY2038	19,000,000	0.023	441,898
FY2039	19,000,000	0.021	405,073
FY2040	19,000,000	0.019	368,249
FY2041	19,000,000	0.017	331,424
FY2042	19,000,000	0.016	294,599
FY2043	19,000,000	0.014	257,774
FY2044	19,000,000	0.012	220,949
FY2045	17,700,000	0.010	171,526
FY2046	18,800,000	0.008	145,749
FY2047	16,400,000	0.006	100,000^
FY2048	16,900,000	0.004	100,000^
FY2049	17,200,000	0.002	100,000^
FY2050	18,200,000	0.000	0
FY2051- FY2093*	Varies	0.000	0

* Whitehaven would be required to mitigate or offset all Scope 1 emissions post FY2050.
^ The calculated production adjusted baseline falls below 100,000 t CO_2-e from FY2047 to FY2049 due to the declining emissions intensity forecast. In accordance with section 10(1) of the Safeguard Rule, the applicable safeguard baseline has been set to 100,000 t CO_2-e for those years.

3.5 Electricity Supply Context

BWM is located directly south of Blackwater, where grid electricity is supplied by a 132 kilovolt (kV) primary plant substation (132 kV Blackwater to Bluff) as apart of TransGrid's high-voltage system linking Central West Queensland with the broader QLD grid. The Project would continue to receive electricity from the existing 66 kV transmission line which supplies electricity to the site via an intake switching station (TransGrid, 2025)

TransGrid's *Transmission Annual Planning Report* (2025) discusses various planned electrical infrastructure upgrades to the Central West zone of Queensland, including replacement of the Blackwater 132 kV primary plant to maintain supply reliability in the region.

3.6 Life-Of-Mine Context

The BWM has been in operation since 1967. Mining activities at BWM have been undertaken to date by progressive delivery of major mobile mining equipment in alignment with operational demands and existing mobile fleet equipment lifespan.

Major mobile equipment purchases by Whitehaven would continue to occur as required over the life of the operation. As a result, opportunities for new equipment procurement, replacement or major rebuilds are expected to occur multiple times over the life of the operation.

3.7 Mining Emissions Context

Estimated LOM emissions for the Project have been calculated by RWDI and are presented in Appendix B of the GMAP.

Chart 3 provides a summary of Scope 1 emission sources for the BWM, disaggregated by key source as percentage contributions. Stationary diesel consumption (approximately 49.33%) and fugitive emissions (approximately 47.19%) are the largest contributors to emissions, with the remainder (approximately 3.48%) sourced from vegetation clearing (not reportable under NGER), explosives (not reportable under NGER) and other minor Scope 1 emissions sources.

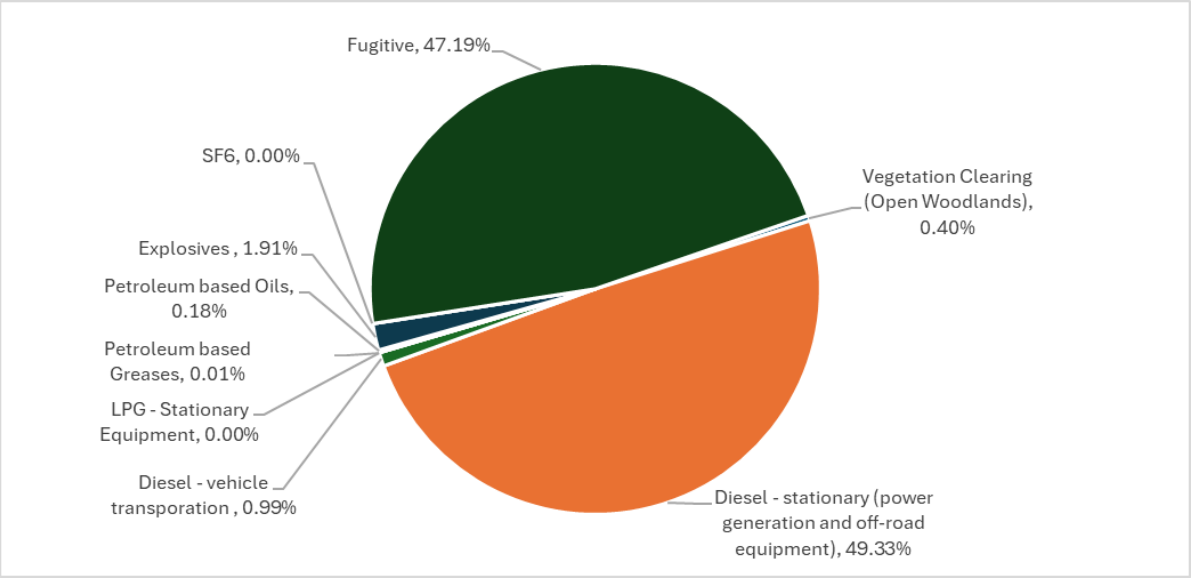


Chart 3 Breakdown of Total Predicted Scope 1 Emissions for the Project by Source

3.7.1 DIESEL CONSUMPTION

As shown in Chart 3, stationary diesel consumption and fugitive emissions are the primary source of greenhouse gas emissions at BWM.

Chart 4 provides a summary of projected diesel consumption at the BWM for the period of the Project and illustrates that over the life of the Project, haul trucks (64%) are predicted to be the largest diesel consumers followed by dig units (14%) and dozers (10%).

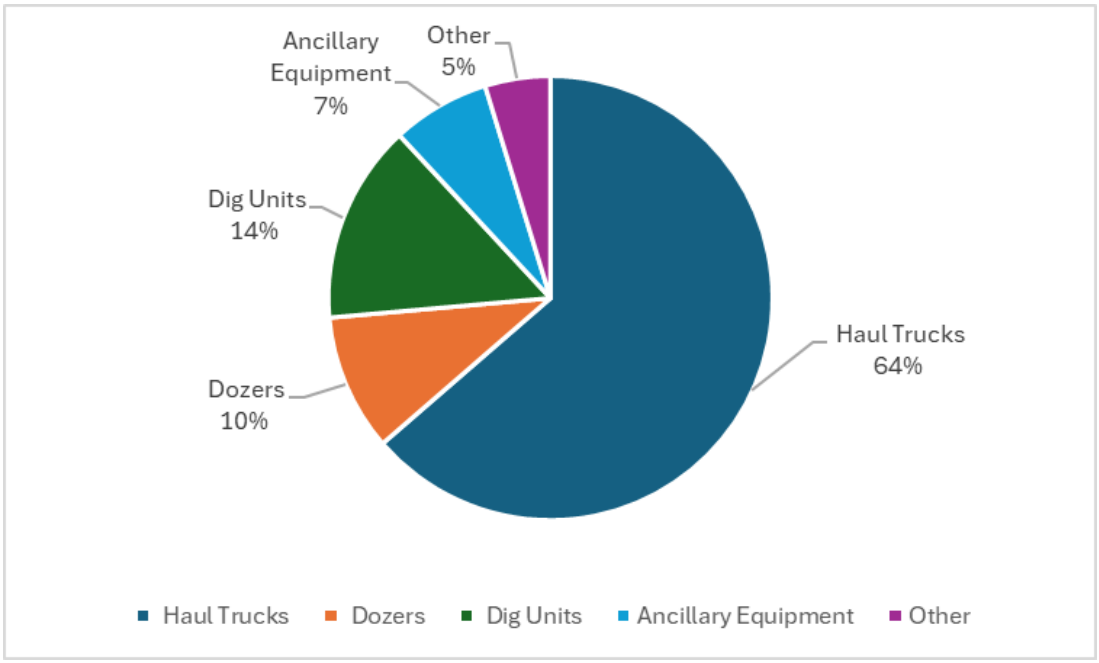


Chart 4 Breakdown of Mobile Fleet Diesel Consumption for the Project

Projected future diesel demand over the life of the operation is expected to follow similar trends and LOM estimates provided in Chart 5.

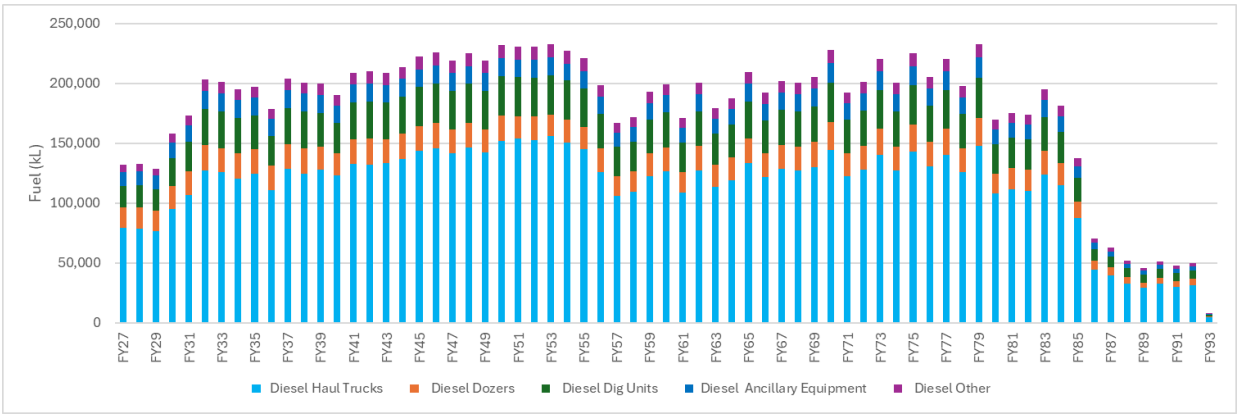


Chart 5 Breakdown of Projected Annual Diesel Consumption for the Project

Haul trucks remain the dominant diesel users throughout the LOM, accounting for roughly half of total fuel consumption. Diesel powered dig units represent the second-largest fuel consumers, followed by dozers and other ancillary equipment. Graders, water carts, service carts and miscellaneous equipment comprise the remaining share.

3.8 Mining Fleet Demands and Scheduling

The mining fleet modelling described below begins in 2027, as a large amount of Blackwater's fleet were previously hired, all of which are set to complete works in 2027. The modelling below shows 100% Whitehaven owned fleet.

Based on indicative average equipment lifespans and replacement purchase windows shown in Chart 6, major fleet replacement activity is concentrated from the early to mid 2030s, with a smaller number of long-life assets extending into the 2050s.

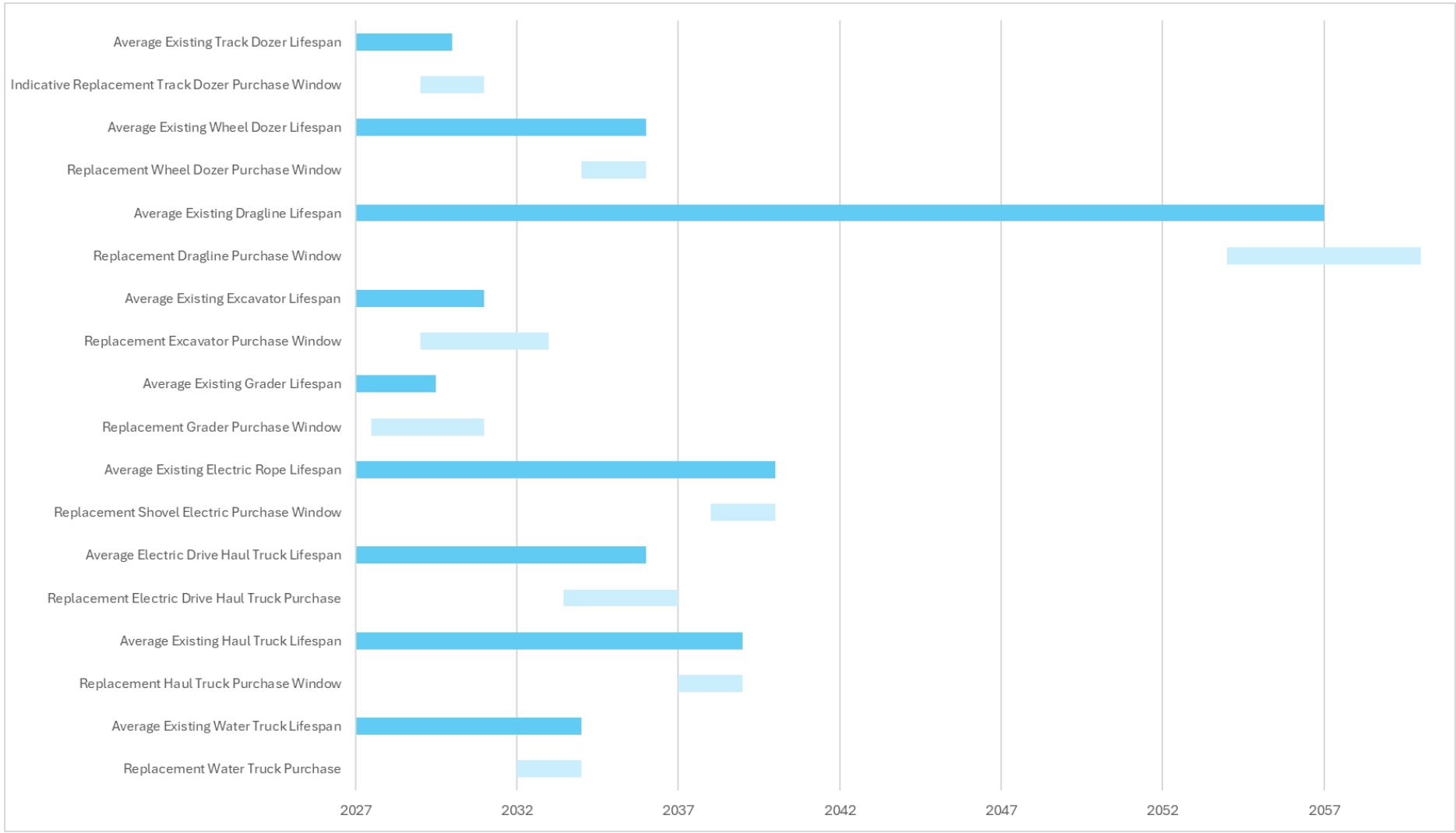


Chart 6 Indicative Fleet Procurement and Replacement Timeline

Specifically, indicative scheduling based on average equipment lifespan shows:

- **Dozers:** Replacement of wheel dozers is anticipated in the early to mid 2030s, with indicative purchase windows centred around 2032 to 2035.
- **Draglines:** Draglines are long life assets, with replacement not anticipated until the mid to late 2050s, consistent with average lifespans extending to approximately 2057.
- **Loaders:** Replacement of excavators and loaders is anticipated in the early 2030s, with indicative replacement windows between approximately 2031 and 2034.
- **Electric Haul Trucks:** Electric drive haul trucks are expected to reach end of average service life in the mid 2030s, with replacement purchase windows occurring around 2034 to 2037.
- **Mechanical Haul Trucks:** Mechanical drive haul trucks exhibit longer average lifespans, with indicative replacement windows in the late 2030s, around 2037 to 2040.

Final fleet composition, procurement timing and associated emissions profiles/technology decisions would continue to include consideration of reasonable and feasible greenhouse gas emission reduction opportunities and particulate emissions.

3.9 Existing Reasonable and Feasible Mitigation Measures

Whitehaven Blackwater currently utilise premium diesel in their QLD operations (Whitehaven, 2025). Premium diesel provides improved engine performance, fuel efficiency and subsequently results in reduced greenhouse gas emissions for the overall project.

In addition, Whitehaven Blackwater implements various controls to reduce diesel consumption including:

- managing dump trucks loading to fill capacity to maximise efficiency (i.e. fuel used per unit of material moved);
- maximising the efficiency of mining fleet through selection of truck size;
- maximising the efficiency of the mining fleet through regular maintenance;
- mine planning efficiencies to minimise the gradient, length and height of loaded haul runs for dump trucks, where practicable;
- in-pit and mobile refuelling facilities;
- monitoring system for heavy vehicle use and fuel burn. This system also determines individual equipment utilisation which assists in maximising fleet efficiency; and
- maximising in-pit dumping.

Lastly, Whitehaven Blackwater uses draglines and electric rope shovels as a significant part of the operation. These are tethered electrical mining equipment and are powered by the electricity grid rather than being diesel fuelled. This practice delivers material savings in diesel use relative to an alternative operation that uses solely diesel fuelled excavators and shovels.

Using draglines instead of conventional diesel excavators and haul trucks results in significant emission savings. Replacing the seven draglines operating at BWM would require approximately seven excavators and 58 haul trucks. This alternative scenario would consume an additional 150,000 litres of diesel each year, equivalent to around 420,000 t CO_2-e annually.

This outcome should be interpreted as part of business-as-usual operations at BWM rather than an additional mitigation commitment. That said, the presence of tethered equipment means a substantial portion of diesel emissions is already avoided in the current operating model, and as the associated electricity emissions intensity is expected to decline over time as the Queensland grid continues to decarbonize, the associated Scope 2 emissions are also anticipated to reduce for the BWM.

4 Reasonable and Feasible Greenhouse Gas Evaluation

4.1 Qualitative Evaluation of Reasonable and Feasible Mitigation Measures

4.1.1 QUALITATIVE EVALUATION METHODOLOGY

Whitehaven Blackwater 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 BWM.
- **Operational Expenditure:** Anticipated ongoing costs to operate the technology at the BWM when compared to current mining activities.
- **Abatement Effectiveness:** Anticipated greenhouse gas abatement achieved when compared to current mining activities.
- **Site Specific:** Considers the technology's suitability based on BWM's geology, terrain, mine plan and the likely marginal cost of abatement.
- **Summary Evaluation:** Considers all the above categories and if the technology could reasonably and feasibly integrate into the BWM, with the opportunity of a trial (either on or off site) to gather additional data or practical experience to further evaluate potential feasibility.

It is noted that, in the context of the Project, this qualitative evaluation considers Project emissions. However, as required by the QLD GHG Guideline, quantitative evaluation would consider the Project only emissions.

Technology and Commercial Readiness

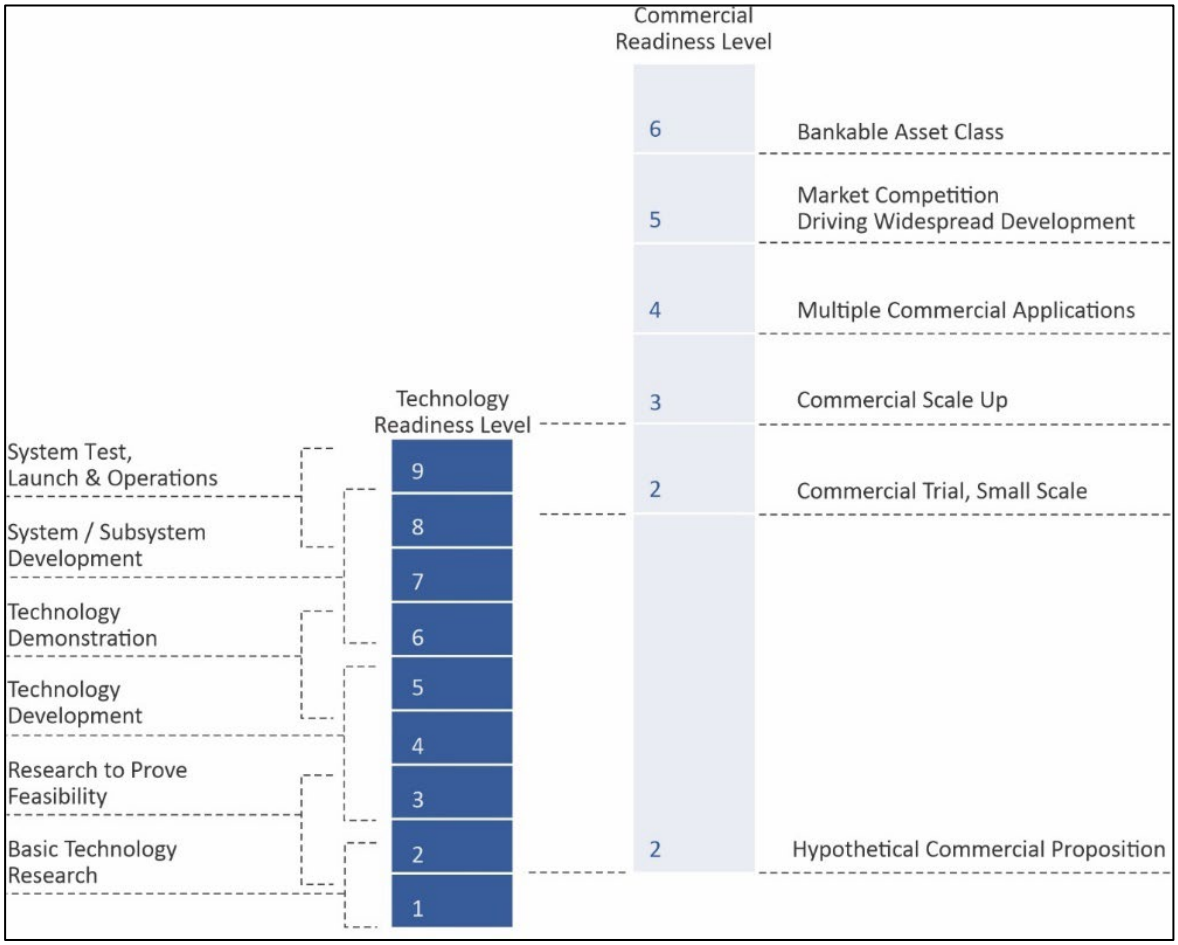
Standardised technology readiness terminology was originally developed by the National Aeronautics and Space Administration for its development programmes, and has since been adopted by many organisations, including Australia's Defence Force. To standardise the description of the technology readiness and commercial readiness of alternative potential greenhouse gas mitigation technologies, Whitehaven Blackwater 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 Chart 7 below.

Where practical, Whitehaven Blackwater 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 Whitehaven Blackwater greenhouse gas emission reduction opportunities. It is noted that Whitehaven Blackwater can potentially be involved at all levels of the technology readiness and commercial readiness levels development pathway of a greenhouse gas mitigation measure. However, the adoption of a greenhouse gas mitigation measure is likely to require commercial readiness at level 4 or above to allow appropriate feasibility assessment.

4.1.2 EVALUATION OF REASONABLE AND FEASIBLE MITIGATION MEASURES

Key potential mitigation measures which have been identified and considered by Whitehaven are described and briefly discussed in Table 9.

Table 10 provides a colour-coded summary of the outcomes of the qualitative mitigation measures assessed by Whitehaven Blackwater. The colour coding represents Whitehaven Blackwater's evaluation of relative positive and negative factors for each opportunity, where dark green and dark red indicate the most positive and most negative factors, respectively. The intent of the colour-coded rating system is to illustrate the opportunities that Whitehaven Blackwater has rated more positively or negatively across many factors when considering potential application to BWM.
Key potential abatement opportunities that are considered to warrant further assessment in the three-year plan are discussed in Section 4.2.



Source: (ARENA, 2014).

Chart 7 Technical Readiness and Commercial Readiness Level Schematic (ARENA, 2014)

Table 9
Summary of Identified Potential Scope 1 and 2 Mitigation Measures

Opportunity Name	Mitigation Hierarchy	Summary Description of Mitigation Measure	Potential Effectiveness at the BWM
Scope 1 - Fugitive			
Pre-mining gas drainage and capture	Reduce	Reduce (pre-drain and capture) methane gas from coal seams prior to mining by drilling gas bores down to and/or within the target coal seams.	Whitehaven Blackwater has identified a broad range of potential fugitive emissions mitigation measures that may be applicable across the BWM. The effectiveness of these measures at the BWM cannot be appropriately assessed at this stage due to the current reliance on NGER Method 1 fugitive emissions estimates, which do not provide sufficient gas reservoir information, such as the resolution on gas content, gas composition, or spatial variability. While gas drainage, capture and abatement technologies have been applied more extensively at underground coal mines, their application at open cut operations remains limited and largely at pilot or demonstration scale. The applicability and potential effectiveness of fugitive emissions mitigation measures at Blackwater would be reviewed once mine specific NGER Method 2 modelling and detailed gas domain data become available. This future assessment would inform whether gas drainage, capture and abatement is practicable for the operation.
Methane flaring	Reduce	Abates (oxidises) methane through a flare system.	
Electricity generation	Reduce	Pre-drainage gas is reticulated to a gas treatment plant for use in gas engines to generate electricity.	
Compressed natural gas (CNG) or LNG generation	Reduce	Pre-drainage gas is reticulated to an appropriate treatment plant for export or local use.	
Scope 1 – Diesel (Fuel)			
Renewable Diesel Fuel Supply	Substitute	Blend site diesel supply with a proportion of renewable diesel.	Renewable diesel (e.g. hydrogenated vegetable oil) can be manufactured from a variety of feedstocks, is commercially available, and is present in small volumes in the Australian fuel market. Lifecycle emission reduction rates for renewable diesel, compared to conventional diesel, range from 75 to 90% (Neste Corporation, 2024; Volvo Penta, 2024). However, these reductions are highly variable and depend largely on the feedstock used (United States Environmental Protection Agency, 2024). Current supply options are limited and cost prohibitive, but costs may improve with Australian industry development.

Table 9 (Continued)
Summary of Identified Potential Scope 1 and 2 Mitigation Measures

Opportunity Name	Mitigation Hierarchy	Summary Description of Mitigation Measure	Potential Effectiveness at the BWM
Scope 1 – Diesel (Fuel) (Continued)			
Biodiesel Fuel Supply	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 engine compatibility (in particular large mining haul truck engines) 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 low carbon fuel prospect for the mining industry, primarily since the negative impacts of biodiesel are largely averted 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	Substitute	Utilise alternative hydrogen-derived fuel for a proportion of mobile equipment.	Commercial readiness, energy conversion efficiency limitations and the infrastructure required remain significant limitations for hydrogen-derived fuels. Whitehaven considers it unlikely to become a reasonable and feasible fuel alternative in the near future.
Hydrogen Trickle Feed	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 Limited [Alpha H2], 2025). 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 to 25% reduction in fuel usage (Alpha H2, 2024a; 2024b). Currently not commercially available for implementation at the BWM.

Table 9 (Continued)
Summary of Identified Potential Scope 1 and 2 Mitigation Measures

Opportunity Name	Mitigation Hierarchy	Summary Description of Mitigation Measure	Potential Effectiveness at the BWM
Scope 1 – Diesel (Fuel) (Continued)			
Retrofitted CNG vehicles	Substitute	Pre-drainage gas is reticulated to a gas treatment plant for use as an alternative to diesel fuels. This would also require modifications to the existing diesel equipment.	Conversion of diesel engines to operate on CNG (dual-fuel systems) requires high-pressure gas storage, injection hardware and on-site gas handling infrastructure. Dual-fuel systems can achieve high diesel-substitution rates and measurable emission reductions, however the effectiveness of the technology is heavily dependent on access to a consistent and affordable local gas supply.
Scope 1 – Diesel (Equipment)			
In pit crushing and conveying	Substitute	In-pit crushing of waste/rock and utilising conveyors for transport of material to reduce diesel combustion for transport of material.	In-pit-crushing and conveying systems are a mature technology with a long history of use in open cut hard rock mining that offers an alternative to conventional truck haulage systems. However, this is not a technology that is currently utilised in coal mining due to high advance rates and dynamic pit construction. 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. Coal mines like the BWM which have established draglines, haul truck fleet and mine geometry (including ramps) optimised for conventional truck haulage would present significant barriers of entry.
Trolley Assist	Substitute	Haul trucks connected to overhead catenary lines to draw electricity for climbing steep grades.	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.

Table 9 (Continued)
Summary of Identified Potential Scope 1 and 2 Mitigation Measures

Opportunity Name	Mitigation Hierarchy	Summary Description of Mitigation Measure	Potential Effectiveness at the BWM
Scope 1 – Diesel (Equipment) (Continued)			
Trolley Assist (Continued)	Continued.	Continued.	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. Implementation also has implications for site-wide electrical demand and power distribution infrastructure. Similarly to IPCC, trolley assist is best suited to hard rock mining, with coal mine advance rate and dynamic changes to ramps and haul routes presenting significant barriers of entry.
Plug-in (tethered) electric equipment	Substitute	Replace diesel powered loading equipment with plug-in (tethered) electric loading equipment	Plug in electric equipment replaces diesel engines with electric drives and motors supplied via a trailing cable or fixed connection. The emissions benefit at BWM is driven by how much diesel activity can be substituted and the carbon intensity of supplied electricity, noting the site has established grid supply arrangements via high voltage transmission and a site intake connection. At BWM, the practical application is strongest where operating areas are predictable and semi fixed, and where cable management, relocation frequency, and electrical reticulation can be controlled. Uptake would depend on mine planning, the ability to stage electrical distribution upgrades and existing mining fleet lifespan (Chart 4).
Battery electric vehicle	Substitute	Replace mobile diesel equipment with battery electric vehicles (BEVs).	BEVs replace diesel combustion engines by using onboard batteries and electric drivetrains, with charging via fixed or dynamic charging infrastructure and associated power management. For BWM, effectiveness scales with the proportion of mobile diesel plant displaced, the availability and placement of charging to avoid productivity losses, and the ability to manage charging demand against site electrical capacity and distribution. For larger mining equipment categories, battery electric technology remains in active development and trial phases across the sector, including charging system evaluation. Subsequently, BEVs have near term deployment risk and uncertainty for substitution of ultra class haulage.

Table 9 (Continued)
Summary of Identified Potential Scope 1 and 2 Mitigation Measures

Opportunity Name	Mitigation Hierarchy	Summary Description of Mitigation Measure	Potential Effectiveness at the BWM
Scope 1 – Diesel (Equipment) (Continued)			
Hybrid diesel-electric vehicle	Substitute	Diesel-electric hybrid vehicles utilised to reduce consumption of diesel.	Hybrid diesel electric vehicles retain a primary diesel engine but integrate an electric drive and potentially an energy recovery system, typically capturing energy through regenerative braking and redeploying it to support high demand activities such as acceleration or uphill haulage. This configuration can reduce diesel consumption and associated emissions while also improving equipment productivity in duty cycles with frequent braking and variable load and has been noted as having potential to materially reduce fuel consumption and improve cycle times. Note, this differs from existing diesel electric heavy mobile equipment currently operating on site, which uses a diesel engine to generate electricity for electric traction motors but typically has limited energy storage capacity. Hybrid diesel electric equipment can be implemented without new electrical infrastructure. Adoption would be aligned with the fleet replacement schedule (Chart 6) and evaluated against conventional diesel equipment on a whole of plant cost and productivity basis. Based on current evidence, efficiency gains associated with alternative haulage technologies are expected to be limited, with marginal improvements in operational performance relative to diesel fleets constraining near term uptake.
Autonomy	Reduce	autonomous mine vehicles to optimise engine loading, reduce idling and other key benefits.	Autonomy of major plant items (e.g. haul trucks, excavators) can improve productivity and fuel efficiency through optimised operation and reduced idle time.
Scope 2 – Electricity			
Renewable grid electricity	Substitute	Sourcing electricity from renewable-heavy grids reducing indirect emissions intensity.	Electricity consumption accounts for approximately 5% of the combined Scope 1 and 2 emissions at the BWM. Commonwealth DCCEEW (2025e) projects ongoing decarbonisation of the QLD electricity grid, with emission factors expected to be 0.19, and 0.23 t CO_2-e per megawatt-hour by 2030, and 2040 respectively (i.e. based on this forecast, the benefits of establishing a solar farm or a renewable electricity supply contract would decline over time as the grid is progressively decarbonised).
On-site renewable energy	Substitute	Use of on-site renewable electricity generation in the form of solar, wind, geothermal, etc.	
On-site energy storage	Substitute	Energy storage systems to enable greater renewable penetration in high-emission grid periods.	

Table 10
Evaluation Matrix

Opportunity Name	TR	CR	CAPEX	OPEX	Abatement Potential	Site Specific	Summary Evaluation	Key notes
Scope 1 – Diesel (Fuel)								
Renewable Diesel Fuel Supply								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								The effectiveness of biodiesel in reducing greenhouse gas emissions is limited by safe engine blend limits.
Hydrogen Derived Fuel Supply								Energy conversion efficiency limitations and the infrastructure required remain significant limitations for green hydrogen-derived fuels.
Hydrogen Trickle Feed								Retrofitting existing diesel engines with a parasitic hydrogen trickle-feed system may reduce both fuel consumption and particulate emissions.
Retrofitted CNG vehicles								Retrofitting existing diesel engines with a dual fuel system to allow CNG fuel consumption may reduce both fuel consumption and particulate emissions. Affordable local or on-site supply would be required
Scope 1 – Diesel (Equipment)								
In pit crushing and conveying								Due to the site layout and LOM capacity planning the IPCC option, this abatement option has limited current use at BWM.
Trolley Assist								Due to the dynamic nature of BWM waste haul road networks, the implementation of any fixed electrical assist system is not likely to be suitable for the Project, however, will be continually reviewed during ongoing GMAP reviews.
Plug-in electric equipment								Electric rope shovels are an example of tethered equipment and are already in use at BWM. Further use is not considered feasible (their use is already optimised).

Table 10 (Continued)
Evaluation Matrix

Opportunity Name	TR	CR	CAPEX	OPEX	Abatement Potential	Site Specific	Summary Evaluation	Key notes
Scope 1 – Diesel (Equipment) (Continued)								
Battery electric vehicle								Due to the current state of commercial and technical readiness of large haul truck BEVs, this technology will continue to be monitored during ongoing GMAP reviews.
Hybrid diesel-electric vehicle								Hybrid diesel-electric vehicles are noted as a key potential abatement opportunity for BWM as it may practicably reduce diesel emissions.
Autonomy								The implementation of autonomous haulage is not likely to be suitable for the Project, however, will be continually reviewed during ongoing GMAP reviews.
Scope 2 – Electricity								
Renewable grid electricity								Renewable grid electricity contract supplied by a third party for the mine.
On-site renewable energy								Due to high CAPEX and limited abatement potential due to the projected QLD grid greening for 2050, this abatement option has limited current use at BWM; however, as electricity consumption increases due to other abatement measures, this option may become feasible in the future.
On-site energy storage								Due to high CAPEX and limited abatement potential due to the projected QLD Grid Greening for 2050, this abatement option has limited current use at BWM; however, as electricity consumption increases due to other abatement measures, this option may become feasible in the future.

Table 10 (Continued)
Evaluation Matrix

Opportunity Name	TR	CR	CAPEX	OPEX	Abatement Potential	Site Specific	Summary Evaluation	Key notes
Scope 1 - Fugitive								
Pre-mining gas drainage and capture								Whitehaven Blackwater has completed a high-level assessment of potential fugitive emissions mitigation measures for BWM on a NGER Act Measurement Determination Method 1 basis to inform the GMAP at concept stage. These potential mitigation measures would be revisited and assessed once Method 2 determinations, supporting site specific gas domain inputs are available and progress of the Three-Year Action Plan.
Methane flaring								
Electricity generation								
CNG or LNG generation								

Notes: TR = Technological Readiness, CR = Commercial Readiness, CAPEX = Capital Expenditure, OPEX = Operational Expenditure, Abatement Potential = Effectiveness of Greenhouse Gas Abatement, Site Specific = Effectiveness at BWM, Summary Evaluation = Pre-Project Quantitative Evaluation, IPCC = International Panel on Climate Change.
Colour Legend:

Most Positive	Positive	Neutral	Negative	Most Negative	Not Applicable

4.2 Key Prospective Technologies for the Site

Following the evaluation, the below mitigation measures have been short-listed for potential selection into BWM's decarbonisation plan. The below mitigation measures have been selected for a multitude of reasons, including:

- greenhouse gas abatement potential;
- technology readiness; and
- permitting future scope and scale adjustments to allow for adaptation during the life of the operation where emissions conditions would be experienced.

These options generally support a phased introduction, lowering the capacity intensity while also supporting the opportunity to adopt new technologies as commercial visibility is proven.

4.2.1 SCOPE 1 – GAS CAPTURE AND DRAINAGE OPTIONS

Whitehaven Blackwater has undertaken a high level, conceptual assessment of gas capture, drainage and treatment options for BWM to identify measures that may reduce fugitive CH_4 emissions over time. This assessment was completed on the basis of NGER Act Measurement Determination Method 1 for fugitive emissions and is intended to inform the GMAP at concept stage only.

Fugitive emissions mitigation measures would be revisited and refined once Method 2 determinations and supporting site specific gas domain inputs are available, including improved gas content and composition data, reservoir and drainage characterisation, and other geological and operational parameters that materially influence technical feasibility, extraction performance and the most appropriate treatment pathway for any recovered gas. Until that point, the Three-Year Action Plan focuses on establishing the required baseline and completing the feasibility work needed to confirm whether gas drainage and treatment measures are reasonable and feasible for the Project's operational context (Section 5).

4.2.2 SCOPE 1 – DIESEL COMBUSTION

Whitehaven Blackwater has considered several diesel combustion options, and notes the following are shortlisted to be implemented at BWM:

Alternative Carbon Neutral Diesel Supply

Whitehaven does not consider biodiesel to be a viable long-term pathway for the BWM. Biodiesel is typically supplied as a blend (for example B5 or B20), and equipment compatibility can vary materially for large mining haul trucks and other heavy equipment, which can introduce constraints on the blend level that can be adopted and the durability of any operational benefits. In this context, biodiesel is considered less likely to represent a durable, scalable substitute for conventional diesel at the Project relative to renewable diesel.

Accordingly, the preferred alternative liquid fuel pathway for the Project is renewable diesel (e.g. hydrogenated vegetable oil [HVO]), which is chemically very similar to conventional diesel and is increasingly treated internationally as a drop in option for diesel fleets. Near term uptake at the Project is expected to be limited by Australian supply availability and price.

Whitehaven has undertaken a trial of renewable diesel (HVO) at the MCCM.

The trial involved use of renewable diesel (supplied by Viva Energy Australia [Viva Energy Australia, 2024]), with short-term hire of compliant fuel storage infrastructure. Operationally, no major issues were observed, and ancillary equipment such as lighting plants and gensets showed no noticeable performance reduction. In haul trucks, data indicated somewhat higher fuel consumption compared to conventional diesel (fuel consumption is expected to increase when using HVO as it has slightly lower calorific value than conventional diesel); however, this was based on a relatively short trial period with limited datasets and detailed haul truck data from Cummin's indicated no significant deviations in fuel usage rates after the trial was completed. Operators reported no discernible difference in performance, reliability, or availability, and one generator was observed to run cleaner with reduced visible emissions.

Overall, the trial confirmed the technical feasibility of renewable diesel integration, with no adverse maintenance impacts during the trial period. However, renewable diesel fuel costs in the trial were approximately four times higher than conventional diesel, indicating that any adoption is not viable at current prices in NSW.

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 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, 2025d).

Battery Electric Vehicles and/or Hybrid Diesel Equipment

Battery electric vehicles replace diesel combustion through onboard batteries and electric drivetrains, with charging provided via fixed or mobile infrastructure and associated power management systems. For the BWM, the effectiveness of BEVs would scale with the proportion of mobile diesel plant displaced, the availability and placement of charging infrastructure to avoid productivity losses, and the capacity of the site electrical network to accommodate dynamic charging demand (including consideration of electrical demand from neighbouring mines which are likely to decarbonise at the same time). For large mining equipment categories, including ultra class haulage, battery electric technology remains in active development and trial phases across the sector, with ongoing evaluation of charging systems.

Hybrid diesel-electric equipment provides a near term substitution pathway that can reduce diesel consumption without reliance on site charging infrastructure. Hybrid diesel-electric vehicles retain a primary diesel engine but integrate an electric drive and potentially an energy recovery system, typically capturing energy through regenerative braking and redeploying it to support high demand activities such as acceleration or uphill haulage. This configuration can marginally reduce diesel consumption and associated emissions and can improve productivity in duty cycles with frequent braking and variable load and would be assessed against conventional diesel options on a whole of plant cost and productivity basis as part of procurement decisions aligned with the fleet replacement schedule.

The technical and commercial readiness of BEVs and other electrification pathways will continue to be monitored and reviewed through ongoing GMAP updates, informed by industry trials, OEM developments and site-specific operating factors.

The Three-Year Action Plan is described in Section 5.2, including consultation with OEMs and procurement evaluation of hybrid diesel equipment alternatives for haul trucks, dozers and loaders against conventional diesel equipment based on life of plant financial and productivity analysis.

4.2.3 SCOPE 2 – ELECTRICITY FROM MAIN GRID

Renewable grid electricity

Renewable grid electricity can be pursued through a renewable or carbon neutral electricity supply contract with an electricity retailer or independent power provider, with the contract structured to reduce the indirect emissions intensity associated with purchased electricity. Key constraints for this pathway include limited availability of firmed renewable electricity and limited incentives under the Safeguard Mechanism for Scope 2 abatement in isolation.

At BWM, electricity consumption is currently a minor contributor to the combined Scope 1 and Scope 2 profile so the abatement significance of a renewable electricity contract is expected to be modest in the near term. The relative benefit is also expected to decline over time as the grid progressively decarbonises, meaning any solar farm or carbon neutral electricity supply contract delivers diminishing marginal reductions as grid emission factors fall.

Details on electricity options from the main grid are discussed below and further actions proposed in the Three-Year Action Plan period are described in Section 5.3.

5 Three-Year Action Plan

Whitehaven would implement adaptive management of greenhouse gas emissions over the life of the BWM, consistent with Australia's emissions reduction requirements as set out under the Safeguard Mechanism.

As part of detailed engineering design and feasibility assessment further quantitative evaluations would be conducted. Such analysis would be undertaken post-approval and as such a Three-Year Action Plan has been developed to guide these decisions and would be subject to regular reviews, based on the technological, economic, regulatory and Project context at the time.

The Three-Year Action Plan has been developed to align with the current stage of the Project (i.e. environmental approvals) and the information that is presently available for the BWM. The Three-Year Action Plan would be revisited during the course of the Project as the regulatory, operational, technological and commercial context evolves.

The Three-Year Action Plan focuses on activities that increase site-specific information, including targeted trials and feasibility assessments that enable Whitehaven to identify measures that are reasonable and feasible.

A peer review of this GMAP, including the Three-Year Action Plan was undertaken by Loop Decarbonisation Services (2026), which concluded the GMAP is robust and meets the expectations of a mitigation planning document under the QLD GHG Guideline (Appendix C).

5.1 Scope 1 – Gas Capture and Drainage Options

Table 11 sets out the three-year work program for fugitive emissions management for the Project. Fugitive emissions are a material Scope 1 source at the BWM, but site-specific characterisation and feasibility work for BWM remains at an early stage and would be progressively refined in future GMAP revisions.

Accordingly, the actions in Table 11 prioritise establishing a baseline and assess whether gas drainage, capture and abatement options (for example surface-to-inseam drilling and flaring or utilisation pathways) are reasonable and feasible for the Project's operational context.

Technology adoption timing and engineering solutions are subject to further feasibility assessment, technology maturation and operational planning considerations.

Table 11
Three-Year Action Plan – Fugitive Emissions

Measure	Year 1^	Year 2	Year 3	Rationale
Transition to NGER Method 2 Fugitive Emissions Basis	Transition of the BWM fugitive emissions estimates to a NGER Method 2 basis (as updated modelling inputs and supporting documentation become available).	Incorporate fugitive emissions forecasting outputs into the Project fugitive emissions methodology and assumptions.	N/A	Transitioning the Project's fugitive emissions estimates to an NGER Method 2 basis would enhance the accuracy of fugitive emissions estimation. This higher resolution would support more detailed feasibility assessments. In addition, Method 2 will provide a basis to account for gas capture and abatement.
Methane Pre-Drainage Capture and Abatement	Undertake a concept assessment of methane pre-drainage capture and abatement opportunities within the 5-year mine plan, informed by available gas reservoir data and development of the Method 2 gas model. Develop forward work plan for methane gas capture, including field validation if appropriate.	Progress shortlisted concepts through technical and economic feasibility assessment informed by updated gas reservoir information and Method 2 fugitive emissions estimates as appropriate.	Where feasibility assessment supports and recommends progression, arrange a pilot trial program (subject to regulatory requirements) to validate feasibility assumptions or fill data gaps for methane capture and abatement options.	Methane capture and abatement opportunities at BWM are highly site specific and dependent on gas reservoir characteristics, mine sequencing, and operational factors. Subject to outcomes of the concept assessment, feasibility assessment and pilot trial, integrate preferred methane pre-drainage into the next Three-Year Action Plan, considering the mine plan progress and appropriate regulatory approval pathways for development. The staged assessment approach provides a progression from gas modelling to concept development and feasibility screening with emerging industry practice in the Bowen Basin.

^ Year 1 is indicatively financial year 2027

5.2 Scope 1 – Diesel Combustion

Table 12 sets out the three-year work program in relation to the Project's diesel emissions, recognising diesel combustion is a major contributor to the Project's Scope 1 emissions profile and is strongly influenced by haulage requirements and operational practices (e.g. use of draglines instead of diesel haul trucks). The actions in Table 12 aim to build operational understanding, including evaluation of near-term fuel substitution options where practicable and assessment of market available hybrid and battery electric alternatives as part of replacement decisions within the equipment procurement cycle.

Table 12
Three-Year Action Plan – Diesel Combustion Emissions

Measure	Year 1^	Year 2	Year 3	Rationale
Biodiesel/ Renewable Diesel	Conduct cost and efficiency review of potential diesel fuel alternatives and review transferability of Maules Creek Coal Mine trial outcomes to the BWM.	Undertake site specific applicability assessment for biodiesel and renewable diesel at the BWM, including fleet compatibility, fuel quality requirements, storage and handling constraints.	Review potential feasibility including the marginal abatement cost of partial implementation.	Moderate trial opportunity, low-risk implementation and potential to modestly reduce diesel fuel emissions.
Hybrid Diesel Equipment	Consult with OEMs on the availability and practicability of hybrid diesel equipment alternatives for haul trucks, dozers and loaders, including capital, operating and fuel consumption data	Conduct a procurement evaluation of currently available hybrid diesel equipment vs conventional diesel equipment based on life-of-plant financial and productivity analysis.	Determine potential feasibility of adoption of hybrid equipment in consideration of the BWM replacement schedule. Undertake a review of the readiness of large mining BEVs and associated infrastructure, to inform future emission reduction plans.	Hybrid diesel/electric equipment has potential to materially reduce diesel combustion emissions.
Tethered Equipment Study	Consult with OEMs on the availability and practicability of electrical tethered equipment as a replacement for existing diesel powered equipment, including capital, operating and electricity consumption data.	Considering the previous consultation, identify the tethered equipment that may be suitable for use at the Project and evaluate the applicable site electrical supply and distribution requirements and any key constraints to adoption.	Determine potential feasibility of adoption of previously identified tethered equipment in consideration of any site constraints and procurement requirements.	The use of electrical equipment would reduce Scope 1 emissions through the displacement of diesel and other direct fuel combustion sources.

^ Year 1 is indicatively financial year 2027

5.3 Scope 2 – Electricity from Main Grid

Table 13 sets out the three-year work program for Scope 2 emissions management. The actions in Table 13 prioritise improved understanding of electricity demand and efficiency opportunities, alongside a staged review of practicable renewable electricity contracts consistent with broader corporate considerations.

Table 13
Three-Year Action Plan – Scope 2 Emissions

Measure	Year 1^	Year 2	Year 3	Rationale
Site Electricity Supply – Offset Scope 2 emissions	Assess available options and consult with existing suppliers (e.g. GreenPower is currently used for Whitehaven's NSW operations) or alternative renewable electricity providers regarding opportunities to offset Scope 2 emissions at the BWM.	Determine whether it would be reasonable and feasible to offset Scope 2 emissions associated with the site electricity supply (agreement extension or alternative supplier).	Implement extended or new site electricity supply agreement (if applicable).	As the electricity grid is progressively decarbonised, Scope 2 emissions would correspondingly fall.

^ Year 1 is indicatively financial year 2027

6 Monitoring, Reporting and Review

6.1 Monitoring

Diesel, electricity usage, ROM coal and waste extraction would be monitored for the Project, to track diesel and electricity efficiency.

Greenhouse gas emissions from the Project would be tracked and reported each year in the Australian Government's *National Greenhouse and Energy Reporting Scheme* (Section 6.2).

Whitehaven acknowledges the Australian Government's recent appointment of an expert Panel (the Panel) to provide advice on atmospheric measurement of fugitive methane emissions in Australia (Commonwealth DCCEEW, 2025b). The Panel will run until 2027 and would provide advice to the Australian Government regarding the use of top-down approaches for estimating fugitive methane emissions from coal, oil and gas sector activities and the role top-down approaches could play in the NGER scheme. Future revisions of this plan would incorporate any updates to align with legislative changes as a result of this advice.

6.2 National Greenhouse and Energy Reporting

Annual assessment of greenhouse gas emissions would be reported in accordance with the NGER Act and the most contemporary NGER Determination.

The report would be provided to the CER by the end of October each year, provided in the manner and form in accordance with the requirements of the *Guideline – Manner and Form Sections 19 22G and 22X reports* (CER, 2021a).

Consistent with Whitehaven's corporate reporting framework, NGER data for the BWM is subject to third party independent assurance prior to submission.

6.3 Review

This GMAP would be reviewed, and if necessary revised, at least every three years. Each review would incorporate the outcomes of the current three-year action plan and any other relevant updates across this report, including updates to emissions reduction targets and implementation measures to reflect changes to the Safeguard Mechanism and other applicable requirements, and would establish a new three-year action plan for the subsequent period. Whitehaven Blackwater would also regularly (that is, biennially) assess, review and evaluate greenhouse gas emission abatement opportunities for implementation at the Project, with outcomes used to inform subsequent revisions and inclusion in this GMAP. As described in Section 4.1.1, all future quantitative evaluations would consider the Project only emissions.

7 Potential Impacts of Greenhouse Gas Emissions on Environmental Values

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.*

The sources for climate change projections considered for the Project include the following:

- The Working Group 1 Contribution to the Sixth Assessment Report of the IPCC (IPCC, 2021).
- Climate Change in Australia, produced by CSIRO and BoM (CSIRO and BoM, 2015).
- Information included in the QLD GHG Guideline (DETSI, 2026).

7.1 Climate Change Projections Globally

The IPCC has completed a number of comprehensive assessments of potential climate change, which include projections for both the 'near-term' (for the period 2021 to 2040), and 'long-term' (for the period 2081 to 2100). Summaries of relevant climate projections from the *Working Group 1 Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (IPCC, 2021) are provided below:

- 'Near-term' climate projections – projections indicated 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.
- 'Long-term' climatic projections – global mean surface temperatures are projected to increase by 1.3 to 2.7°C under the SSP2-4.55 climate scenario and 2.5 to 4.9°C under the SSP5-8.56 climate scenario 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 (2021) 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 would 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, 2021).

Multiple climate hazards are also projected to occur simultaneously, and multiple climatic and non-climatic risks would interact, resulting in compounding overall risk and risks cascading across sectors and regions (IPCC, 2021).

7.2 Climate Change Projections for Australia

In Australia, the climate is generally projected to become warmer and drier. Climate change may result in changes to rainfall patterns, runoff patterns and river flow.

It is noted that the RCP8.5 scenario (worst-case) illustrated in Table 14 is a scenario where minimal greenhouse gas emissions controls are introduced and therefore does not reflect the measures currently being pursued by Parties to the *Paris Agreement*.

Table 15 presents two global greenhouse gas emission scenario projections for annual average rainfall in the East Coast South sub-cluster of 'Eastern Australia' for 2030 and 2090 (relative to 1995), based on the Climate Change in Australia impact (CSIRO and BoM, 2015).

Table 14
Climate Change Projections for the East Coast South Sub-cluster, Eastern Australia – Percentage Change in Rainfall (relative to 1995)

Period	2030	2090	
	RCP4.5	RCP4.5	RCP8.5
Summer	+1	0	+10
Autumn	-5	-4	-4
Winter	-3	-10	-17
Spring	-2	-8	-14
Annual	**-2**	**-4**	**-6**

Source: (CSIRO and BoM, 2015).
RCP4.5: Emissions scenario assuming a slow reduction in emissions that stabilises CO_2 concentration at about 540 parts per million (ppm) by 2100.
RCP8.5: Emissions scenario assuming an increase in emission leading to a CO_2 concentration of about 940 ppm by 2100.

7.3 Climate Change Projections for Queensland

In QLD, average temperatures across the state are currently 1°C higher than they were 100 years ago (DETSI, 2026). Climate change is expected by the DETSI (2026) to further impact QLD in the future, including:

- higher temperatures;
- hotter and more frequent hot days;
- harsher fire weather;
- fewer frosts;
- reduced rainfall in the south-east;
- more intense downpours;
- less frequent but more intense tropical cyclones in the north;
- rising sea level;
- more frequent sea-level extremes; and
- warmer and more acidic seas (Queensland Government, 2019).

Human-induced changes to climate can negatively affect environmental values (DETSI, 2026), including:

- human health and wellbeing;
- the health and biodiversity of ecosystems; and
- agricultural use of the environment.

The Australian Government Consistent Climate Scenarios (CCS) project was used to generate climate change adjusted rainfall and evaporation data, which transformed historical climate data from the period between 1960 and 2024 (64 years). The CCS project provides climate projections as a daily time series across Australia on a 0.05-degree grid.

Changes to annual rainfall are predicted to vary across the Central Highlands Region, with average rainfall projected to decrease annually (Trancoso et al., 2024) (Table 15).

Table 15
Climate Change Projections for the Central Highlands Region, Queensland – Change in Rainfall (mm/d)

Period	2050			2090		
Scenario	SSP1-2.6 (mm/d)	SSP2-4.5 (mm/d)	SSP3-7.0 (mm/d)	SSP1-2.6 (mm/d)	SSP2-4.5 (mm/d)	SSP3-7.0 (mm/d)
Summer	-0.1 (-0.8 – 0.6)	-0.3 (-0.9 – 0.5)	-0.1 (-1.3 – 0.6)	-0.3 (-0.7 – 0.3)	-0.3 (-1.1 – 0.5)	-0.1 (-1.1 – 0.4)
Autumn	-0.3 (-0.7 – 0)	-0.2 (-0.5 – 0.2)	-0.2 (-0.7 – 0.3)	-0.2 (-0.8 – 0.1)	-0.4 (-0.8 - -0.2)	-0.5 (-0.8 - -0.1)
Winter	-0.1 (-0.5 – 0.2)	0 (-0.3 – 0.3)	0 (-0.3 – 0.2)	-0.1 (-0.4 – 0.2)	-0.1 (-0.5 – 0.1)	0 (-0.4 – 0.1)
Spring	-0.1 (-0.8 – 0.4)	-0.1 (-0.4 – 0.2)	0 (0.6 – 0.2)	-0.1 (-0.5 – 0.3)	0 (-0.5 – 0.4)	-0.1 (-0.4 – 0.3)
Annual	-0.1 (-0.3 – 0)	-0.1 (-0.3 – 0.2)	-0.1 (-0.5 – 0.3)	-0.2 (-0.3 – 0)	-0.2 (-0.4 – 0.1)	-0.2 (-0.4 – 0)

Note: SSP refers to the Shared Socio-economic Pathway which describing the socio-economic trends underlying the scenario (SSP1 - Low Emissions scenario; SSP2 – Medium Emissions scenario; SSP3 – High Emissions scenario). mm/d = millimetres per day
Values in brackets represent range of predictions.

In addition to the projected changes in rainfall discussed above, Table 16 summarises anticipated variability of in temperature for the Central Highlands Region. These projections indicate that the region is expected to experience an increase in average temperatures.

Table 16
Climate Change Projections for the Central Highlands Region, Queensland – Change in Mean Temperature (°C)

Period	2050			2090		
Scenario	SSP1-2.6 (°C)	SSP2-4.5 (°C)	SSP3-7.0 (°C)	SSP1-2.6 (°C)	SSP2-4.5 (°C)	SSP3-7.0 (°C)
Summer	1 (0.1 – 1.5)	1.4 (0.9 – 2.3)	1.5 (0.8 – 2.6)	1.2 (0.4 – 2)	2.3 (1.3 – 3.3)	3.4 (2.1 – 4.3)
Autumn	1.2 (0.7 – 1.8)	1.5 (0.9 – 2)	1.7 (1.3 – 2.5)	1.4 (0.6 – 2.1)	2.6 (1.8 – 3.5)	3.8 (2.6 – 4.7)
Winter	1.1 (0.6 – 1.8)	1.4 (0.8 – 2)	1.6 (1.2 – 2.4)	1.3 (0.6 – 2.1)	2.5 (1.7 – 3.2)	3.6 (2.7 – 4.3)
Spring	1 (0.3 – 1.7)	1.3 (0.6 – 1.8)	1.4 (0.8 – 2.1)	1.2 (0.2 – 1.8)	2.2 (1.1 – 3.1)	3.4 (2.4 – 4.1)
Annual	1.1 (0.5 – 1.6)	1.4 (0.9 – 1.9)	1.6 (1.1 – 2.4)	1.3 (0.5 – 1.9)	2.4 (1.5 – 3.2)	3.5 (2.7 – 4.2)

Note: SSP refers to the Shared Socio-economic Pathway which describing the socio-economic trends underlying the scenario (SSP1 - Low Emissions scenario; SSP2 – Medium Emissions scenario; SSP3 – High Emissions scenario).
Values in brackets represent range of predictions.

7.4 Potential Impacts of the Project

The Project's contribution to Australian emissions would be relatively small, as estimated annual average Scope 1 and 2 emissions would represent:

- approximately 0.09% and 0.41% in 2030 and 2035 respectively of the estimated total greenhouse gas emissions in QLD from (133 and 48 Mt CO_2-e in 2030 and 2035, respectively); and
- approximately 0.03% and 0.11% of Australia's projected greenhouse gas emissions in 2030 and 2035 respectively (349 and 184 Mt CO_2-e in 2030 and 2035 respectively).

If the Project is approved and proceeds, the Project's contribution to global climate change would be proportional to its contribution to global greenhouse gas emissions. Greenhouse gases directly generated at the Project (i.e. Scope 1 emissions) and indirect emissions associated with the on-site use of electricity (i.e. Scope 2 emissions) have together been estimated at approximately 0.28 million tonnes of carbon dioxide per year (Mt CO_2-e per year) during operations. These emissions would be small in the context of global greenhouse gas emissions.

The IPCC reports that every 1,000 gigatonnes (Gt) of cumulative global CO_2-e emissions (at CO_2-e) 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 Project. This approach assumes conservatively that all Project emissions are truly additive at the global level, even though this is unlikely in practice.

It is anticipated that the Scope 3 emissions from the use of Project coal would occur overseas and therefore would not contribute to Australian greenhouse gas emissions or materially factor in Australian greenhouse gas reduction targets. The Project is a continuation of existing operations at the BWM, which has an existing range of direct-sale customer countries that are signatories to the *Paris Agreement* or, in the case of Taiwan, have domestic energy policies that are aligned with the *Paris Agreement* (Whitehaven, 2025). If the Project does not proceed, global demand for metallurgical and thermal coal could be satisfied by other sources.

However, based on a conservative approach that assumes that the Project's emissions are wholly additive, the Project'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), as follows:

- total Scope 1 and 2 Emissions - Global Surface Temperature Change 0.000008356°C (8.4 millionths of a °C); and
- total Scope 1, 2 and 3 Emissions - Global Surface Temperature Change 0.0002469°C (0.25 thousandths of a °C).

Given the above, the project's incremental contribution to temperature change would be sufficiently minor that no additional impacts on the environmental values would arise.

8 Conclusion

This GMAP has been prepared by Whitehaven Blackwater to detail predicted greenhouse gas emissions at BWM for the proposed Project, as well as greenhouse gas management and abatement measures proposed for the Project. The GMAP considers both Scope 1 and 2 emissions.

8.1 Emissions Context

Fugitive emissions in this GMAP have been estimated on the NGER Method 1 basis (default), as site specific gas estimates and supporting documentation for NGER Method 2 approach are not yet available.

RWDI (2026) undertook greenhouse gas calculations in accordance with the QLD GHG Guideline. The Project would produce an average 0.27 Mt CO_2-e per year of Scope 1 emissions. Along with an average of 0.004 and 7.91 Mt CO_2-e per year of Scope 2 and 3 emissions, respectively.

The existing EID for ROM coal is 0.0527 t CO_2-e / t ROM (CER, 2025b). This ranks the BWM as having the 29th lowest emissions intensity among approximately 68 Australian coal mining facilities with published EIDs. Further, the emissions intensity at BWM is lower than the industry default value of 0.0653 t CO_2-e / t ROM, as specified under the Safeguard Rule.

Scope 1 emissions at the BWM (including the Project) are predicted to constitute 47.19 % fugitive emissions and 49.33% is predicted to be stationary diesel; the other approximately 3.48% of emissions originating from vegetation clearing, explosives and other Scope 1 sources.

Consistent with Whitehaven's adopted greenhouse gas policy, the adopted net emission goals for the Project are reflective of predicted Project net emission reduction targets under the Commonwealth Safeguard Mechanism. The BWM'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 a possible variation to the baseline value, it is anticipated that Whitehaven's implementation of various mitigation measures to minimise the overall generation of greenhouse gas emissions from the Project would result in greenhouse gas emissions being maintained within any varied Safeguard Mechanism baseline emissions value.

8.2 Three-Year Plan

The Three-Year Action Plan focuses on activities that increase site-specific information, including targeted trials, and feasibility assessments that enable Whitehaven to identify measures that are reasonable and feasible. The following abatement categories and measures have been identified as potentially being suitable as mitigation measures at BWM over the life of the Project:

- Scope 1 – Gas Capture and Drainage Opportunities:
  - Transition to NGER Method 2 Fugitive Emissions Basis.
  - Methane gas Pre-Drainage and Flaring/utilisation investigations.
- Scope 1 – Diesel Combustion:
  - Biodiesel/Renewable Diesel assessments.
  - Battery Electric Vehicles and/or Hybrid Diesel Equipment investigations.
  - Tethered Equipment Study.
- Scope 2 – Electricity from main grid:
  - Site Electricity Supply – Offset Scope 2 emissions.

8.3 Potential Impacts of GHG Emissions on Environmental Values

In Australia, the climate is generally projected to become warmer and drier. Climate change may result in changes to rainfall patterns, run off patterns and river flow.

The Project's contribution to Australian emissions would be relatively small, as estimated annual average Scope 1 and 2 emissions would represent approximately 0.09% and 0.41% in 2030 and 2035, respectively of the estimated total greenhouse gas emissions in QLD from (133 and 48 Mt CO_2-e in 2030 and 2035, respectively) and approximately 0.03% and 0.11% of Australia's projected greenhouse gas emissions in 2030 and 2035 respectively (349 and 184 Mt $CO_{2\text{-}e}$ in 2030 and 2035, respectively).

If the Project is approved and proceeds, the Project's contribution to global climate change would be proportional to its contribution to global greenhouse gas emissions. Greenhouse gases directly generated at the Project (i.e. Scope 1 emissions) and indirect emissions associated with the on-site use of electricity (i.e. Scope 2 emissions) have together been estimated at approximately 0.28 Mt CO_2-e per year during operations. These emissions would be small in the context of global greenhouse gas emissions.

However, based on a conservative approach that assumes that the Project's emissions are wholly additive, the Project'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), as follows:

- total Scope 1 and 2 Emissions - Global Surface Temperature Change 0.000008356°C (8.4 millionths of a °C); and
- total Scope 1, 2 and 3 Emissions - Global Surface Temperature Change 0.0002469°C (0.25 thousandths of a °C).

Given the above, the project's incremental contribution to temperature change would be sufficiently minor that no additional impacts on the environmental values would arise.

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Blackwater North Extension Project

Appendix A
Summary of Existing and Emerging Scope 1 and 2 Mitigation Measures at Surface Mines



Table A-1
Summary of Existing Scope 1 and 2 Mitigation Measures at Surface Mines

Greenhouse Gas Source	Mitigation Measures	Notes	Technological Readiness	Potential Barriers
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	-
	Fleet planning	Structuring of haul truck fleet (e.g. truck capacity) to minimise energy consumption.	Mature	-
	Energy-efficient units	Procurement of energy-efficient vehicles and equipment, including ventilation, lighting and control systems.	Mature	-
	Servicing and maintenance	Maintenance of vehicles and equipment according to manufacturers' specifications.	Mature	-
	Renewable fuels	Switching to biodiesel (likely to be an interim measure).	Mature	- High operational expenditure (OPEX). - Lack of supply. - Vehicle modifications. - Long-term storage. - Increased maintenance.
Light vehicle	Electrification	Hybrid, Battery Electric Vehicle (BEV).	Mature	- High capital expenditure (CAPEX). - Range. - Power limitations.
Haul trucks	Driver training	Eco-driving.	Mature	-
Existing measures for Scope 1 emissions – fugitive methane (Active Surface Mines)				
Drainage gas	None identified	-	-	-

Table A-1 (Continued)
Summary of Existing Scope 1 and 2 Mitigation Measures at Surface Mines

Greenhouse Gas Source	Mitigation Measures	Notes	Technological Readiness	Potential Barriers
Existing measures for Scope 1 emissions – other processes				
Petrol combustion	Electrification	Hybrid, BEV.	Mature	-
	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	-
Oils, greases	Recycling	Recycling of oils and greases.	Mature	-
Fugitive sulfur hexafluoride (SF6)	Best practice management	Operational protocols, gas accounting, training, recycling, Leak Detection and Repair (LDAR), equipment upgrades.	Mature	-
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).
Vegetation removal	Best practice management	Minimising vegetation clearing, re-use of the removed vegetation, and rehabilitation of land as quickly as possible	Mature	-

Table A-1 (Continued)
Summary of Existing Scope 1 and 2 Mitigation Measures at Surface Mines

Greenhouse Gas Source	Mitigation Measures	Notes	Technological Readiness	Potential Barriers
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	-
	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

Source: (EMM, 2025).

Table A-2
Summary of Emerging Scope 1 and 2 Mitigation Measures at Surface Mines

Greenhouse Gas Source	Mitigation Measures	Notes	Technological Readiness	Potential Barriers	Risks or Disadvantages
Emerging measures for Scope 1 emissions – diesel combustion					
Haul trucks	Electrification	On-board: hybrid, BEV	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
		On-board: fuel cell/dihydrogen (H_2)		- Lack of supply of renewable hydrogen. - High cost of renewable hydrogen.	
		Tethering: connection to a fixed electricity supply		- Impractical for haul trucks at surface coal mines due to distances involved.	
		Trolley assist: connection to an overhead cable to power an electric drive		- Likely to be impractical for surface coal mines due to evolving mine plans.	

Table A-2 (Continued)
Summary of Emerging Scope 1 and 2 Mitigation Measures at Surface Mines

Greenhouse Gas Source	Mitigation Measures	Notes	Technological Readiness	Potential Barriers	Risks or Disadvantages
Emerging measures for Scope 1 emissions – diesel combustion					
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.
		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).
		Automation	Demonstration to mature.	- Technology development needed. - High CAPEX.	- New worker safety issues. - Elimination of jobs.
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	-

Table A-2 (Continued)
Summary of Emerging Scope 1 and 2 Mitigation Measures at Surface Mines

Greenhouse Gas Source	Mitigation Measures	Notes	Technological Readiness	Potential Barriers	Risks or Disadvantages
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 methane [CH_4] to carbon dioxide [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.
	Utilisation (any purpose)	Capture of gas through boreholes, followed by utilisation	Reduce (reduces GWP through conversion of 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
Oils, greases	Alternative lubricants	-	-	-	-
Fugitive SF6	None identified	-	-	-	-

Table A-2 (Continued)
Summary of Emerging Scope 1 and 2 Mitigation Measures at Surface Mines

Greenhouse Gas Source	Mitigation Measures	Notes	Technological Readiness	Potential Barriers	Risks or Disadvantages
Emerging measures for Scope 1 emissions – other processes (Continued)					
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	Wind, solar or geothermal power	Demonstration to mature	- High CAPEX - Regulatory approvals - Space constraints	- Reliability (dependency on weather)
-	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)

Source: (EMM, 2025).

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Blackwater North Extension Project

Appendix B
Greenhouse Gas Calculations Report



FINAL REPORT

BLACKWATER NORTH EXTENSION PROJECT GREENHOUSE GAS CALCULATION REPORT

BLACKWATER, QUEENSLAND

GREENHOUSE GAS CALCULATION REPORT
RWDI # 2510129
10 April 2026

SUBMITTED TO

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QUALITY ASSURANCE

RWDI Australia Pty Ltd operates a Quality Management System which complies with the requirements of AS/NZS ISO 9001:2015. This management system has been externally certified by SAI Global and Licence No. QEC 13457 has been issued for the following scope: The provision of consultancy services in acoustic engineering and air quality; and the sale, service, support and installation of acoustic monitoring and related systems and technologies.

TABLE OF CONTENTS

EXECUTIVE SUMMARY 6

1 INTRODUCTION 7

1.1 Project Description 7

1.2 Project Scenarios 9

1.3 Objectives 9

2 BACKGROUND 10

2.1 Overview of the Greenhouse Gas Protocol 10

2.2 Scope 1 (Direct GHG Emissions) 10

2.3 Scope 2 (Indirect GHG Emissions) 10

2.4 Scope 3 (Other indirect GHG Emissions) 10

2.5 Global Warming Potential 12

3 RELEVANT LEGISLATIONS 13

3.1 Australian Legislation 13

3.1.1 National Greenhouse and Energy Reporting Framework 13

3.1.2 Safeguard Mechanism 13

3.1.3 Queensland State Legislation 14

4 GHG ASSESSMENT METHODOLOGY 15

4.1 Overview 15

4.2 Identification of GHG emission sources 15

4.2.1 GHG Assessment Boundary and Emission Sources 16

4.2.2 GHG Emission Sources 16

4.2.3 GHG Assessment Scenarios 17

5 CALCULATING GHG EMISSIONS 19

5.1 Scope 1 Emission Factors 19

5.2 Scope 1 Emissions Calculation Methodologies 21

5.2.1 Clearing of Vegetation 21

5.2.2 Fuel, Petroleum Oil and Greases Combustion 22

5.2.3 Construction Emissions 22

5.2.4 SF_6 Leakage 22

5.2.5 Explosives 22

5.2.6 Fugitive Emissions 23

5.3 Scope 2 Emission Factors 23

5.4 Scope 2 Emissions Calculation Methodologies 24

5.5 Scope 3 Emission Factors 25

5.6 Scope 3 Emissions Calculation Methodologies 27

5.6.1 Scope 3 Fuel, Petroleum Oil and Greases Combustion 27
5.6.2 Scope 3 Emissions from Electricity Transmission Losses 27
5.6.3 Scope 3 Product Transportation Emissions 27
5.6.4 Scope 3 Coal Combustion Emissions 29

6 QUANTIFIED GHG EMISSIONS 30

6.1 Scope 1 and Scope 2 Emissions 30

6.2 Scope 3 Emissions 36

7 COMPARISON OF ESTIMATED PROJECT EMISSIONS WITH QUEENSLAND AND NATIONAL EMISSION BUDGETS 41

7.1 National and Queensland Reduction Targets 41

7.2 Project Contribution 42

8 CONCLUSION 43

9 REFERENCES 44

10 STATEMENT OF LIMITATIONS 46

LIST OF APPENDICES

Appendix A: Activity Data
Appendix B: Detailed Emission Estimates

LIST OF FIGURES

Figure 1: Blackwater North Extension Project
Figure 2: Overview of GHG Protocol scopes and emissions across the value chain
Figure 3: GHG assessment boundary and emission sources
Figure 4: Scope 1 and 2 Project Scenario Emissions
Figure 5: Scope 1 and 2 Project Only Scenario Emissions
Figure 6: Scope 3 Project Scenario Emissions
Figure 7: Scope 3 Project Only Scenario Emissions

LIST OF TABLES

Table 1: GHGs and 100-year Global Warming Potentials
Table 2: Scope 1 Emission Factors
Table 3: Projected Scope 2 Emission Factors for Queensland's Electricity Grid
Table 4: Scope 3 Emission Factors
Table 5: Related Scope 3 Emission Factors for Electricity Transmission Losses
Table 6: Weighted Average Shipping Distance with Return for Bulk Carrier
Table 7: Results of Scope 1 and 2 emissions
Table 8: Results of Scope 3 emissions
Table 9: National and State Current Emissions and Reduction Targets for CO2e
Table 10: Comparison of Estimated Project and Project Only Emissions with National and Queensland Emissions and Reduction Targets

EXECUTIVE SUMMARY

RWDI Australia Pty Ltd (RWDI) has been engaged by Whitehaven Blackwater Pty Ltd (Whitehaven Blackwater), to prepare a Greenhouse Gas (GHG) Calculation Report for the proposed Blackwater North Extension Project (the Project). The Blackwater Mine (BWM) is an existing, open cut metallurgical coal mine located approximately 20 kilometres (km) south-west of Blackwater in the Bowen Basin, Queensland.

This GHG Calculation Report was prepared in accordance with the *Greenhouse Gas Emissions Guideline* (Version 1.02) prepared by Queensland Department of the Environment, Tourism, Science and Innovation (DETSI, 2026) ('The GHG Guideline'). This GHG Calculation Report summarises the methods used to calculate direct (Scope 1), indirect (Scope 2), and other indirect (Scope 3) GHG emissions, and presents a summary of unabated GHG emissions for the:

- Baseline Scenario i.e. already approved for BWM life-of-mine (LOM).
- Project Scenario i.e. the amended BWM LOM.
- Project Only Scenario i.e. the Project amendment only (Baseline minus Project).

The report also provides a comparison of the Project (Project Only) unabated emissions against national and Queensland state emissions reduction targets for 2030 to 2050. GHG emissions mitigation and management practices, a GHG abatement plan and associated risk assessment are not discussed in this report.

Scope 1, 2 and 3 emissions were estimated based on data available at the time of writing and the relevant guidelines and standards. Based on calculations and assumptions as outlined in this report, assessment results indicate:

- Estimated annual Scope 1 plus Scope 2 GHG emissions from the (unabated) Project Only Scenario range from negative 47 (i.e. a GHG emission saving of 49 kilotonnes [kt]) to 695 kt carbon dioxide equivalent (CO_2e) per year.
- Annual Project Only emissions are estimated to be:
    - 0.03 and 0.11 percent (%) of Australia's target emissions in 2030 and 2035, respectively.
    - 0.09 and 0.41% of Queensland's target emissions in 2030 and 2035, respectively.
- Diesel consumption from stationary power generation and off-road equipment, together with fugitive emissions, represent the largest contributors to the unabated Project Only Scope 1 emissions; accounting for 64% and 32% of total Scope 1 emissions, respectively. Fugitive emissions were estimated based on Method 1 (default).

As part of implementing the Project, the Proponent will seek to mitigate GHG emissions as documented in the Decarbonisation Study Report.

1 INTRODUCTION

1.1 Project Description

RWDI Australia Pty Ltd (RWDI) has been engaged by Whitehaven Blackwater Pty Ltd (Whitehaven Blackwater), to prepare a Greenhouse Gas (GHG) Assessment for the proposed Blackwater North Extension Project (the Project). The Blackwater Mine (BWM) is an existing, open cut metallurgical coal mine located approximately 20 kilometres (km) south-west of Blackwater in the Bowen Basin, Queensland.

The BWM has been in operation since 1967 and operates in accordance with, amongst other authorisations, Environmental Authority (EA) EPML00717813, granted under the *Environmental Protection Act 1994* (EP Act).

The BWM is a joint venture between Whitehaven Coal Limited (Whitehaven) (70%), Nippon Steel Corporation (20%) and JFE Steel Corporation (10%). Whitehaven Blackwater, a wholly owned subsidiary of Whitehaven, is the operator of BWM.

The existing BWM comprises a series of open-cut mining pits along an approximate 80 km long strike length. The BWM extracts coal using drill and blast methods, draglines, dozers and truck and shovel fleets for overburden removal and haulage. Existing infrastructure at BWM includes two rail spurs and balloon loops from the Bauhinia Railway Line, a coal handling and preparation plant (CHPP), thermal coal plant (TCP), product stockpiles, run-of-mine (ROM) coal stockpiles, tailings storage facility, in-pit spoil (i.e. waste rock) dumps, train-load out facilities, water management infrastructure and other supporting infrastructure (e.g. haul roads, access roads, laydown areas, electricity transmission lines, workshops and offices).

Whitehaven Blackwater proposes to develop the Blackwater North Extension Project (**Figure 1**), which would extend the current open cut mining development at the BWM to within Surface Area (SA) 7 on Mining Lease (ML) 1762 and SA 10 on ML 1759. The Project is expected to optimise mining operations at BWM allowing ongoing employment and economic benefits from the BWM to the local area, region, and State of Queensland.

The Project would include the following activities:

- extension of open cut operations into SA 7 on ML1762 and SA 10 on ML1759 to allow mining of additional coal reserves to approximately 2055;
- extraction of an additional 200 million tonnes (Mt) (approximately) of ROM coal;
- continued extraction of up to 19 Mtpa of ROM coal;
- continued use of existing BWM infrastructure (e.g. CHPP, TCP, ROM and product coal stockpiles, train load-out, water management, tailings management and other supporting infrastructure);
- construction and operation of new water management and water storage infrastructure in support of extended mining operations;
- development of a waste rock emplacement landform;
- continued co-disposal of coarse rejects with waste rock and disposal of tailings into an approved tailings storage facility or in-pit void;
- construction of semi-permanent tailings cells to be utilised for the disposal of fine rejects;
- progressive rehabilitation activities of the Project;
- ongoing exploration activities in the Project area; and
- other associated infrastructure, equipment and activities.

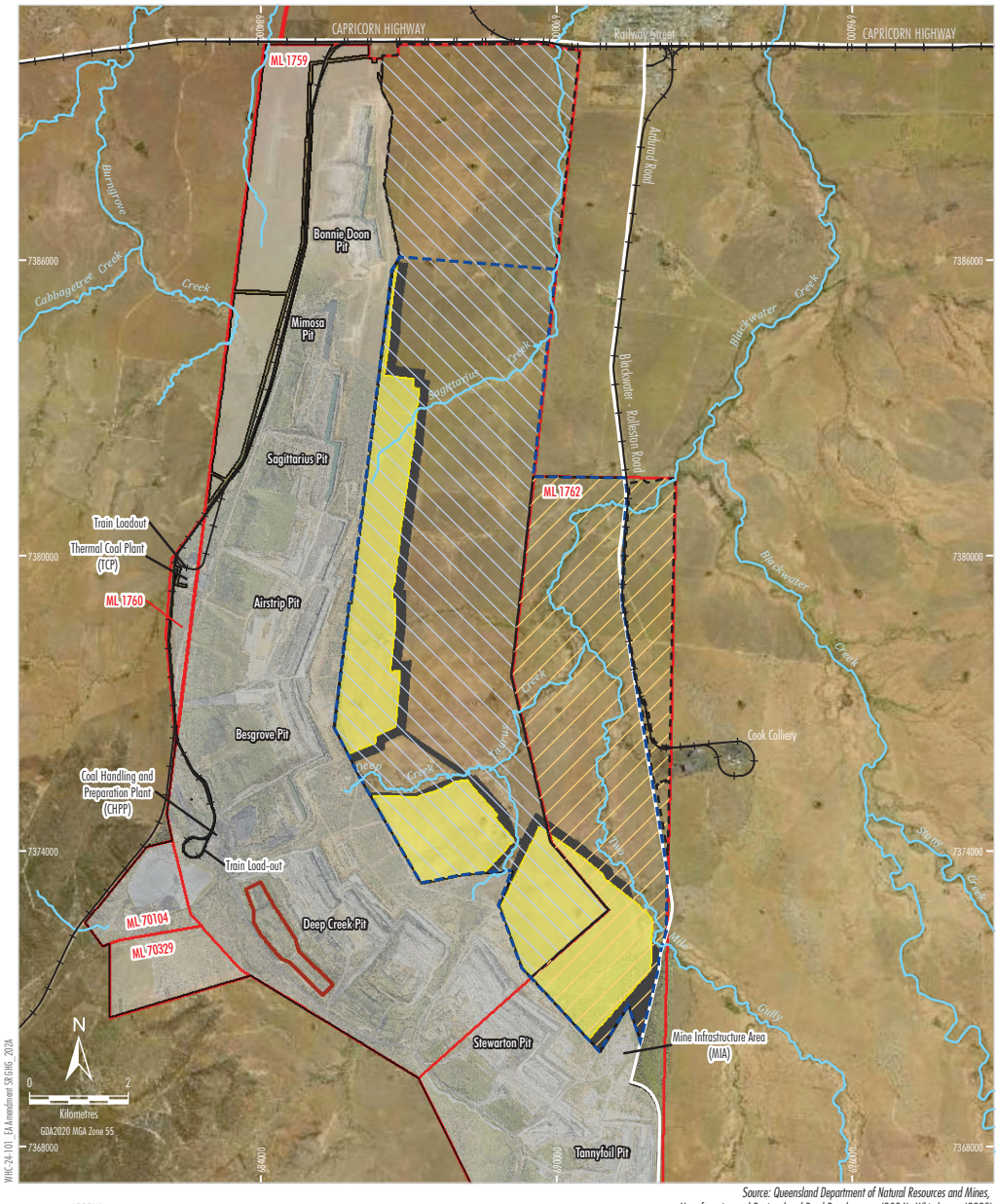


Figure 1: Blackwater North Extension Project

1.2 Project Scenarios

The following terminology is used through the report to describe the individual components of the Project:

- **Baseline Scenario** (Approved BWM Scenario): Approved life of mine (LOM) as approved by EA EPML00717813 excluding the Project Amendment. This scenario assumes continued operations of the BWM at the authorised maximum extraction rate of 19.0 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal until 2090 (at an average ROM coal extraction rate of approximately 12.8 Mtpa).
- **Project Scenario** (Amended BWM Scenario): Proposed LOM with the Project Amendment, incorporating the proposed extension of open-cut mining on SA 7 on ML 1762 and SA 10 on ML 1759. This amendment would enable extraction of an additional 200 Mt of ROM coal when compared to the Baseline Scenario, extending operations to approximately 2093 with continued maximum annual ROM coal extraction rate of 19.0 Mtpa (at an average ROM coal extraction rate of approximately 15.0 Mtpa).
- **Project Only Scenario** (Amendment Scenario): the Project Amendment only. This scenario evaluates the net change in emissions resulting from the Project extension by comparing the emissions from Project Scenario against those from Baseline Scenario, thereby quantifying the incremental impact of the proposed amendment.

1.3 Objectives

This report has been developed to support the Environmental Assessment Amendment Application for the Project, in alignment with the requirements of EP Act. This GHG Calculation Report has been prepared to fulfill the requirements outlined in the *Greenhouse Gas Emissions Guideline* (Version 1.02) prepared by Queensland Department of the Environment, Tourism, Science and Innovation ([DETSI], 2026 ('The GHG Guideline'), supporting the EA amendment application for the Project.

The primary objectives of this GHG Calculation Report are to estimate the anticipated GHG emissions for the Baseline Scenario, Project Scenario and Project Only Scenario. This includes:

- A detailed inventory of projected annual direct Scope 1emissions (methodology and results are provided in Section 5.2 and Section 6.1, respectively).
- A detailed inventory of projected annual indirect Scope 2 emissions (methodology and results are provided in Section 5.3 and Section 6.1, respectively).
- An indicative estimate of annual Scope 3 emissions associated with the Project (methodology and results are provided in Section 5.5 and Section 6.2, respectively).
- Assessment of contribution to State and National emissions (Section 7).

2 BACKGROUND

2.1 Overview of the Greenhouse Gas Protocol

The GHG Protocol, developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), is the globally recognized standard for GHG accounting and reporting (WRI and WBCSD, 2004). It provides a comprehensive framework that includes accounting standards, sector-specific guidance, calculation tools, and training resources to support businesses and governments in measuring and managing GHG emissions. The protocol enables consistent and transparent reporting across operations, value chains, products, cities, and policies, facilitating emissions reductions across both private and public sectors. Emissions are categorized into three scopes based on their emission sources as shown in **Figure 2**.

2.2 Scope 1 (Direct GHG Emissions)

Organizations report greenhouse GHG emissions from sources they own or control as Scope 1 emissions, which fall within the defined boundary of the organization (WRI and WBCSD, 2004). For the coal mining sector, emissions primarily result from operational activities associated with the Project, including GHG emissions from:

i) vegetation clearing;
ii) fugitive emissions of methane (CH_4) and carbon dioxide (CO_2) during coal extraction;
iii) emissions of CO_2, CH_4, and nitrous oxide (N_2O) from the combustion of fossil fuels, oils, and greases in both mobile and stationary equipment and;
iv) leakage of sulphur hexafluoride (SF_6) from high-voltage circuit breakers.

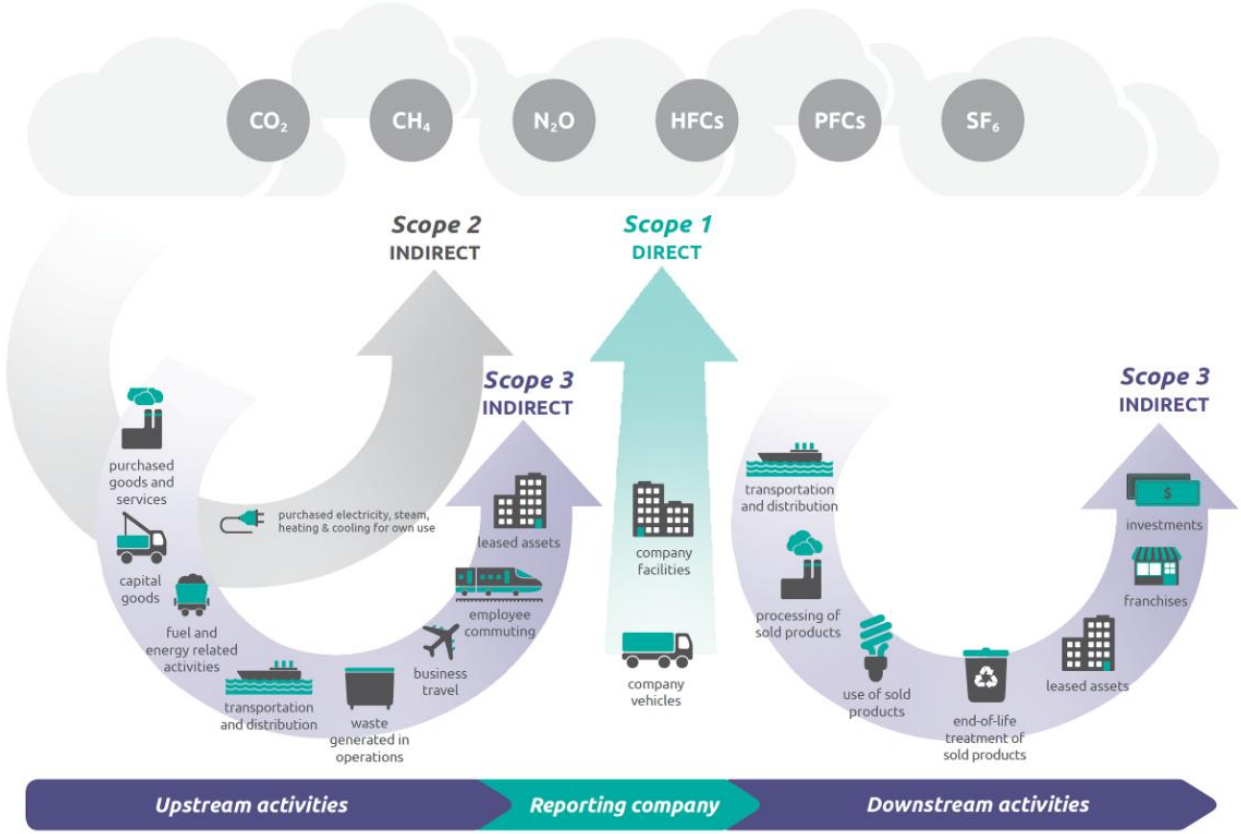
2.3 Scope 2 (Indirect GHG Emissions)

Organizations account for GHG emissions resulting from the generation of energy such as electricity, steam, heating, and cooling, that is purchased and used in their owned or controlled operations as Scope 2 emissions (WRI and WBCSD, 2004). Although the organization consumes the energy, the associated emissions occur at the external facility where the energy is produced. These emissions are considered indirect but are attributed to the organization due to its role as the end user of the energy.

2.4 Scope 3 (Other indirect GHG Emissions)

Scope 3 emissions refer to indirect GHG emissions that occur outside the organization's direct control, both upstream and downstream of its operations (WRI and WBCSD, 2004). These emissions may arise from a wide range of activities, including:

i) the extraction and production of purchased materials and fuels;
ii) transportation of goods and fuels, employee business travel, commuting, and the distribution of sold products;



Source: (WRI and WBCSD, 2011)

Figure 2: Overview of GHG Protocol scopes and emissions across the value chain

iii) emissions related to electricity generation not covered under Scope 2, such as those from fuel extraction, production, and transmission losses;
iv) emissions from leased assets, franchises, and outsourced activities, provided these are not included under the organization's chosen consolidation approach and;
v) the use and disposal of sold products, waste generated during operations, and waste associated with the production of purchased inputs.

2.5 Global Warming Potential

Global Warming Potential (GWP) is a measure developed by the Intergovernmental Panel on Climate Change (IPCC) to compare the relative climate impact of different GHGs over a specific time horizon, typically 100 years. It quantifies how much heat a GHG traps in the atmosphere compared to CO_2, which has a GWP of 1 (Greenhouse Gas Protocol, 2024). The 100-year GWPs from the Fifth Assessment Report have been applied in this assessment, in alignment with Australia's current GHG reporting requirements (Department of Climate Change, Energy, the Environment and Water [DCCEEW], 2025a) as shown in **Table 1**.

Table 1: GHGs and 100-year Global Warming Potentials

Emission Source	Emission Factor
Carbon dioxide (CO_2)	1
Methane (CH_4)	28
Nitrous oxide (N_2O)	265
Sulphur hexafluoride (SF_6)	23,500

Source: DCCEEW (2025a)

3 RELEVANT LEGISLATIONS

3.1 Australian Legislation

Australia ratified the Paris Agreement in November 2016, joining global efforts to combat climate change through legally binding commitments under the UNFCCC. Initially, Australia pledged to reduce GHG emissions by 26–28% below 2005 levels by 2030 (DCCEEW, 2015). On 16 June 2022, the Australian Government submitted an updated Nationally Determined Contribution (NDC) to the UNFCCC, committing to a more ambitious target of 43% emissions reduction below 2005 levels by 2030, affirming the commitment to achieve net-zero emissions by 2050 (DCCEEW, 2022).

In September 2025, Australia further strengthened its climate ambition by submitting a new NDC that sets a target to reduce emissions by 62–70% below 2005 levels by 2035. This target is supported by a comprehensive Net Zero Plan and six sector-specific emissions reduction strategies, aimed at ensuring a fair and economically beneficial transition to a low-carbon future (DCCEEW, 2025b).

3.1.1 National Greenhouse and Energy Reporting Framework

The *National Greenhouse and Energy Reporting Act 2007* (NGER Act) establishes the legislative foundation for the NGER Scheme, a unified national system for collecting data on GHG emissions, energy production, and energy consumption from Australian corporations (DCCEEW, 2025a).

Administered by the Clean Energy Regulator, the NGER Scheme requires corporations to register and report annually if they meet specific thresholds. As of 2025, these thresholds for Scope 1 and Scope 2 GHG emissions remain at 25,000 tonnes (t) of CO_2e per year for a single facility, or 50,000 t CO_2e per year for a corporation. Entities exceeding these limits must report Scope 1 (direct emissions) and Scope 2 (indirect emissions from electricity use) data (DETSI, 2025).

The legislative framework supporting the NGER Act includes the *National Greenhouse and Energy Reporting Regulations 2008.* The *National Greenhouse and Energy Reporting (Measurement) Determination 2008* (NGER Determination) provides the methods and criteria for calculating greenhouse gas emissions and has been updated annually since 2009, with the last update issued in 2025. These instruments provide the technical foundation for how emissions and energy data must be calculated and reported. The Measurement Determination outlines approved methodologies for estimating Scope 1 and Scope 2 emissions, estimation of the production and consumption of energy and assessing uncertainty. It ensures consistency and accuracy across reporting entities by specifying measurement criteria, data sources, and calculation procedures.

3.1.2 Safeguard Mechanism

The Safeguard Mechanism, established under the NGER Act, is a key policy tool used by the Australian Government to manage emissions from the country's largest industrial facilities. Originally legislated in 2014 and implemented in 2016, the mechanism was significantly reformed in 2023 to align with Australia's national climate targets.

The mechanism applies to facilities that emit more than 100,000 t of CO_2e annually (Scope 1 emissions). These facilities from sectors such as mining, manufacturing, oil and gas, transport, and waste, account for approximately 31% of Australia's total GHG emissions (DCCEEW, 2025c). Under the reformed framework, each facility is assigned an emissions baseline, which represents the maximum allowable net emissions. These baselines are designed to decline predictably over time, following a trajectory consistent with Australia's commitment to reduce emissions by 43% below 2005 levels by 2030, and to achieve net zero emissions by 2050. From 2023 to 2030, baselines will decrease at a rate of 4.9% per year (DCCEEW, 2025c). Facilities that exceed their baseline must offset the excess emissions by surrendering either Australian Carbon Credit Units or Safeguard Mechanism Credits (SMCs). Conversely, facilities that emit below their baseline may be eligible to generate SMCs, which can be traded or banked for future compliance.

3.1.3 Queensland State Legislation

The Queensland Government has demonstrated a strong commitment to climate action through both national and international partnerships and progressive state policy. Since joining the Under2 Coalition in 2017, Queensland has continued to align its actions with the goals of the Paris Agreement, working to limit global temperature rise to well below 2°C, with efforts to pursue 1.5°C (Queensland Government, 2024a).

The Queensland Government has enacted a suite of progressive legislative and policy measures to accelerate the state's transition to a low-emissions economy. The Clean Economy Jobs Act 2024 legally enshrines Queensland's emissions reduction targets: a 30% cut below 2005 levels by 2030, 75% by 2035, and net zero by 2050 (Queensland Government, 2024b). This Act also establishes the Clean Economy Expert Panel to guide implementation and monitor progress. Complementing this is the Queensland Climate Transition Bill 2023, which proposes a strategic phase-out of fossil fuel exports and the creation of the Climate Transition Authority to oversee a just transition for affected communities and industries (Queensland Government, 2023a). The Queensland Renewable Energy Zones Policy 2025 supports the development of large-scale renewable infrastructure, aiming to meet ambitious targets of 70% renewable energy by 2032 and 80% by 2035, while ensuring grid reliability and economic growth. These efforts are further guided by Queensland's 2035 Clean Economy Pathway, which outlines sector-specific strategies to meet the 75% emissions reduction goal by 2035 (Queensland Government, 2024c).

4 GHG ASSESSMENT METHODOLOGY

4.1 Overview

The GHG Guideline outlines the process to be followed based on the type of application. The procedure specific to amendment applications is summarised below.

Step 1: Identify the GHG emissions likely to be generated throughout the life of the project, only in relation to the amendment.

Step 2: Determine if the application meets the medium to high GHG emission category, only in relation to the amendment.

Step 3: Identify the management practices proposed to be implemented to prevent or minimise adverse impacts, only in relation to the amendment.

Step 4: Identify if a GHG abatement plan will be required to accompany the application, only in relation to the amendment.

Step 5: Describe the impacts of climate change on environmental values and the risk and likely magnitude of such impacts based on the relative scale of the project's net GHG emissions, only in relation to the amendment.

Step 3 to Step 4 were outside of the scope of this report and are addressed in detail in a separate document, the Decarbonisation Study Report, prepared by Phronis Consulting. Step 5 is considered in this report for unmitigated GHG emission only.

Scope 3 emissions have been calculated in accordance with the GHG Guideline as combined Scope 1 and 2 emissions are expected to be greater than 25 kt CO2-e/year.

4.2 Identification of GHG emission sources

The GHG Guideline specifies that, in relation to the amendment, applications must meet the following requirements when identifying GHG emissions expected to be generated throughout the life cycle of the project:

- Include an emissions inventory identifying the GHG to be emitted and the stage of the project at which the emissions will occur. Include a breakdown of GHG emissions by source.
- Estimate the projected annual Scope 1 and Scope 2 CO_2e emissions over the life of the project. Include both unabated emissions and emissions after all avoidance and abatement measures have been accounted.
- Provide an estimate of annual Scope 3 emissions and total Scope 3 emissions over the life of the project.

This results in the following outcome:

- Definition of the GHG assessment boundary, emission sources, and relevant amendment phases.
- Identification of emission scenarios.
- Development of emission scenarios reflecting both mitigated and unmitigated conditions (the present report has

Note: the present report only considers unmitigated conditions.

4.2.1 GHG Assessment Boundary and Emission Sources

The GHG emission inventory for the Project has been developed based on specific boundary considerations. Since the Project does not include a distinct construction phase beyond land clearing, which is considered part of routine mining operations, a separate inventory for construction-related emissions was not prepared. Emissions associated with the decommissioning and rehabilitation of the mine are expected to occur at the end of its operational life. However, due to uncertainties regarding the timing and nature of these activities, and the minimal impact of the Project on overall emissions during closure, these emissions were not included in the current assessment.

The evaluation encompasses Scope 1, Scope 2, and Scope 3 emissions related to the BWM. Scope 1 and Scope 2 emissions are confined to the BWM site, while significant emissions from activities occurring outside this geographical boundary are addressed under Scope 3.

4.2.2 GHG Emission Sources

The GHG emission sources associated with the BWM site were identified through a review of previous inventories for both the currently approved operations and the BWM - North Extension Project (SLR Consulting Australia Pty Ltd and BHP Mitsubishi Alliance, 2023; Whitehaven, 2025). The following sources were considered in this assessment:

Scope 1 emissions include:

- Vegetation clearing activities.
- Combustion of fossil fuels in mobile and stationary equipment (e.g. removal of overburden, mining coal, construction activities, mine service activities, decommissioning activities, rehabilitation activities and generation of electricity).
- Use of explosives.
- Use of oils and greases.
- Fugitive emissions from coal extraction.
- Leakage of SF_6 from electrical switchgear.

Scope 2 emissions include:

- Electricity consumption at the project site (e.g. for conveyors, the CHPP, amenities, etc.).

Scope 3 emissions include:

- Transmission losses from electricity use.
- Rail transport of product coal through the Bauhinia railway line.
- Shipping of coal from Port of Gladstone to other international ports.
- Combustion of exported coal.
- Extraction, production and transport of liquid fuels, oils and greases.

4.2.3 GHG Assessment Scenarios

The Project builds upon and expands the activities of the previously approved BWM operation. For the purposes of this GHG Calculation Report, the boundary has been defined to include the material currently present on-site. This encompasses direct emissions from on-site mining activities (Scope 1), indirect emissions from electricity usage related to BWM operations (Scope 2), and a review of upstream and downstream emissions (Scope 3) as shown in **Figure 3** to ensure a thorough evaluation.

The assessed scenarios are described in Section 1.2 of this report and include the Baseline, Project, and Project Only cases. For the Baseline Scenario, emissions were assessed up to 2090, assuming mine decommissioning occurs between 2091 and 2093. The Project and Project Only Scenarios were assessed through to 2093.

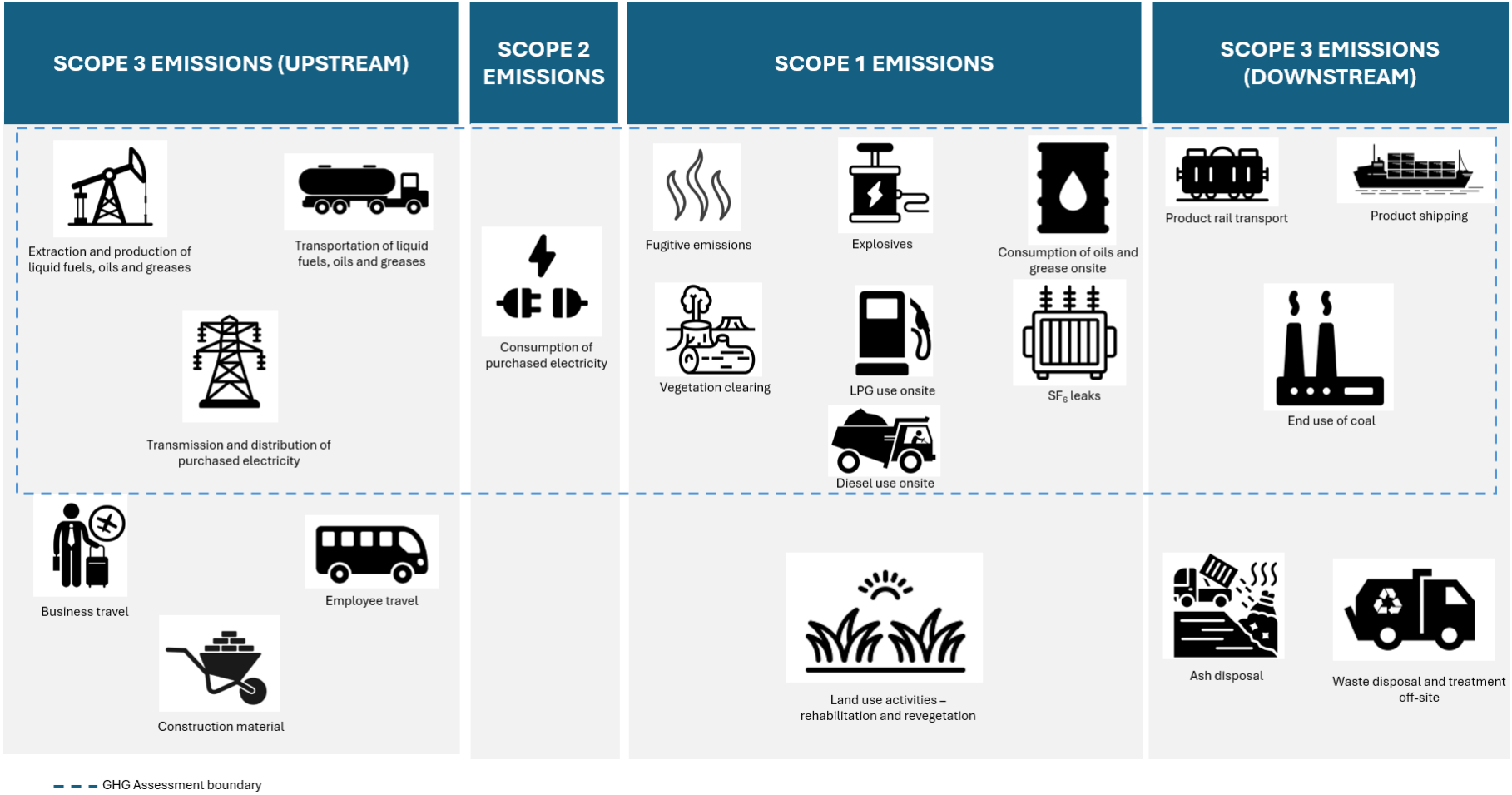


Figure 3: GHG assessment boundary and emission sources

5 CALCULATING GHG EMISSIONS

The GHG emissions associated with the BWM have been evaluated on an annual basis over the full duration of the BWM's lifecycle. Emissions estimates for each scenario were primarily guided by the following methodologies and regulatory frameworks:

- *Greenhouse Gas Protocol: The GHG Protocol for Project Accounting* developed by the WRI and the WBCSD (WRI and WBCSD, 2004).
- *Australian National Greenhouse Accounts Factors - For individuals and organisations estimating greenhouse gas emissions 2025* (DCCEEW, 2025a).
- NGER Scheme and NGER Determination (see Section 3.1.1).

5.1 Scope 1 Emission Factors

The emission factors and energy content for each of the emissions sources that have been used in the assessment for Scope 1 are summarised in **Table 2**.

Table 2: Scope 1 Emission Factors

Emission Source	Energy Content Factor (GJ/kL) or (GJ/t)	Scope 1 Emission Factors					
		CO_2	CH_4	N_2O	Total	Units	Note
Vegetation Clearance (woodland/forest/grassland/others)							
Open Shrubland Class G	-	-	-	-	113	t CO_2e/ha	[1]
Fuel Use – Stationary Combustion (from power generation and off-road equipment)							
Diesel	38.6	69.9	0.1	0.2	70.2	kg CO_2e/GJ	[2]
Liquid Petroleum Gas	25.7	60.2	0.2	0.2	60.6	kg CO_2e/GJ	[2]
Fuel Use - Transport							
Diesel (Heavy duty - Euro I)	38.6	69.9	0.2	0.4	70.5	kg CO_2e/GJ	[3]
Gasoline (Cars and commercial light vehicles)	34.2	67.4	0.02	0.2	67.62	kg CO_2e/GJ	[3]
Oils and Greases							
Petroleum based oils	38.8	13.9	0	0	13.9	kg CO_2e/GJ	[2]
Petroleum based greases	38.8	3.5	0	0	3.5	kg CO_2e/GJ	[2]
SF_6 leakage							
Gas-insulated switchgear and circuit breaker applications	-	-	-	-	0.0089	kg SF_6/kg SF_6	[4]
Explosives							
Ammonium Nitrate Fuel Oil (ANFO)	-	-	-	-	0.1778	t CO_2e/t explosive	[5]

Notes:

[1] Based on Table 2 of *Appendix E Vegetation Emissions Methodology from Greenhouse Gas Assessment Workbook for Road Projects* (Transport Authorities Greenhouse Group [TAGG], 2013).

[2] Based on Table 8 of *Australian National Greenhouse Accounts Factors - For individuals and organisations estimating greenhouse gas emissions* (DCCEEW, 2025a).

[3] Based on Table 9 of *Australian National Greenhouse Accounts Factors - For individuals and organisations estimating greenhouse gas emissions* (DCCEEW, 2025a).

[4] Based on Section 4.102 Method 1 from NGER Determination.

[5] Included using obsolete value from AGO (2004) – there is no reliable estimate of N_2O released.

t = tonnes, kg = kilogramme, GJ = gigajoule, ha = hectare

5.2 Scope 1 Emissions Calculation Methodologies

5.2.1 Clearing of Vegetation

The GHG emissions from vegetation clearing were included as Scope 1 emissions in the calculation because the removal of vegetation eliminates a natural carbon sink. When vegetation is cleared, its ability to absorb and store CO_2 from the atmosphere ceases. As a result, the amount of CO_2 that would have been sequestered by the vegetation remains in the atmosphere, leading to a direct increase in atmospheric GHG concentrations. The disposal of cleared vegetation, whether sent to landfill, where it may decompose anaerobically, or to facilities for combustion, results in further GHG emissions.

GHG emissions from land clearing are not reportable under the NGER Scheme.

The Carbon Gauge Tool Guideline developed by the TAGG was used to estimate GHG emissions from land clearing (TAGG, 2013). This guideline provides a simplified approach to estimate carbon sink losses using maps that show the maximum potential biomass (maxbio) class for all regions of Australia. The maxbio class represents the estimated maximum tonnes of dry vegetation matter per hectare for a given location and is outlined in Table 2 of Appendix E – Vegetation Emissions Methodology (TAGG, 2013). The user identifies the proposed clearance areas corresponding to each vegetation class, and the accompanying workbook provides Vegetation Clearance Emission Factors (in t CO_2-e/ha) based on the vegetation class information from Table 1 of Appendix E of the guideline.

The method described in the guide evaluates GHG emissions resulting from land clearing by accounting for both the carbon currently stored in vegetation and the carbon that would have been absorbed over time had the vegetation remained intact. This technique adopts a cautious stance and relies on several key assumptions:

- All carbon pools (woody biomass, non-woody biomass, debris, and soil) are completely removed.
- All removed carbon is converted to CO_2 and released into the atmosphere.
- Potential carbon sequestration from future revegetation of the project site is excluded.

Based on the Plant Community Type Mapping undertaken for the project, Vegetation Class G, Class 1 with the emission factor of 113 t CO_2e/ha was selected for the Project, are shown in **Table 2**.

Emissions for each year and scenario were calculated using the following equation:

$$Emissions_{vegegation\ clearing}(t\ of CO_{2e}) = Alea\ Cleared\ (ha) \times Emission\ factor\ (\frac{tCO2e}{ha})$$

where:

Area cleared was obtained from the data provided by BWM for each scenario, as summarised in Appendix A, Table A.1 to Table A.3.

5.2.2 Fuel, Petroleum Oil and Greases Combustion

Emissions resulting from fossil fuel (diesel and liquid petroleum gas), petroleum oil and greases combustion were calculated for each year and scenario using the following equation:

$$Emissions_{Combustion}(t\ of CO_2e)$$
$$= Quantity\ of\ Fuel, Oil, Greeses\ (kL) \times Energy\ Content\ of\ Fuel\ \left(\frac{GJ}{kL}\right) \times Emission\ factor_{Scope\ 1}\ \left(\frac{kg\ CO2e}{GJ}\right) \times 10^{-3}$$

where:

Quantity of fuel, petroleum oil and greases was obtained from the data provided by BWM for each scenario, as summarised in Appendix A, Table A.1 to Table A.3.

Energy content values specific to each fuel type, petroleum oil or grease (expressed in gigajoules per kilolitre, GJ/kL) along with the corresponding Scope 1 emission factors (expressed in kg CO_2e/GJ), were obtained from **Table 2**.

5.2.3 Construction Emissions

A separate evaluation of the construction phase was deemed unnecessary, as the mine has been operational for several decades. Any emissions linked to construction activities have been accounted into the early years of the Project.

5.2.4 SF_6 Leakage

Emissions resulting from SF_6 gas-insulated electrical equipment were calculated for each year and scenario using the following equation:

$$Emissions_{SF6\ Leakage}\ (t\ of CO_2e) = Quantity\ of\ SF_6\ (t) \times \text{Default annual leakage rate of } SF_6\ \times GWP_{SF_6}$$

where:

Quantity of SF_6 expected to be present in the installed components was obtained from the data provided by BWM for each scenario, as summarised in Appendix A, Table A.1 to Table A.3. The default annual SF_6 leakage rate was obtained from **Table 2**, along with the GWP value for SF_6 listed in **Table 1**.

5.2.5 Explosives

There is no published emission factor for blasting under the NGER scheme. However, for completeness Scope 1 emissions from the use of heavy ANFO (ammonium nitrate and fuel oil) explosives have been estimated using the following equation:

$$Emissions_{Explosives}(t\ of CO_2e) = Quantity\ of\ Explosives\ (kt) \times Emission\ factor_{Scope\ 1}\ \left(\frac{t\ CO_2e}{t\ of\ Explosive}\right) \times 10^3$$

Quantity of explosives was obtained from the data provided by BWM for each scenario, as summarised in Appendix A, Table A.1 to Table A.3 and presented in the Calculation Report for information purpose only. The emissions factor for explosives (heavy ANFO) is included in **Table 2** and sourced from AGO (2004).

5.2.6 Fugitive Emissions

Fugitive emissions associated with the Project would arise from the exposure of coal seams during coal extraction activities. Fugitive emissions from coal extraction are estimated using the Method 1 approach outlined in the NGER Determination.

Fugitive emissions from extraction of coal were calculated for each year and scenario using the following equation:

$$Emissions_{Fugitive}\ (t\ of CO_2e)$$

$$= Quantity\ of\ ROM\ coal\ (Mt) \times Default\ Queensland\ Methane\ Emission\ Factor\ (\frac{t\ of CO_{2e}}{t\ of\ ROM\ Coal}) \times 10^6$$

where:

Quantity of ROM coal was obtained from the data provided by BWM for each scenario, as summarised in Appendix A, Table A.1 to Table A.3. Default Queensland Methane Emission Factor is 0.031 (t of CO_2e/t of ROM coal) as per Method 1 – extraction of coal fugitive emission approach outlined in the NGER Determination.

5.3 Scope 2 Emission Factors

Scope 2 GHG emissions, which are indirect emissions associated with electricity usage, were calculated by applying Queensland's grid emission factor sourced from the latest national emissions projections from (DCCEEW, 2025d). The emission factors are presented in **Table 3**. Emission factors for the Queensland electricity grid are projected through to the year 2040, based on data from (DCCEEW, 2025d). For the period between 2041 and 2093, the projected 2040 emission factor was applied to be conservative. Australia's national objective is to achieve net zero GHG emissions by 2050.

Table 3: Projected Scope 2 Emission Factors for Queensland's Electricity Grid

Year	Projected Scope 2 Emission Factors for Queensland's Electricity Grid (t CO_2e/MWh)
2027	0.49
2028	0.41
2029	0.32
2030	0.19
2031	0.19
2032	0.17
2033	0.19
2034	0.21
2035	0.25
2036	0.26
2037	0.24
2038	0.23

Year	Projected Scope 2 Emission Factors for Queensland's Electricity Grid (t CO_2e/MWh)
2039	0.23
2040	0.23
2041	0.23*
2042	0.23*
2043	0.23*
2044	0.23*
2045	0.23*
2046	0.23*
2047	0.23*
2048	0.23*
2049	0.23*
2050 to 2093	0.23*

Notes: MWh = megawatt-hour

* For the period between 2041 and 2093, the projected 2040 emission factor was applied to be conservative. Australia's national objective is to achieve net zero GHG emissions by 2050.

It should be noted that if QLD electricity sector decarbonisation occurs more slowly or more rapidly than assumed by DCCEEW (2025d), Scope 2 emissions may be higher or lower than the estimated values. This uncertainty is inherent to this forward-looking methodology. To provide a conservative estimate over the long term, the 2040 electricity emission factor was held constant for the period 2041 to 2093, notwithstanding Australia's objective to achieve net zero greenhouse gas emissions by 2050.

5.4 Scope 2 Emissions Calculation Methodologies

Indirect emissions associated with electricity usage were calculated for each year and scenario using the following equation:

$$Emissions_{Scope\ 2}\ (t\ of\ CO_{2e})$$

$$= Projected\ Electricity\ Usage\ (GWh) \times Projected\ Scope\ 2\ Queensland\ EF\ \left(\frac{tCO_2e}{MWh}\right) \times 10^3$$

where:

Projected electricity usage was obtained from the data provided by BWM for each scenario, as summarised in Appendix A, Table A.1 to Table A.3. Projected Scope 2 Emission Factors for Queensland's Electricity Grid were obtained from **Table 3**.

5.5 Scope 3 Emission Factors

The emission factors and energy content (where applicable) for each emission source used in the Scope 3 assessment are summarised in **Table 4**. Scope 3 emission factors for electricity transmission losses are summarised in **Table 5**.

As shown in **Table 5**, projected emission factors for electricity transmission losses are available for the Queensland grid through 2040 (DCCEEW, 2025d). For the period between 2041 and 2093, a 2040 emission factor was applied to be conservative. Australia's national objective is to achieve net zero GHG emissions by 2050.

Table 4: Scope 3 Emission Factors

Emission Source	Energy Content Factor (GJ/kL) or (GJ/t)	Scope 3 Emission Factors					
		CO_2	CH_4	N_2O	Total	Units	Note
Fuel Use – Stationary Combustion (from power generation and off-road equipment)							
Diesel	38.6	-	-	-	17.3	kg CO_2e/GJ	[1]
Liquid Petroleum Gas	25.7	-	-	-	20.2	kg CO_2e/GJ	[1]
Fuel Use - Transport							
Diesel	38.6	-	-	-	17.3	kg CO_2e/GJ	[2]
Gasoline	34.2	-	-	-	17.2	kg CO_2e/GJ	[2]
Oils and Greases							
Petroleum based oils	38.8	-	-	-	18	kg CO_2e/GJ	[1]
Petroleum based greases	38.8	-	-	-	18	kg CO_2e/GJ	[1]
Downstream							
Rail transport	-	27.49	0.02	0.28	27.79	t CO_2e/Mt-km	[3]
Ship transport (Average Bulk Carrier)	-	3.49	0.001	0.04	3.53	t CO_2e/Mt-km	[4]
Thermal coal	27	90	0.04	0.2	90.24	kg CO_2e/GJ	[5]
Coking coal	30	91.8	0.03	0.2	92.03	kg CO2-e/GJ	[5]

Notes:

[1] Based on Table 8 of Australian National Greenhouse Accounts Factors for Individuals and Organisations Estimating Greenhouse Gas Emissions 2025, (DCCEEW, 2025a).

[2] Based on Table 9 of Australian National Greenhouse Accounts Factors for Individuals and Organisations Estimating Greenhouse Gas Emissions 2025, (DCCEEW, 2025a).

[3] Based on data for Freighting goods, Rail – Freight Train, from UK Government GHG Conversion Factors for Company Reporting, Department for Energy Security and Net Zero (UK Government, 2025).

[4] Based on data for Freighting goods, Bulk Carrier – Average data, from UK Government GHG Conversion Factors for Company Reporting, Department for Energy Security and Net Zero (UK Government, 2025).
[5] Based on Table 4 of Australian National Greenhouse Accounts Factors for Individuals and Organisations Estimating Greenhouse Gas Emissions 2025, (DCCEEW, 2025a): Scope 1 Bituminous Coal emission factors for thermal coal and Scope 1 Coking Coal emission factors for coking coal, respectively.
km = kilometre

Table 5: Related Scope 3 Emission Factors for Electricity Transmission Losses

Year	Projected Scope 3 Emission Factors for Queensland's Electricity Grid ($t CO_2e/MWh$)
2027	0.07
2028	0.06
2029	0.04
2030	0.02
2031	0.03
2032	0.03
2033	0.03
2034	0.03
2035	0.04
2036	0.03
2037	0.04
2038	0.03
2039	0.03
2040	0.03
2041	0.03*
2042	0.03*
2043	0.03*
2044	0.03*
2045	0.03*
2046	0.03*
2047	0.03*
2048	0.03*
2049	0.03*
2050 to 2093	0.03*

* For the period between 2041 and 2093, a 2040 emission factor was applied to be conservative. Australia's national objective is to achieve net zero GHG emissions by 2050.

5.6 Scope 3 Emissions Calculation Methodologies

Scope 3 emissions can encompass a broad range of sources, both upstream and downstream of the Project. For upstream emissions, this assessment includes those associated with fossil fuel (diesel and liquid petroleum gas), petroleum oil and greases supply to the site, and electricity transmission. However, emissions from company and employee travel, as well as those linked to the production of construction materials or delivery of new mobile equipment, have not been estimated as this is an amended project. For downstream emissions, this assessment includes final transportation and utilization of coal products. Downstream Scope 3 emissions are highly variable, depending on the destination country, transportation methods, handling processes, and the type of coal product being utilized (i.e., thermal or coking coal). This analysis provides estimates for rail transport to the port, international shipping, and coal combustion.

5.6.1 Scope 3 Fuel, Petroleum Oil and Greases Combustion

Scope 3 emissions resulting from fossil fuel (diesel and liquid petroleum gas), petroleum oil and greases supply to the site, were calculated for each year and scenario using the following equation:

$$Emissions_{Scope\ 3\ Fuels,Oil,Greases}\ (t\ of CO_2e)$$

$$= Quantity\ of\ Fuel\ (kL) \times Energy\ Content\ of\ Fuel\ \left(\frac{GJ}{kL}\right) \times Emission\ factor_{Scope\ 3}\ \left(\frac{kgCO_2e}{GJ}\right) \times 10^{-3}$$

where:

Quantity of fuel, petroleum oil and greases was obtained from the data provided by BWM for each scenario, as summarised in Appendix A, Table A.1 to Table A.3.

Energy content values specific to each fuel type, petroleum oil or grease (expressed in GJ/KL) along with the corresponding Scope 3 emission factors (expressed in $kgCO_2e/GJ$), were obtained from **Table 4**.

5.6.2 Scope 3 Emissions from Electricity Transmission Losses

Scope 3 emissions from electricity transmission losses were calculated for each year and scenario using the following equation:

$$Emissions_{Electricity\ Scope\ 3}\ (t\ of CO_2e)$$

$$= Projected\ Electricity\ Usage\ (GWh) \times Projected\ Scope\ 3\ Queensland\ EF\ \left(\frac{tCO_2e}{MWh}\right) \times 10^3$$

where:

Projected electricity usage was obtained from the data provided by BWM for each scenario, as summarised in Appendix A, Table A.1 to Table A.3. Projected Scope 3 Emission Factors for Queensland's Electricity Grid were obtained from **Table 3**.

5.6.3 Scope 3 Product Transportation Emissions

Product transportation emissions include both domestic transport (via rail to Gladstone using the Bauhinia Line of 250 km one way and by bulk carrier within Australia) and international shipping (via bulk carrier).

International shipping destinations include Japan, India, Korea, the Netherlands, China, Taiwan, Indonesia, France, Vietnam and Belgium. For a conservative assessment, transportation emissions were included for both outbound and return journeys. The average round-trip shipping distance was calculated based on weighted average production data for fiscal years 2025 and 2026, as summarised in **Table 6**.

Table 6: Weighted Average Shipping Distance with Return for Bulk Carrier

Location	Port	2025 Product Allocation	2026 Product Allocation	2025-2025 Product Weighted Average	Oneway distance (km)	Weighted Average Shipping Distance with Return (km)
Japan	Port of Kochi	46.6%	45.5%	46.3%	7,000	6,486
India	Cochin	24.6%	24.0%	24.5%	12,500	6,120
Korea	Yeosu	8.4%	10.9%	9.0%	7,500	1,355
Australia	Port of Eden Marina	0.5%	0.4%	0.5%	2,000	20
The Netherlands	Rotterdam	0.9%	0.0%	0.7%	18,000	248
China	Shanghai	10.9%	5.6%	9.5%	8,000	1,524
Taiwan	Kao-Hsiung	0.9%	2.9%	1.4%	7,500	215
Indonesia	Terminal Penumpang Gapura Surya Nusantara	0.1%	0.0%	0.1%	5,500	9
France	Rotterdam	1.5%	2.1%	1.7%	18,000	603
Vietnam	Vung Tua Port Green	4.8%	6.4%	5.2%	7,500	779
Belgium	Rotterdam	0.7%	2.1%	1.1%	18,000	385
Total		100%	100%	100%	-	**17,744**

Scope 3 product transportation emissions were calculated for each year and scenario using the following equation:

$$Emissions_{Scope\ 3\ Coal\ Transportation}\ (t\ of CO_2e)$$

$$= Quantity\ of\ Transported\ Product\ \ (Mt) \times Travelled\ Distance\ with\ Return\ (km) \times$$

$$\times\ Emission\ factor_{Scope\ 3\ Transport}\ \left(\frac{tCO_2e}{Mt-km}\right)$$

where:

Quantity of transported product obtained from the data provided by BWM for each scenario, as summarised in Appendix A, Table A.1 to Table A.4.

Travelled distance with return for rail transportation corresponds to 500 km (Bauhinia Line from BWM location to Gladstone). Travelled distance with return for bulk carrier corresponds to product destination weighted average shipping distance of 17,744 km as per **Table 6**.

Scope 3 emission factors for rail and bulk carrier transportation (expressed in t CO_2e/Mt-km), were obtained from **Table 4**.

5.6.4 Scope 3 Coal Combustion Emissions

Scope 3 coal combustion emissions include the final use of coal products at their destination and encompass both thermal coal and coking coal.

Scope 3 emissions from coal combustion were calculated for each year and scenario using the following equation:

$$Emissions_{Scope\ 3\ Coal\ Combustion}\ (t\ of CO_2e)$$

$$= Quantity\ of\ Final\ Product(Mt) \times Energy\ Content\ of\ Final\ Product\left(\frac{GJ}{kt}\right) \times$$

$$\times Emission\ factor_{Scope\ 3\ Final\ Product}\ \left(\frac{kgCO_2e}{GJ}\right) \times 10^3$$

where:

Quantity of thermal and coking coal was provided by BWM for each scenario, as summarised in Appendix A, Table A.4.

Energy content values specific to each coal type (expressed in GJ/kt) and corresponding Scope 3 emission factors (expressed in kgCO_2e/GJ), were obtained from **Table 4**.

6 QUANTIFIED GHG EMISSIONS

6.1 Scope 1 and Scope 2 Emissions

Appendix B provides the complete emissions inventory for Scope 1 and Scope 2 across all scenarios. **Table 7** summarises the estimated total unabated Scope 1 and Scope 2 emissions for each year of the Project, including Baseline Scenario, Project Scenario and Project Only Scenario. A graphical representation of annual GHG emissions for Project and Project only scenarios are shown in **Figure 4** and **Figure 5**, respectively. Diesel consumption from stationary power generation and off-road equipment, together with fugitive emissions, represented the largest contributors to the Project's cumulative Scope 1 emissions. Together, these two sources accounted for approximately 49% and 48% of total Scope 1 emissions in the Project Scenario, respectively. For the Project Only scenario, these two sources accounted for approximately 66% and 31% of total Scope 1 emissions, respectively.

The annual average Scope 1 and 2 emissions for Baseline Scenario, Project Scenario and Project Only Scenario would be approximately 797,266 t CO_2e/year, 1,038,721 t CO_2e/year, 277,154 t CO_2e/year respectively.

The Project will support an increase in average ROM production from 12 Mtpa to 15 Mtpa (approximately 23% increase).

The Scope 1 GHG emissions intensity at BWM is anticipated to change from approximately 0.0586 t CO_2e/t ROM (Baseline scenario) to approximately 0.0660 tCO_2e/t ROM (Project scenario), an increase of approximately 11%, that is related to geologic conditions.

According to the criteria outlined in Section 3.2 of the Guideline (DETSI, 2025), which defines medium to high Scope 1 and Scope 2 GHG emission sources as those producing 25,000 t of CO_2e or more annually, the Project falls within the medium to high emitter category.

Table 7: Results of Scope 1 and 2 emissions

Year	Scope 1 and Scope 2 emissions (t CO_2e/year)		
	Baseline Scenario	Project Scenario	Project Only Scenario (Difference)
FY27	959,363	979,223	19,860
FY28	968,664	1,017,002	48,338
FY29	995,551	946,061	-49,490
FY30	846,517	965,678	119,160
FY31	932,501	1,094,412	161,912
FY32	956,354	1,223,947	267,593
FY33	915,513	1,221,781	306,268

Year	Scope 1 and Scope 2 emissions (t CO_2e/year)		
	Baseline Scenario	Project Scenario	Project Only Scenario (Difference)
FY34	996,453	1,190,861	194,408
FY35	1,030,128	1,223,622	193,494
FY36	986,748	1,173,207	186,460
FY37	991,025	1,240,787	249,762
FY38	948,125	1,230,800	282,675
FY39	972,400	1,225,614	253,215
FY40	947,730	1,198,105	250,376
FY41	926,256	1,252,521	326,264
FY42	909,161	1,256,875	347,715
FY43	942,564	1,251,955	309,391
FY44	887,367	1,266,776	379,410
FY45	836,796	1,249,557	412,760
FY46	829,682	1,293,983	464,301
FY47	754,918	1,197,886	442,968
FY48	737,458	1,231,707	494,250
FY49	675,232	1,224,143	548,911
FY50	662,869	1,292,977	630,108
FY51	632,334	1,280,721	648,387
FY52	585,646	1,172,436	586,790
FY53	553,136	1,247,865	694,728
FY54	548,599	1,166,467	617,868
FY55	551,068	1,190,023	638,955
FY56	944,287	1,117,802	173,515
FY57	952,571	1,030,645	78,073
FY58	935,898	1,044,912	109,014
FY59	925,481	1,102,242	176,762
FY60	954,569	1,120,956	166,386

Year	Scope 1 and Scope 2 emissions (t CO_2e/year)		
	Baseline Scenario	Project Scenario	Project Only Scenario (Difference)
FY61	958,682	1,042,769	84,087
FY62	935,886	1,124,519	188,633
FY63	983,059	1,064,885	81,826
FY64	939,921	1,088,419	148,498
FY65	1,009,863	1,083,870	74,008
FY66	963,778	1,101,262	137,485
FY67	1,028,565	1,128,766	100,201
FY68	988,940	1,090,933	101,993
FY69	1,020,414	1,137,485	117,070
FY70	979,740	1,192,284	212,544
FY71	995,008	1,067,799	72,791
FY72	995,196	1,126,208	131,013
FY73	913,160	1,095,745	182,585
FY74	885,328	1,059,884	174,556
FY75	767,503	1,128,833	361,330
FY76	585,048	1,074,610	489,562
FY77	583,228	1,116,236	533,008
FY78	584,821	1,053,502	468,681
FY79	557,486	1,149,251	591,766
FY80	579,677	971,701	392,023
FY81	572,079	941,438	369,359
FY82	546,703	912,406	365,703
FY83	490,767	913,816	423,049
FY84	484,174	874,413	390,239
FY85	479,078	749,622	270,543
FY86	449,538	559,462	109,924
FY87	423,102	538,303	115,201

Year	Scope 1 and Scope 2 emissions (t CO_2e/year)		
	Baseline Scenario	Project Scenario	Project Only Scenario (Difference)
FY88	433,508	507,500	73,992
FY89	394,969	453,714	58,745
FY90	302,821	410,666	107,846
FY91	-	405,002	405,002
FY92	-	377,808	377,808
FY93	-	127,669	127,669
Average	**797,266***	**1,038,721**	**277,154**

* For the Baseline Scenario Average, FY91 to FY93 are excluded.

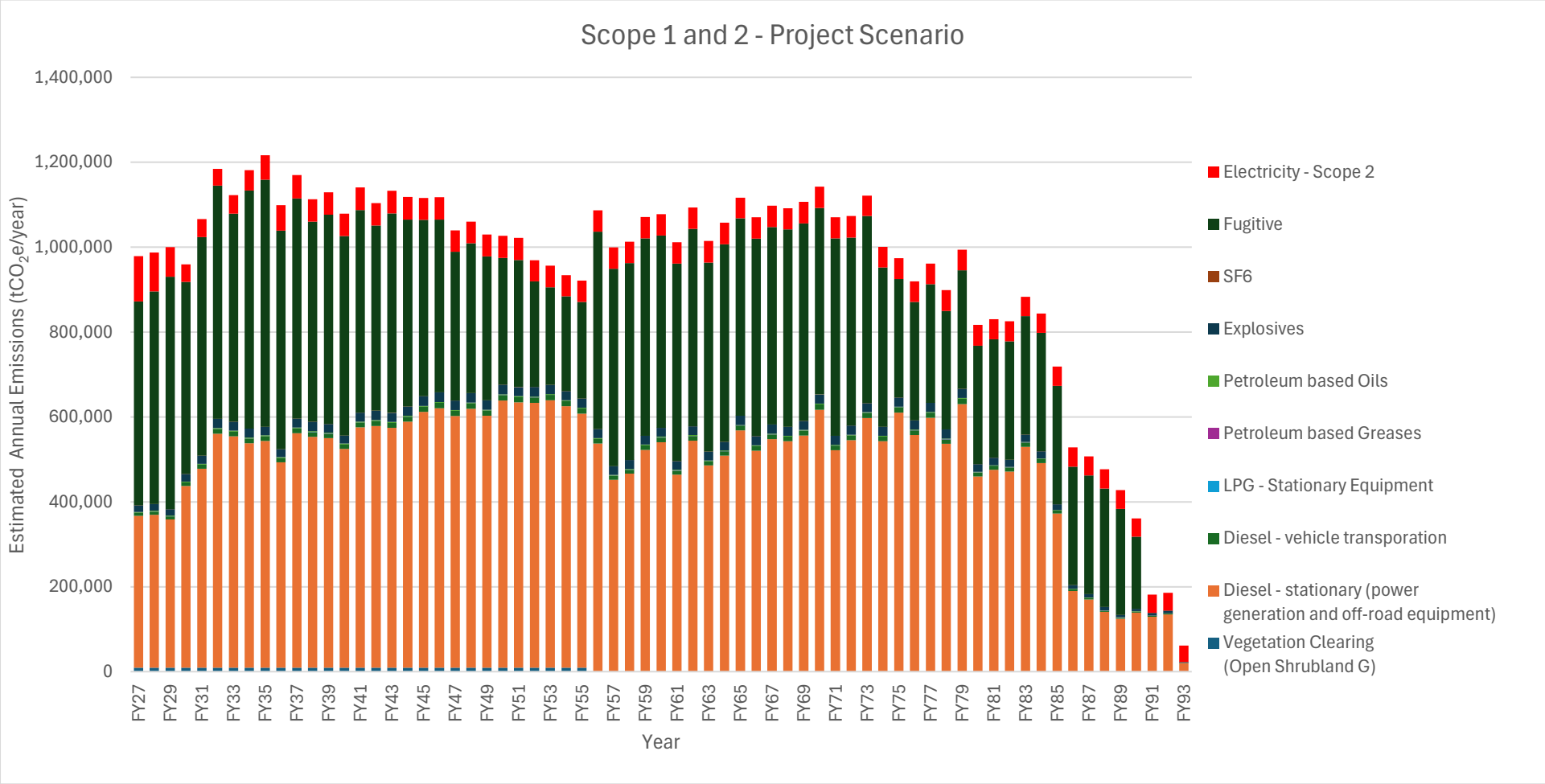


Figure 4: Scope 1 and 2 Project Scenario Emissions

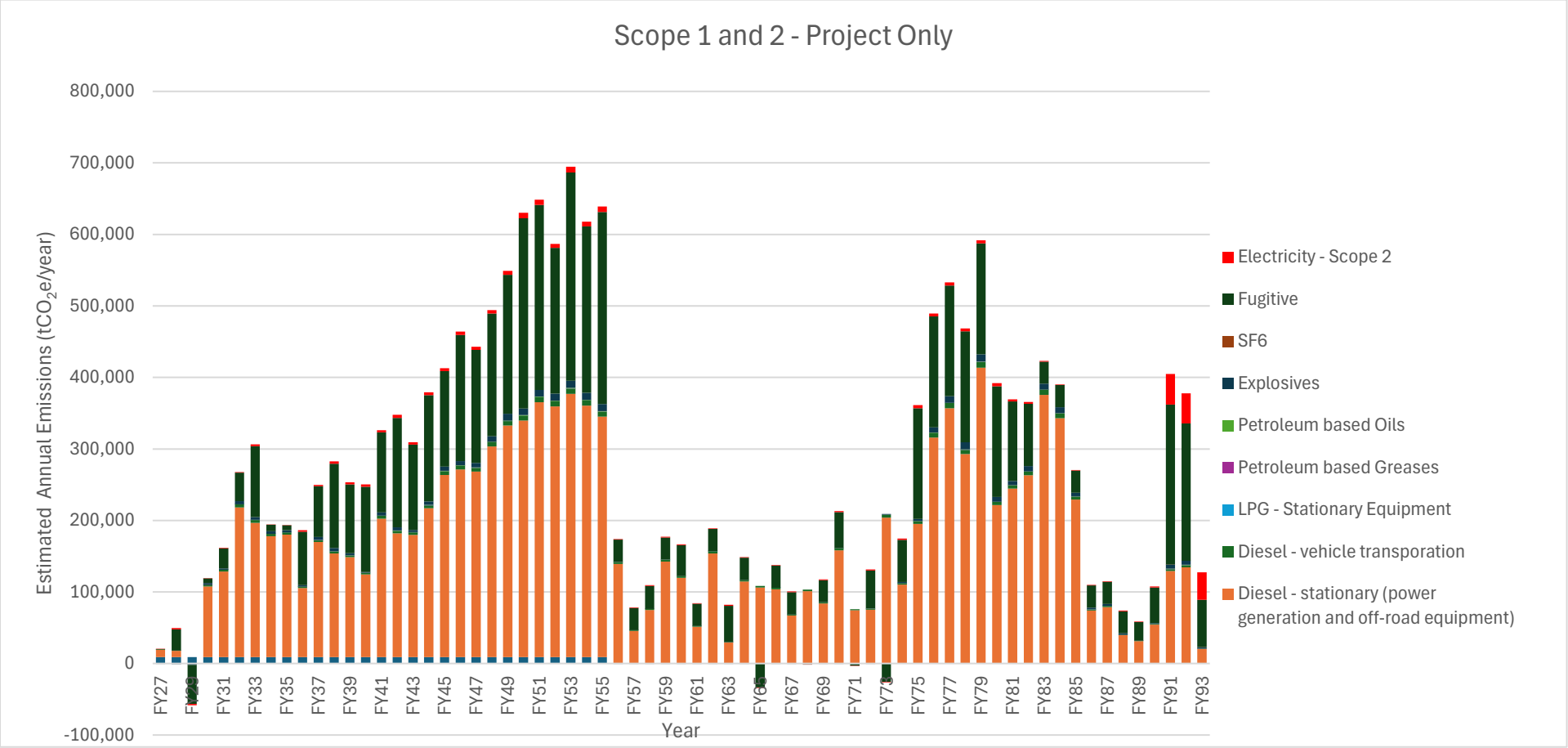


Figure 5: Scope 1 and 2 Project Only Scenario Emissions

6.2 Scope 3 Emissions

Appendix B provides the complete emissions inventory for Scope 3 across all scenarios. **Table 8** summarises the estimated total Scope 3 emissions for each year of the Project, including Baseline Scenario, Project Scenario and Project Only Scenario. Graphical representations of the annual Scope 3 GHG emissions for the Project and Project only scenarios are shown in **Figure** 6 and **Figure 7** respectively. These results indicate that the dominant source of Scope 3 emissions is the downstream combustion of the produced coal, which accounts for roughly 97% and 96% of the cumulative Scope 3 emissions in the Project and Project Only Scenarios, respectively.

Table 8: Results of Scope 3 emissions

Year	Scope 3 Emissions (t CO_2e/year)		
	Baseline Scenario	Project Scenario	Project Only Scenario (Difference)
FY27	32,938,720	38,314,140	5,375,421
FY28	33,342,849	41,101,983	7,759,134
FY29	37,415,526	37,747,807	332,280
FY30	30,966,010	38,062,999	7,096,989
FY31	36,002,466	42,453,938	6,451,472
FY32	38,921,351	48,328,080	9,406,729
FY33	32,894,655	46,793,910	13,899,254
FY34	39,157,149	44,641,917	5,484,769
FY35	40,534,107	47,604,716	7,070,609
FY36	36,378,975	47,873,479	11,494,505
FY37	36,586,723	43,491,113	6,904,390
FY38	32,894,617	47,361,218	14,466,602
FY39	34,098,776	46,590,519	12,491,743
FY40	32,713,107	46,267,999	13,554,892
FY41	33,818,960	42,511,227	8,692,267
FY42	30,431,149	44,798,548	14,367,398
FY43	33,132,393	44,481,379	11,348,987
FY44	31,077,553	42,101,071	11,023,517
FY45	29,574,405	43,525,220	13,950,815

Year	Scope 3 Emissions (t CO_2e/year)		
	Baseline Scenario	Project Scenario	Project Only Scenario (Difference)
FY46	28,657,423	42,676,553	14,019,131
FY47	24,249,666	35,018,332	10,768,666
FY48	25,283,843	39,724,961	14,441,117
FY49	23,626,304	45,184,651	21,558,348
FY50	21,396,013	44,350,859	22,954,846
FY51	21,370,845	43,077,329	21,706,484
FY52	18,036,746	30,842,432	12,805,686
FY53	16,481,227	38,821,524	22,340,298
FY54	15,971,704	33,645,091	17,673,387
FY55	16,356,002	37,613,508	21,257,506
FY56	34,348,226	36,449,440	2,101,214
FY57	34,087,894	35,986,823	1,898,929
FY58	33,359,865	36,000,687	2,640,822
FY59	33,053,768	35,998,470	2,944,702
FY60	32,751,903	35,319,696	2,567,792
FY61	33,363,258	34,972,824	1,609,566
FY62	32,076,582	34,854,900	2,778,317
FY63	32,023,594	35,039,474	3,015,881
FY64	32,328,274	34,908,240	2,579,966
FY65	33,238,282	30,079,471	(3,158,810)
FY66	32,094,697	35,418,311	3,323,614
FY67	33,303,681	35,031,798	1,728,117
FY68	31,676,124	32,192,635	516,510
FY69	32,227,432	35,260,983	3,033,551
FY70	30,670,811	34,833,577	4,162,766
FY71	32,350,650	32,408,202	57,552
FY72	30,705,005	34,912,531	4,207,526

Year	Scope 3 Emissions (t CO_2e/year)		
	Baseline Scenario	Project Scenario	Project Only Scenario (Difference)
FY73	30,404,107	28,381,212	(2,022,895)
FY74	25,959,784	30,659,050	4,699,266
FY75	18,845,996	30,744,116	11,898,119
FY76	18,818,039	30,232,745	11,414,706
FY77	19,562,449	30,038,772	10,476,323
FY78	18,800,135	29,184,179	10,384,044
FY79	19,130,973	30,694,625	11,563,652
FY80	18,018,844	29,010,256	10,991,412
FY81	19,556,918	26,432,091	6,875,173
FY82	18,479,542	25,249,680	6,770,138
FY83	18,004,753	20,884,063	2,879,310
FY84	18,533,047	20,859,326	2,326,279
FY85	18,585,054	20,618,091	2,033,037
FY86	18,472,304	20,365,598	1,893,294
FY87	18,176,571	20,451,228	2,274,658
FY88	17,817,880	20,754,163	2,936,283
FY89	16,419,672	18,024,453	1,604,781
FY90	10,372,130	13,843,987	3,471,858
FY91	-	14,777,563	14,777,563
FY92	-	12,281,205	12,281,205
FY93	-	3,924,205	3,924,205

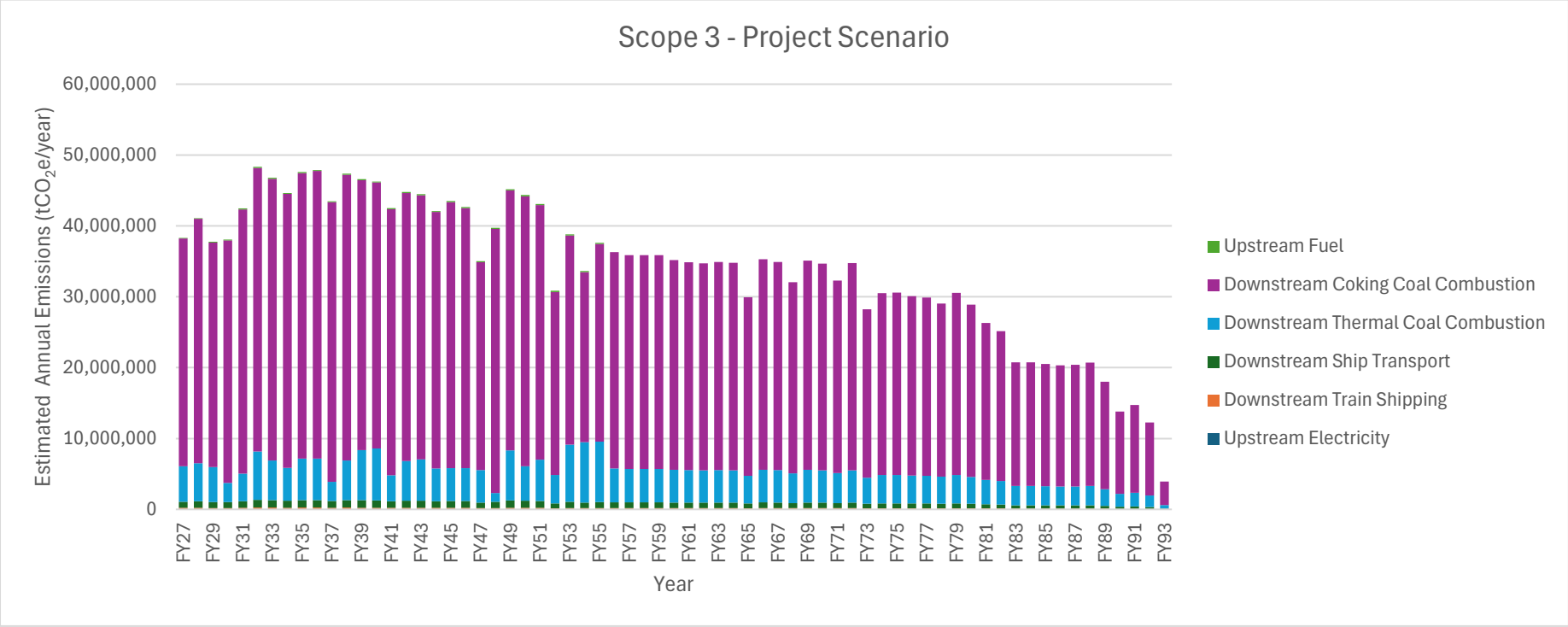


Figure 6: Scope 3 Project Scenario Emissions

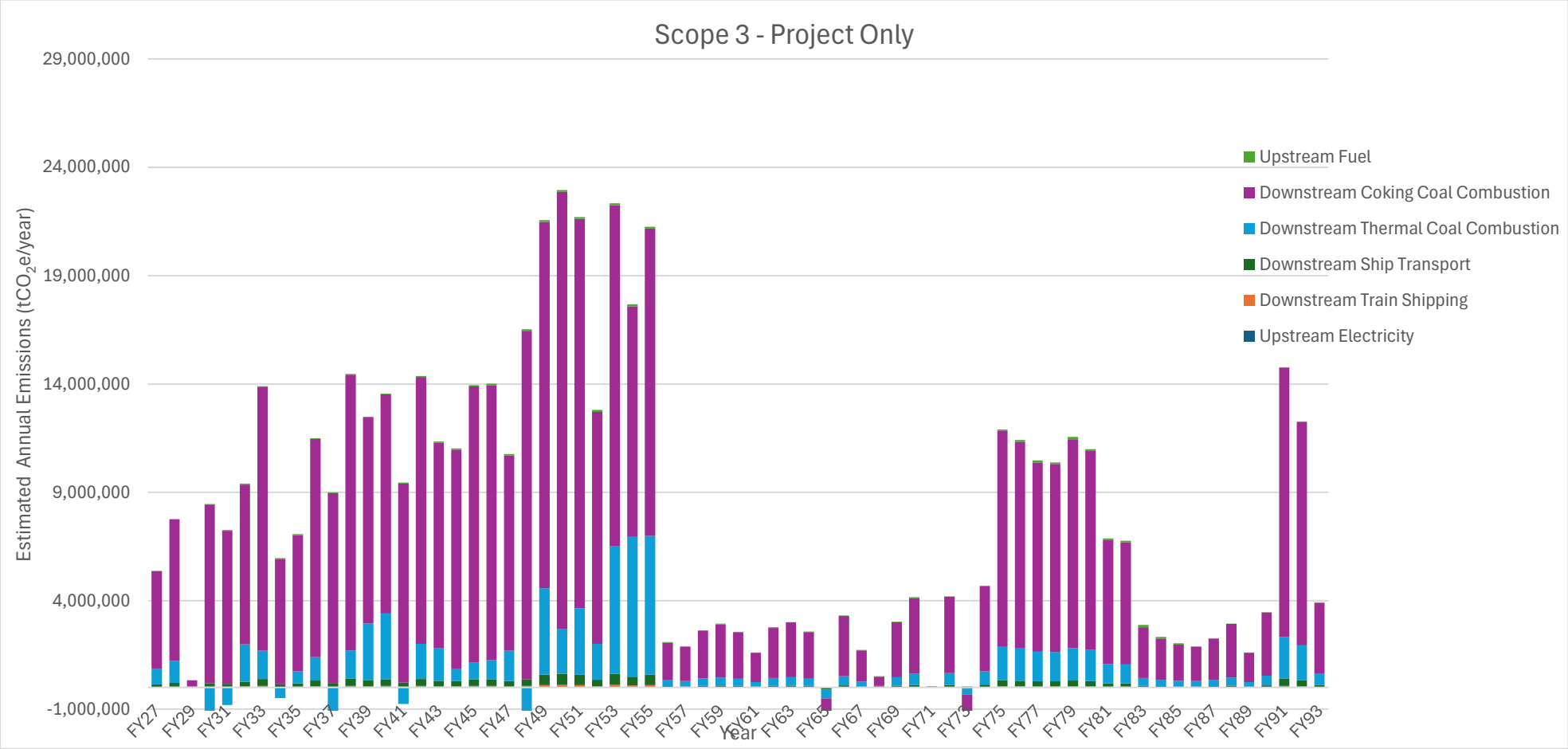


Figure 7: Scope 3 Project Only Scenario Emissions

7 COMPARISON OF ESTIMATED PROJECT EMISSIONS WITH QUEENSLAND AND NATIONAL EMISSION BUDGETS

Since 2015, a total of 196 Parties including Australia, have adopted the Paris Agreement, a global accord designed to tackle climate change and limit future warming. The Agreement's central objective is to keep the rise in global average temperatures well below 2°C above pre-industrial levels, while also pursuing efforts to restrict warming to 1.5°C.

7.1 National and Queensland Reduction Targets

Australia and Queensland have both set ambitious GHG emissions reduction targets compared with their 2005 emission levels. Nationally, Australia aims to cut emissions 43% below 2005 levels by 2030 and further accelerate reductions to 62–70% below 2005 levels by 2035, ultimately reaching net-zero by 2050 (DCCEEW, 2025e).

Queensland, has legislated reductions for the same periods, targeting a 30% reduction by 2030, then increasing to 75% below 2005 levels by 2035, and net-zero by 2050 (Queensland Government, 2024b).

Australia and Queensland's current annual GHG emissions and reduction targets are summarised in **Table 9.**

Table 9: National and State Current Emissions and Reduction Targets for CO_2e

Jurisdiction	Current Emissions [1] (Mt)	2030 Target (Mt)	2035 Target (Mt)	2050 Target (Mt)
Australia Target	-	43% below 2005	62–70% below 2005	Net zero
Queensland Target	-	30% below 2005	75% below 2005	Net zero
Australia	446	349	184	-
Queensland	126	133	48	-

Note: [1] Average Australian GHG emissions for 2023–2025 (DCCEEW, 2025d) and average Queensland GHG emissions for 2022–2023 (Queensland Government, 2023b and Queensland Government, 2024d).

7.2 Project Contribution

Table 10 presents a comparison of the total estimated Scope 1 and Scope 2 emissions for the Project and Project Only Scenarios for 2030 and 2035.

Annual Project Only emissions are estimated to be:

- 0.03 and 0.11% of Australia's target emissions in 2030 and 2035, respectively.
- 0.09 and 0.41% of Queensland's target emissions in 2030 and 2035, respectively.

Table 10: Comparison of Estimated Project and Project Only Emissions with National and Queensland Emissions and Reduction Targets

Emission/Year	2030	2035
Scope 1 and 2 Project Only (Mt of CO_2e)	0.12	0.19
Australia Target (Mt of CO_2e)	349	184
Queensland Target (Mt of CO_2e)	133	48
Project Only % contribution to Australia Target	0.03	0.11
Project Only % contribution to Queensland Target	0.09	0.41

8 CONCLUSION

This report presents the findings of the GHG Calculation Report for the proposed Project, involving the expansion of the existing open-cut metallurgical coal mine located in the Bowen Basin, Queensland.

Scope 1, 2 and 3 emissions were estimated based on data available at the time of writing and the relevant guidelines and standards. Based on calculations and assumptions as outlined in this report, assessment results indicate:

- Estimated annual Scope 1 plus Scope 2 GHG emissions from the (unabated) Project Only Scenario range from negative 49 (i.e. a GHG emission saving of 49 Kt) to 695 kt CO_2e per year.
- Annual Project Only emissions are estimated to be:
    - 0.03 and 0.11% of Australia's target emissions in 2030 and 2035, respectively.
    - 0.09 and 0.41% of Queensland's target emissions in 2030 and 2035, respectively.
- Diesel consumption from stationary power generation and off-road equipment, together with fugitive emissions, represent the largest contributors to the unabated Project Only Scope 1 emissions; accounting for 64% and 32% of total Scope 1 emissions, respectively. Fugitive emissions were estimated based on Method 1.

The Project is unlikely to materially increase the national effort required to reach Australia's 2030, 2035 and 2050 GHG mitigation targets. Further, the Project in isolation is unlikely to limit Australia achieving its national mitigation targets. As part of implementing the Project, the Proponent will seek to mitigate GHG emissions as documented in the Decarbonisation Study Report.

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10 STATEMENT OF LIMITATIONS

This report entitled Blackwater North Extension Project Greenhouse gas Calculation Report, dated 10 April 2026, was prepared by RWDI Australia Pty Ltd ("RWDI") for Whitehaven Blackwater Pty Ltd (Whitehaven Blackwater). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein ("the Project"). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared. Because the contents of this report may not reflect the final design of the Project or subsequent changes made after the date of this report, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Project.

The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

APPENDIX A

Appendix A

Activity Data

Table A.1: Baseline Scenario Activity Data in the Emission Estimates

Baseline Scenario																	
Year	ROM	Product	Total Diesel	Diesel Transport	Diesel Haul Trucks	Diesel Dozers	Diesel Dig Units	Diesel Ancillary Equipment	Diesel Other	Diesel Station (Haul+Dozers+Dig Units+Ancillary +Other)	LPG	Petroleum based oils	Petroleum based greases	SF_6	Explosives	Electricity	Total surface disturbance area
	Mt	Mt	kL	kL	kL	kL	kL	kL	kL	kL	kL	kL	kL	t	kt	GWh	ha
FY27	15.5	11.8	130,890	2,566	78,040	15,116	18,227	10,829	6,111	128,324	3.3	3,341	605	0.121	91	218	0.0
FY28	16.1	11.9	132,411	2,596	79,622	16,947	15,914	11,150	6,182	129,815	3.5	3,483	631	0.121	97	220	0.0
FY29	17.7	13.4	131,727	2,583	79,205	16,628	16,009	11,151	6,150	129,144	3.8	3,809	690	0.121	96	226	0.0
FY30	14.6	11.1	123,940	2,430	74,062	15,761	15,299	10,602	5,786	121,510	3.1	3,148	570	0.121	89	214	0.0
FY31	16.6	12.9	131,565	2,580	76,745	15,974	19,073	11,052	6,142	128,986	3.6	3,580	649	0.121	98	222	0.0
FY32	17.7	13.9	128,774	2,525	75,767	14,828	18,952	10,690	6,012	126,249	3.8	3,823	692	0.121	99	226	0.0
FY33	15.8	11.8	134,511	2,637	79,862	15,384	19,038	11,310	6,280	131,874	3.4	3,409	618	0.121	100	219	0.0
FY34	18.1	14.0	135,658	2,660	80,386	15,564	19,330	11,385	6,333	132,998	3.9	3,906	708	0.121	99	227	0.0
FY35	18.8	14.5	136,839	2,683	81,351	15,728	19,303	11,385	6,388	134,155	4.0	4,051	734	0.121	99	230	0.0
FY36	16.6	13.0	145,913	2,861	90,224	14,533	20,355	11,128	6,812	143,052	3.6	3,581	649	0.121	97	222	0.0
FY37	16.7	13.1	147,533	2,893	89,837	16,347	20,218	11,351	6,888	144,640	3.6	3,606	653	0.121	100	222	0.0
FY38	15.2	11.8	150,397	2,949	93,161	14,913	21,136	11,216	7,021	147,448	3.3	3,279	594	0.121	100	216	0.0
FY39	15.9	12.2	151,030	2,961	92,952	15,347	21,540	11,179	7,051	148,069	3.4	3,430	621	0.121	102	219	0.0
FY40	15.2	11.7	150,666	2,954	92,088	16,271	20,977	11,342	7,034	147,712	3.3	3,270	592	0.121	101	216	0.0
FY41	15.4	12.1	140,328	2,752	85,931	14,740	19,779	10,576	6,551	137,577	3.3	3,321	602	0.121	95	217	0.0
FY42	14.1	10.9	149,317	2,928	91,653	15,688	21,010	11,068	6,971	146,390	3.0	3,035	550	0.121	101	212	0.0
FY43	15.1	11.8	148,626	2,914	90,566	16,232	20,861	11,114	6,939	145,712	3.3	3,269	592	0.121	104	216	0.0
FY44	14.2	11.1	139,856	2,742	85,414	14,982	19,389	10,799	6,529	137,113	3.1	3,066	555	0.121	97	213	0.0
FY45	13.4	10.6	131,019	2,569	79,369	14,808	17,621	10,535	6,117	128,450	2.9	2,890	523	0.121	94	210	0.0
FY46	13.1	10.2	131,585	2,580	79,041	15,201	18,251	10,369	6,143	129,005	2.8	2,829	512	0.121	96	209	0.0
FY47	11.3	8.7	125,812	2,467	76,567	14,083	16,790	10,031	5,874	123,345	2.4	2,438	442	0.121	90	202	0.0
FY48	11.4	9.0	118,922	2,332	72,039	13,680	15,532	9,789	5,552	116,591	2.4	2,453	444	0.121	84	202	0.0
FY49	10.9	8.4	101,802	1,996	61,775	11,986	12,803	8,491	4,753	99,806	2.4	2,359	427	0.121	73	200	0.0

Baseline Scenario																	
Year	ROM	Product	Total Diesel	Diesel Transport	Diesel Haul Trucks	Diesel Dozers	Diesel Dig Units	Diesel Ancillary Equipment	Diesel Other	Diesel Station (Haul+Dozers+Dig Units+Ancillary +Other)	LPG	Petroleum based oils	Petroleum based greases	SF_6	Explosives	Electricity	Total surface disturbance area
	Mt	Mt	kL	kL	kL	kL	kL	kL	kL	kL	kL	kL	kL	t	kt	GWh	ha
FY50	9.6	7.6	112,474	2,205	69,881	11,296	14,704	9,138	5,251	110,269	2.1	2,074	376	0.121	78	196	0.0
FY51	9.7	7.6	101,210	1,985	62,948	10,433	13,104	8,015	4,725	99,225	2.1	2,084	377	0.121	70	196	0.0
FY52	8.0	6.4	103,082	2,021	64,241	10,186	13,603	8,218	4,812	101,061	1.7	1,733	314	0.121	71	190	0.0
FY53	7.4	5.9	98,762	1,937	62,214	9,501	12,779	7,721	4,611	96,826	1.6	1,597	289	0.121	68	187	0.0
FY54	7.2	5.7	99,495	1,951	62,030	9,758	13,176	7,936	4,645	97,544	1.5	1,552	281	0.121	69	186	0.0
FY55	7.3	5.8	98,820	1,938	62,019	9,604	12,731	7,914	4,613	96,882	1.6	1,582	287	0.121	67	187	0.0
FY56	15.0	12.3	150,015	2,941	91,269	16,502	20,314	11,984	7,003	147,073	3.2	3,237	586	0.121	120	216	0.0
FY57	15.0	12.2	153,071	3,001	93,128	16,839	20,728	12,229	7,146	150,070	3.2	3,237	586	0.121	120	216	0.0
FY58	15.0	11.9	147,373	2,890	89,661	16,212	19,956	11,773	6,880	144,483	3.2	3,228	585	0.121	120	216	0.0
FY59	15.0	11.8	143,075	2,805	87,046	15,739	19,374	11,430	6,679	140,269	3.2	3,237	586	0.121	120	216	0.0
FY60	14.6	11.7	158,393	3,106	96,366	17,424	21,449	12,654	7,395	155,288	3.1	3,153	571	0.121	120	214	0.0
FY61	15.0	11.9	155,326	3,046	94,500	17,087	21,034	12,409	7,251	152,281	3.2	3,237	586	0.121	120	216	0.0
FY62	15.0	11.5	146,914	2,881	89,382	16,161	19,894	11,737	6,859	144,034	3.2	3,237	586	0.121	120	216	0.0
FY63	14.4	11.4	171,742	3,367	104,487	18,892	23,256	13,720	8,018	168,374	3.1	3,101	562	0.121	120	213	0.0
FY64	15.0	11.6	148,403	2,910	90,288	16,325	20,096	11,856	6,928	145,493	3.2	3,237	586	0.121	120	216	0.0
FY65	15.0	11.9	173,922	3,410	105,814	19,132	23,552	13,894	8,120	170,511	3.2	3,237	586	0.121	124	216	0.0
FY66	15.0	11.5	156,916	3,077	95,467	17,261	21,249	12,536	7,326	153,839	3.2	3,237	586	0.121	124	216	0.0
FY67	15.0	11.9	180,823	3,546	110,012	19,891	24,486	14,446	8,442	177,277	3.2	3,237	586	0.121	124	216	0.0
FY68	15.0	11.3	166,201	3,259	101,116	18,283	22,506	13,278	7,759	162,942	3.2	3,237	586	0.121	124	216	0.0
FY69	15.0	11.5	177,815	3,487	108,183	19,560	24,079	14,205	8,301	174,329	3.2	3,237	586	0.121	124	216	0.0
FY70	14.2	11.0	172,688	3,386	105,063	18,996	23,385	13,796	8,062	169,302	3.1	3,056	554	0.121	124	213	0.0
FY71	15.0	11.6	168,440	3,303	102,479	18,529	22,809	13,456	7,864	165,137	3.2	3,237	586	0.121	124	216	0.0
FY72	14.3	11.0	176,880	3,468	107,614	19,458	23,952	14,131	8,258	173,412	3.1	3,084	559	0.121	124	213	0.0
FY73	14.2	10.9	148,148	2,905	90,133	16,297	20,061	11,835	6,916	145,243	3.1	3,066	555	0.121	115	213	0.0
FY74	12.1	9.3	162,865	3,193	99,087	17,916	22,054	13,011	7,603	159,671	2.6	2,610	473	0.121	115	205	0.0
FY75	9.0	6.7	156,327	3,065	95,109	17,197	21,169	12,489	7,298	153,262	1.9	1,942	352	0.121	109	193	0.0
FY76	9.0	6.7	90,837	1,781	55,265	9,992	12,301	7,257	4,241	89,056	1.9	1,942	352	0.121	81	193	0.0

Baseline Scenario																	
Year	ROM	Product	Total Diesel	Diesel Transport	Diesel Haul Trucks	Diesel Dozers	Diesel Dig Units	Diesel Ancillary Equipment	Diesel Other	Diesel Station (Haul+Dozers+Dig Units+Ancillary +Other)	LPG	Petroleum based oils	Petroleum based greases	SF_6	Explosives	Electricity	Total surface disturbance area
	Mt	Mt	kL	kL	kL	kL	kL	kL	kL	kL	kL	kL	kL	t	kt	GWh	ha
FY77	9.0	7.0	90,747	1,779	55,210	9,983	12,289	7,250	4,237	88,968	1.9	1,942	352	0.121	72	193	0.0
FY78	9.0	6.7	91,707	1,798	55,794	10,088	12,419	7,326	4,281	89,909	1.9	1,942	352	0.121	66	193	0.0
FY79	9.0	6.8	81,642	1,601	49,671	8,981	11,056	6,522	3,811	80,041	1.9	1,942	352	0.121	66	193	0.0
FY80	9.0	6.4	89,819	1,761	54,646	9,881	12,163	7,176	4,193	88,058	1.9	1,942	352	0.121	66	193	0.0
FY81	9.0	7.0	87,027	1,706	52,947	9,573	11,785	6,952	4,063	85,321	1.9	1,942	352	0.121	66	193	0.0
FY82	9.0	6.6	78,328	1,536	47,655	8,616	10,607	6,258	3,657	76,793	1.9	1,942	352	0.121	55	193	0.0
FY83	9.0	6.4	57,844	1,134	35,192	6,363	7,833	4,621	2,700	56,709	1.9	1,942	352	0.121	53	193	0.0
FY84	9.0	6.6	55,671	1,092	33,870	6,124	7,539	4,447	2,599	54,580	1.9	1,942	352	0.121	49	193	0.0
FY85	9.0	6.6	53,973	1,058	32,837	5,937	7,309	4,312	2,520	52,914	1.9	1,942	352	0.121	46	193	0.0
FY86	9.0	6.6	43,665	856	26,566	4,803	5,913	3,488	2,039	42,809	1.9	1,942	352	0.121	37	193	0.0
FY87	9.0	6.5	34,234	671	20,828	3,766	4,636	2,735	1,598	33,563	1.9	1,942	352	0.121	32	193	0.0
FY88	9.0	6.4	38,068	746	23,161	4,188	5,155	3,041	1,777	37,322	1.9	1,942	352	0.121	32	193	0.0
FY89	8.1	5.9	35,040	687	21,318	3,855	4,745	2,799	1,636	34,353	1.7	1,737	315	0.121	32	190	0.0
FY90	5.5	3.7	31,783	623	19,337	3,496	4,304	2,539	1,484	31,160	1.2	1,181	214	0.121	28	180	0.0
FY91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FY92	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FY93	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table A.2: Project Scenario Activity Data in the Emission Estimates

Project Scenario																	
Year	ROM	Product	Total Diesel	Diesel Transport	Diesel Haul Trucks	Diesel Dozers	Diesel Dig Units	Diesel Ancillary Equipment	Diesel Other	Diesel Station (Haul+Dozers+Dig Units+Ancillary +Other)	LPG	Petroleum based oils	Petroleum based greases	SF_6	Explosives	Electricity	Total surface disturbance area
	Mt	Mt	kL	kL	kL	kL	kL	kL	kL	kL	kL	kL	kL	t	kt	GWh	ha
FY27	15.5	13.7	134,832	2,644	79,624	16,578	18,114	11,578	6,295	132,188	3.3	3,345	606	0.121	89	218	80
FY28	17.1	14.7	135,741	2,662	78,505	18,015	18,365	11,858	6,337	133,080	3.7	3,690	668	0.121	91	224	80
FY29	15.9	13.5	131,562	2,580	76,640	16,767	17,975	11,458	6,142	128,982	3.4	3,431	621	0.121	87	219	80
FY30	14.8	13.5	161,158	3,160	95,210	18,789	23,712	12,763	7,524	157,998	3.2	3,193	578	0.121	104	215	80
FY31	17.5	15.1	176,622	3,463	106,573	19,688	25,312	13,340	8,246	173,159	3.8	3,776	684	0.121	109	225	80
FY32	19.0	17.3	207,567	4,070	127,301	21,208	30,418	14,880	9,690	203,497	4.1	4,100	743	0.121	123	231	80
FY33	19.0	16.8	205,208	4,024	125,729	20,052	30,989	14,833	9,580	201,184	4.1	4,100	743	0.121	121	231	80
FY34	18.4	15.9	199,234	3,907	120,692	20,724	29,985	14,625	9,301	195,328	4.0	3,970	719	0.121	120	228	80
FY35	19.0	17.0	201,263	3,946	124,559	20,866	28,092	14,404	9,396	197,317	4.1	4,100	743	0.121	113	231	80
FY36	19.0	17.1	182,285	3,574	111,177	20,470	24,719	13,835	8,510	178,711	4.1	4,100	743	0.121	106	231	80
FY37	19.0	15.4	208,060	4,080	128,484	20,549	30,399	14,836	9,713	203,980	4.1	4,100	743	0.121	119	231	80
FY38	19.0	17.0	204,942	4,018	124,221	21,381	30,748	15,007	9,568	200,924	4.1	4,100	743	0.121	124	231	80
FY39	19.0	16.7	203,583	3,992	127,745	19,465	28,341	14,535	9,504	199,591	4.1	4,100	743	0.121	115	231	80
FY40	19.0	16.6	194,096	3,806	122,840	19,087	25,225	14,077	9,061	190,290	4.1	4,100	743	0.121	105	231	80
FY41	19.0	15.1	213,179	4,180	133,073	20,402	30,780	14,791	9,952	208,999	4.1	4,100	743	0.121	120	231	80
FY42	19.0	15.9	214,410	4,204	131,926	22,263	30,921	15,087	10,010	210,206	4.1	4,100	743	0.121	126	231	80
FY43	19.0	15.8	212,937	4,175	133,323	20,057	30,691	14,750	9,941	208,762	4.1	4,100	743	0.121	121	231	80
FY44	19.0	15.0	218,202	4,278	137,061	21,176	30,649	14,852	10,187	213,923	4.1	4,100	743	0.121	124	231	80
FY45	17.7	15.5	226,905	4,449	143,518	20,649	32,802	14,894	10,593	222,456	3.8	3,819	692	0.121	128	226	80
FY46	18.8	15.2	230,264	4,515	146,010	20,896	33,074	15,019	10,750	225,749	4.1	4,057	735	0.121	129	230	80
FY47	16.4	12.5	223,416	4,381	141,912	19,485	32,578	14,630	10,430	219,035	3.5	3,539	641	0.121	125	221	80
FY48	16.9	14.0	229,796	4,506	146,644	20,376	32,737	14,805	10,728	225,290	3.6	3,647	661	0.121	128	223	80
FY49	17.2	16.2	223,604	4,384	142,280	19,132	32,649	14,719	10,439	219,219	3.7	3,711	672	0.121	126	224	80
FY50	18.2	15.8	236,948	4,646	151,737	21,663	32,862	14,978	11,062	232,302	3.9	3,927	711	0.121	129	228	80
FY51	18.0	15.3	235,333	4,614	153,996	18,276	32,874	14,585	10,987	230,718	3.9	3,884	704	0.121	121	227	80
FY52	14.6	11.0	235,056	4,609	152,366	20,214	32,378	14,515	10,974	230,447	3.1	3,150	571	0.121	128	214	80

Project Scenario																	
Year	ROM	Product	Total Diesel	Diesel Transport	Diesel Haul Trucks	Diesel Dozers	Diesel Dig Units	Diesel Ancillary Equipment	Diesel Other	Diesel Station (Haul+Dozers+Dig Units+Ancillary +Other)	LPG	Petroleum based oils	Petroleum based greases	SF_6	Explosives	Electricity	Total surface disturbance area
	Mt	Mt	kL	kL	kL	kL	kL	kL	kL	kL	kL	kL	kL	t	kt	GWh	ha
FY53	16.8	14.0	237,236	4,652	155,791	18,369	32,742	14,607	11,075	232,585	3.6	3,625	657	0.121	123	222	80
FY54	14.7	12.2	231,898	4,547	150,726	19,286	32,345	14,168	10,826	227,351	3.2	3,172	575	0.121	124	215	80
FY55	16.0	13.6	225,365	4,419	145,149	18,296	32,518	14,462	10,521	220,946	3.4	3,452	625	0.121	123	219	80
FY56	16.0	13.0	202,391	3,968	125,998	19,953	28,746	14,278	9,449	198,423	3.4	3,452	625	0.121	117	219	0
FY57	16.0	12.9	170,229	3,338	105,976	16,782	24,178	12,009	7,947	166,891	3.4	3,452	625	0.121	117	219	0
FY58	16.0	12.9	175,494	3,441	109,254	17,301	24,925	12,380	8,193	172,053	3.4	3,452	625	0.121	117	219	0
FY59	16.0	12.9	196,650	3,856	122,424	19,386	27,930	13,873	9,181	192,794	3.4	3,452	625	0.121	117	219	0
FY60	16.0	12.6	203,555	3,991	126,723	20,067	28,911	14,360	9,503	199,564	3.4	3,452	625	0.121	117	219	0
FY61	16.0	12.5	174,703	3,426	108,761	17,223	24,813	12,324	8,156	171,278	3.4	3,452	625	0.121	117	219	0
FY62	16.0	12.4	204,870	4,017	127,541	20,197	29,098	14,452	9,564	200,853	3.4	3,452	625	0.121	117	219	0
FY63	16.0	12.5	182,864	3,586	113,842	18,027	25,972	12,900	8,537	179,279	3.4	3,452	625	0.121	117	219	0
FY64	16.0	12.5	191,549	3,756	119,248	18,884	27,206	13,513	8,943	187,793	3.4	3,452	625	0.121	117	219	0
FY65	13.9	10.7	213,889	4,194	133,156	21,086	30,379	15,089	9,985	209,695	3.0	3,008	545	0.121	122	212	0
FY66	16.0	12.7	196,002	3,843	122,021	19,323	27,838	13,827	9,150	192,159	3.4	3,452	625	0.121	122	219	0
FY67	16.0	12.5	206,152	4,042	128,339	20,323	29,280	14,543	9,624	202,109	3.4	3,452	625	0.121	122	219	0
FY68	15.0	11.5	204,286	4,006	127,178	20,139	29,015	14,411	9,537	200,281	3.2	3,231	585	0.121	122	216	0
FY69	16.0	12.6	209,369	4,105	130,342	20,640	29,737	14,770	9,774	205,264	3.4	3,452	625	0.121	122	219	0
FY70	15.8	12.4	232,240	4,554	144,581	22,895	32,985	16,383	10,842	227,686	3.4	3,404	617	0.121	122	219	0
FY71	14.9	11.6	196,424	3,851	122,283	19,364	27,898	13,857	9,170	192,572	3.2	3,219	583	0.121	122	215	0
FY72	16.0	12.5	205,208	4,024	127,752	20,230	29,146	14,476	9,580	201,184	3.4	3,452	625	0.121	122	219	0
FY73	13.4	10.1	224,912	4,410	140,019	22,173	31,944	15,866	10,500	220,502	2.9	2,887	523	0.121	122	210	0
FY74	14.0	10.9	204,338	4,007	127,210	20,144	29,022	14,415	9,540	200,331	3.0	3,021	547	0.121	122	212	0
FY75	14.0	11.0	229,781	4,506	143,050	22,653	32,636	16,210	10,727	225,275	3.0	3,021	547	0.121	122	212	0
FY76	14.0	10.8	209,772	4,113	130,593	20,680	29,794	14,798	9,793	205,659	3.0	3,021	547	0.121	122	212	0
FY77	14.0	10.7	225,132	4,414	140,156	22,194	31,975	15,882	10,510	220,718	3.0	3,021	547	0.121	122	212	0
FY78	14.0	10.4	201,983	3,960	125,744	19,912	28,688	14,249	9,430	198,022	3.0	3,021	547	0.121	122	212	0
FY79	14.0	10.9	237,315	4,653	147,740	23,395	33,706	16,741	11,079	232,662	3.0	3,021	547	0.121	122	212	0

Project Scenario																	
Year	ROM	Product	Total Diesel	Diesel Transport	Diesel Haul Trucks	Diesel Dozers	Diesel Dig Units	Diesel Ancillary Equipment	Diesel Other	Diesel Station (Haul+Dozers+Dig Units+Ancillary +Other)	LPG	Petroleum based oils	Petroleum based greases	SF_6	Explosives	Electricity	Total surface disturbance area
	Mt	Mt	kL	kL	kL	kL	kL	kL	kL	kL	kL	kL	kL	t	kt	GWh	ha
FY80	14.0	10.4	173,146	3,395	107,792	17,069	24,592	12,215	8,083	169,751	3.0	3,021	547	0.121	101	212	0
FY81	12.6	9.4	179,038	3,511	111,460	17,650	25,429	12,630	8,358	175,528	2.7	2,714	492	0.121	97	207	0
FY82	11.8	9.0	177,412	3,479	110,447	17,490	25,198	12,515	8,283	173,933	2.5	2,548	462	0.121	97	204	0
FY83	10.0	7.4	199,278	3,907	124,061	19,646	28,303	14,058	9,303	195,371	2.2	2,158	391	0.121	97	197	0
FY84	10.0	7.4	184,844	3,624	115,074	18,223	26,253	13,040	8,630	181,220	2.2	2,158	391	0.121	95	197	0
FY85	10.0	7.4	140,212	2,749	87,289	13,823	19,914	9,891	6,546	137,463	2.2	2,158	391	0.121	74	197	0
FY86	10.0	7.3	71,575	1,403	44,559	7,056	10,166	5,049	3,341	70,171	2.2	2,158	391	0.121	50	197	0
FY87	10.0	7.3	63,964	1,254	39,820	6,306	9,085	4,512	2,986	62,709	2.2	2,158	391	0.121	47	197	0
FY88	10.0	7.4	52,983	1,039	32,985	5,223	7,525	3,738	2,474	51,944	2.2	2,158	391	0.121	41	197	0
FY89	8.9	6.4	46,782	917	29,124	4,612	6,644	3,300	2,184	45,865	1.9	1,920	348	0.121	32	193	0
FY90	7.1	4.9	52,288	1,025	32,552	5,155	7,427	3,689	2,441	51,263	1.5	1,529	277	0.121	32	186	0
FY91	7.2	5.3	48,619	953	30,268	4,793	6,905	3,430	2,270	47,666	1.6	1,557	282	0.121	32	187	0
FY92	6.2	4.4	50,660	993	31,539	4,994	7,195	3,574	2,365	49,667	1.3	1,336	242	0.121	32	183	0
FY93	2.1	1.4	7,725	151	4,809	762	1,097	545	361	7,574	0.5	463	84	0.121	8	168	0

Table A.3: Project Only Scenario Activity Data in the Emission Estimates

Project Only Scenario																	
Year	ROM	Product	Total Diesel	Diesel Transport	Diesel Haul Trucks	Diesel Dozers	Diesel Dig Units	Diesel Ancillary Equipment	Diesel Other	Diesel Station (Haul+Dozers+Dig Units+Ancillary +Other)	LPG	Petroleum based oils	Petroleum based greases	SF_6	Explosives	Electricity	Total surface disturbance area
	Mt	Mt	kL	kL	kL	kL	kL	kL	kL	kL	kL	kL	kL	t	kt	GWh	ha
FY27	0.0	1.9	3,942	77	1,583	1,462	-113	749	184	3,864	0.0	4	1	0.0	-3	0	80
FY28	1.0	2.8	3,330	65	-1,118	1,068	2,451	708	155	3,265	0.2	207	37	0.0	-6	4	80
FY29	-1.8	0.1	-165	-3	-2,565	138	1,966	307	-8	-162	-0.4	-378	-68	0.0	-8	-7	80
FY30	0.2	2.4	37,218	730	21,148	3,028	8,413	2,161	1,738	36,488	0.0	45	8	0.0	15	1	80
FY31	0.9	2.2	45,057	883	29,828	3,714	6,240	2,289	2,104	44,174	0.2	196	35	0.0	11	3	80
FY32	1.3	3.4	78,793	1,545	51,534	6,381	11,465	4,190	3,678	77,248	0.3	277	50	0.0	24	5	80
FY33	3.2	5.0	70,696	1,386	45,867	4,668	11,951	3,523	3,300	69,310	0.7	691	125	0.0	21	12	80
FY34	0.3	1.9	63,576	1,247	40,307	5,160	10,655	3,240	2,968	62,329	0.1	64	12	0.0	20	1	80
FY35	0.2	2.5	64,424	1,263	43,208	5,138	8,789	3,020	3,008	63,161	0.0	49	9	0.0	15	1	80
FY36	2.4	4.1	36,372	713	20,953	5,937	4,363	2,707	1,698	35,659	0.5	519	94	0.0	9	9	80
FY37	2.3	2.3	60,527	1,187	38,646	4,202	10,182	3,484	2,826	59,340	0.5	494	89	0.0	19	9	80
FY38	3.8	5.2	54,546	1,070	31,060	6,468	9,611	3,791	2,546	53,476	0.8	820	149	0.0	24	14	80
FY39	3.1	4.5	52,553	1,030	34,793	4,118	6,802	3,356	2,453	51,522	0.7	670	121	0.0	14	12	80
FY40	3.8	4.9	43,430	852	30,752	2,815	4,249	2,735	2,028	42,578	0.8	829	150	0.0	4	14	80
FY41	3.6	3.0	72,850	1,428	47,143	5,662	11,001	4,215	3,401	71,422	0.8	778	141	0.0	25	14	80
FY42	4.9	5.0	65,093	1,276	40,273	6,574	9,911	4,019	3,039	63,816	1.1	1,065	193	0.0	25	18	80
FY43	3.9	4.0	64,311	1,261	42,757	3,825	9,830	3,636	3,002	63,050	0.8	831	150	0.0	17	14	80
FY44	4.8	3.9	78,346	1,536	51,646	6,194	11,259	4,053	3,658	76,810	1.0	1,034	187	0.0	27	18	80
FY45	4.3	4.9	95,886	1,880	64,149	5,841	15,181	4,359	4,476	94,006	0.9	929	168	0.0	34	16	80
FY46	5.7	5.0	98,679	1,935	66,969	5,695	14,823	4,651	4,607	96,745	1.2	1,227	222	0.0	33	21	80
FY47	5.1	3.8	97,604	1,914	65,345	5,402	15,787	4,599	4,557	95,690	1.1	1,101	199	0.0	35	19	80
FY48	5.5	5.0	110,873	2,174	74,605	6,696	17,205	5,016	5,176	108,699	1.2	1,194	216	0.0	44	21	80
FY49	6.3	7.8	121,802	2,388	80,505	7,147	19,847	6,228	5,686	119,413	1.4	1,353	245	0.0	52	23	80
FY50	8.6	8.2	124,474	2,441	81,857	10,368	18,158	5,840	5,811	122,033	1.9	1,853	336	0.0	51	32	80
FY51	8.3	7.7	134,123	2,630	91,048	7,844	19,770	6,570	6,262	131,493	1.8	1,800	326	0.0	51	31	80
FY52	6.6	4.6	131,974	2,588	88,125	10,028	18,776	6,296	6,161	129,387	1.4	1,417	257	0.0	57	25	80

Project Only Scenario																	
Year	ROM	Product	Total Diesel	Diesel Transport	Diesel Haul Trucks	Diesel Dozers	Diesel Dig Units	Diesel Ancillary Equipment	Diesel Other	Diesel Station (Haul+Dozers+Dig Units+Ancillary +Other)	LPG	Petroleum based oils	Petroleum based greases	SF_6	Explosives	Electricity	Total surface disturbance area
	Mt	Mt	kL	kL	kL	kL	kL	kL	kL	kL	kL	kL	kL	t	kt	GWh	ha
FY53	9.4	8.1	138,474	2,715	93,577	8,868	19,963	6,886	6,465	135,759	2.0	2,028	367	0.0	55	35	80
FY54	7.5	6.5	132,403	2,596	88,696	9,528	19,169	6,232	6,181	129,807	1.6	1,620	293	0.0	56	28	80
FY55	8.7	7.8	126,545	2,481	83,129	8,692	19,788	6,548	5,908	124,064	1.9	1,870	339	0.0	55	32	80
FY56	1.0	0.7	52,377	1,027	34,730	3,450	8,431	2,293	2,445	51,350	0.2	216	39	0.0	-2	4	0
FY57	1.0	0.7	17,158	336	12,848	-57	3,449	-220	801	16,822	0.2	216	39	0.0	-2	4	0
FY58	1.0	0.9	28,122	551	19,592	1,089	4,969	607	1,313	27,570	0.2	224	41	0.0	-2	4	0
FY59	1.0	1.0	53,575	1,050	35,377	3,648	8,556	2,443	2,501	52,524	0.2	216	39	0.0	-2	4	0
FY60	1.4	0.9	45,162	886	30,357	2,643	7,462	1,706	2,108	44,276	0.3	300	54	0.0	-2	5	0
FY61	1.0	0.6	19,377	380	14,261	136	3,780	-84	905	18,997	0.2	216	39	0.0	-2	4	0
FY62	1.0	1.0	57,956	1,136	38,159	4,036	9,203	2,716	2,706	56,819	0.2	216	39	0.0	-2	4	0
FY63	1.6	1.1	11,123	218	9,355	-865	2,716	-820	519	10,905	0.4	351	64	0.0	-2	6	0
FY64	1.0	0.9	43,145	846	28,960	2,559	7,110	1,657	2,014	42,299	0.2	216	39	0.0	-2	4	0
FY65	-1.1	-1.1	39,967	784	27,342	1,954	6,827	1,194	1,866	39,183	-0.2	-229	-41	0.0	-2	-4	0
FY66	1.0	1.2	39,087	766	26,554	2,061	6,589	1,291	1,825	38,320	0.2	216	39	0.0	-2	4	0
FY67	1.0	0.6	25,329	497	18,327	432	4,793	97	1,182	24,832	0.2	216	39	0.0	-2	4	0
FY68	0.0	0.2	38,085	747	26,062	1,856	6,509	1,134	1,778	37,339	0.0	-5	-1	0.0	-2	0	0
FY69	1.0	1.1	31,554	619	22,160	1,080	5,658	564	1,473	30,935	0.2	216	39	0.0	-2	4	0
FY70	1.6	1.5	59,552	1,168	39,518	3,899	9,600	2,588	2,780	58,385	0.3	348	63	0.0	-2	6	0
FY71	-0.1	0.0	27,984	549	19,804	835	5,089	400	1,306	27,435	0.0	-18	-3	0.0	-2	0	0
FY72	1.7	1.5	28,328	555	20,138	773	5,193	346	1,322	27,772	0.4	369	67	0.0	-2	6	0
FY73	-0.8	-0.7	76,765	1,505	49,886	5,876	11,883	4,031	3,584	75,259	-0.2	-180	-33	0.0	7	-3	0
FY74	1.9	1.7	41,473	813	28,124	2,229	6,968	1,404	1,936	40,660	0.4	411	74	0.0	7	7	0
FY75	5.0	4.2	73,454	1,440	47,941	5,456	11,467	3,721	3,429	72,014	1.1	1,079	195	0.0	13	19	0
FY76	5.0	4.1	118,935	2,332	75,328	10,688	17,493	7,541	5,553	116,603	1.1	1,079	195	0.0	41	19	0
FY77	5.0	3.7	134,385	2,635	84,945	12,212	19,687	8,632	6,274	131,750	1.1	1,079	195	0.0	50	19	0
FY78	5.0	3.7	110,276	2,162	69,950	9,824	16,269	6,922	5,148	108,114	1.1	1,079	195	0.0	56	19	0
FY79	5.0	4.1	155,673	3,052	98,069	14,414	22,650	10,219	7,268	152,621	1.1	1,079	195	0.0	56	19	0

Project Only Scenario																	
Year	ROM	Product	Total Diesel	Diesel Transport	Diesel Haul Trucks	Diesel Dozers	Diesel Dig Units	Diesel Ancillary Equipment	Diesel Other	Diesel Station (Haul+Dozers+Dig Units+Ancillary +Other)	LPG	Petroleum based oils	Petroleum based greases	SF_6	Explosives	Electricity	Total surface disturbance area
	Mt	Mt	kL	kL	kL	kL	kL	kL	kL	kL	kL	kL	kL	t	kt	GWh	ha
FY80	5.0	3.9	83,327	1,634	53,146	7,189	12,429	5,039	3,890	81,693	1.1	1,079	195	0.0	35	19	0
FY81	3.6	2.4	92,011	1,804	58,513	8,077	13,644	5,678	4,296	90,207	0.8	772	140	0.0	31	13	0
FY82	2.8	2.4	99,083	1,943	62,793	8,873	14,591	6,258	4,626	97,141	0.6	606	110	0.0	41	11	0
FY83	1.0	1.0	141,435	2,773	88,869	13,283	20,471	9,437	6,603	138,662	0.2	216	39	0.0	44	4	0
FY84	1.0	0.8	129,173	2,533	81,204	12,099	18,715	8,592	6,030	126,640	0.2	216	39	0.0	46	4	0
FY85	1.0	0.7	86,240	1,691	54,452	7,885	12,606	5,579	4,026	84,549	0.2	216	39	0.0	27	4	0
FY86	1.0	0.7	27,909	547	17,993	2,253	4,253	1,561	1,303	27,362	0.2	216	39	0.0	13	4	0
FY87	1.0	0.8	29,729	583	18,992	2,540	4,449	1,777	1,388	29,146	0.2	216	39	0.0	15	4	0
FY88	1.0	1.0	14,915	292	9,824	1,036	2,370	696	696	14,623	0.2	216	39	0.0	9	4	0
FY89	0.8	0.6	11,742	230	7,806	757	1,900	501	548	11,512	0.2	182	33	0.0	-1	3	0
FY90	1.6	1.2	20,505	402	13,215	1,658	3,123	1,150	957	20,103	0.3	348	63	0.0	4	6	0
FY91	7.2	5.3	48,619	953	30,268	4,793	6,905	3,430	2,270	47,666	1.6	1,557	282	0.121	32	187	0
FY92	6.2	4.4	50,660	993	31,539	4,994	7,195	3,574	2,365	49,667	1.3	1,336	242	0.121	32	183	0
FY93	2.1	1.4	7,725	151	4,809	762	1,097	545	361	7,574	0.5	463	84	0.121	8	168	0

Table A.4: Production Schedule by Coal Type for Emission Scenarios

Year	Product Coal (Mtpa)								
	Baseline Scenario			Project Scenario			Project Only Scenario		
	Thermal	Coking	Total	Thermal	Coking	Total	Thermal	Coking	Total
FY27	1.8	10.0	11.8	2.1	11.6	13.7	0.3	1.6	1.9
FY28	1.8	10.1	11.9	2.2	12.5	14.7	0.4	2.4	2.8
FY29	2.0	11.4	13.4	2.0	11.5	13.5	0.0	0.1	0.1
FY30	1.7	9.4	11.1	1.1	12.4	13.5	-0.6	3.0	2.4
FY31	1.9	10.9	12.9	1.6	13.5	15.1	-0.3	2.6	2.2
FY32	2.1	11.8	13.9	2.8	14.5	17.3	0.7	2.7	3.4
FY33	1.8	10.0	11.8	2.3	14.4	16.8	0.5	4.4	5.0
FY34	2.1	11.9	14.0	1.9	14.0	15.9	-0.2	2.1	1.9
FY35	2.2	12.3	14.5	2.4	14.6	17.0	0.2	2.3	2.5
FY36	2.0	11.1	13.0	2.4	14.7	17.1	0.4	3.6	4.1
FY37	2.0	11.1	13.1	1.1	14.3	15.4	-0.9	3.2	2.3
FY38	1.8	10.0	11.8	2.3	14.6	17.0	0.5	4.6	5.2
FY39	1.8	10.4	12.2	2.9	13.8	16.7	1.1	3.4	4.5
FY40	1.8	9.9	11.7	3.0	13.6	16.6	1.2	3.7	4.9
FY41	1.8	10.3	12.1	1.5	13.6	15.1	-0.3	3.3	3.0
FY42	1.6	9.2	10.9	2.3	13.7	15.9	0.7	4.5	5.0
FY43	1.8	10.1	11.8	2.4	13.5	15.8	0.6	3.4	4.0
FY44	1.7	9.4	11.1	1.9	13.1	15.0	0.2	3.7	3.9
FY45	1.6	9.0	10.6	1.9	13.6	15.5	0.3	4.6	4.9
FY46	1.5	8.7	10.2	1.9	13.3	15.2	0.4	4.6	5.0
FY47	1.3	7.4	8.7	1.9	10.6	12.5	0.6	3.3	3.8
FY48	1.4	7.7	9.0	0.5	13.5	14.0	-0.9	5.8	5.0
FY49	1.3	7.2	8.4	2.9	13.3	16.2	1.6	6.1	7.8
FY50	1.1	6.5	7.6	2.0	13.8	15.8	0.9	7.3	8.2
FY51	1.1	6.5	7.6	2.4	13.0	15.3	1.3	6.5	7.7
FY52	1.0	5.5	6.4	1.7	9.4	11.0	0.7	3.9	4.6
FY53	0.9	5.0	5.9	3.3	10.7	14.0	2.4	5.7	8.1
FY54	0.9	4.8	5.7	3.5	8.7	12.2	2.6	3.9	6.5
FY55	0.9	5.0	5.8	3.5	10.1	13.6	2.6	5.1	7.8

Year	Product Coal (Mtpa)								
	Baseline Scenario			Project Scenario			Project Only Scenario		
	Thermal	Coking	Total	Thermal	Coking	Total	Thermal	Coking	Total
FY56	1.8	10.4	12.3	2.0	11.1	13.0	0.1	0.6	0.7
FY57	1.8	10.4	12.2	1.9	10.9	12.9	0.1	0.6	0.7
FY58	1.8	10.1	11.9	1.9	10.9	12.9	0.1	0.8	0.9
FY59	1.8	10.0	11.8	1.9	10.9	12.9	0.2	0.9	1.0
FY60	1.8	9.9	11.7	1.9	10.7	12.6	0.1	0.8	0.9
FY61	1.8	10.1	11.9	1.9	10.6	12.5	0.1	0.5	0.6
FY62	1.7	9.7	11.5	1.9	10.6	12.4	0.1	0.8	1.0
FY63	1.7	9.7	11.4	1.9	10.6	12.5	0.2	0.9	1.1
FY64	1.7	9.8	11.6	1.9	10.6	12.5	0.1	0.8	0.9
FY65	1.8	10.1	11.9	1.6	9.1	10.7	-0.2	-1.0	-1.1
FY66	1.7	9.7	11.5	1.9	10.8	12.7	0.2	1.0	1.2
FY67	1.8	10.1	11.9	1.9	10.6	12.5	0.1	0.5	0.6
FY68	1.7	9.6	11.3	1.7	9.8	11.5	0.0	0.1	0.2
FY69	1.7	9.8	11.5	1.9	10.7	12.6	0.2	0.9	1.1
FY70	1.6	9.3	11.0	1.9	10.6	12.4	0.2	1.3	1.5
FY71	1.7	9.8	11.6	1.7	9.8	11.6	0.0	0.0	0.0
FY72	1.6	9.3	11.0	1.9	10.6	12.5	0.2	1.3	1.5
FY73	1.6	9.2	10.9	1.5	8.6	10.1	-0.1	-0.6	-0.7
FY74	1.4	7.9	9.3	1.6	9.3	10.9	0.3	1.4	1.7
FY75	1.0	5.7	6.7	1.6	9.3	11.0	0.6	3.6	4.2
FY76	1.0	5.7	6.7	1.6	9.2	10.8	0.6	3.5	4.1
FY77	1.0	5.9	7.0	1.6	9.1	10.7	0.6	3.2	3.7
FY78	1.0	5.7	6.7	1.6	8.9	10.4	0.6	3.1	3.7
FY79	1.0	5.8	6.8	1.6	9.3	10.9	0.6	3.5	4.1
FY80	1.0	5.5	6.4	1.6	8.8	10.4	0.6	3.3	3.9
FY81	1.0	5.9	7.0	1.4	8.0	9.4	0.4	2.1	2.4
FY82	1.0	5.6	6.6	1.4	7.7	9.0	0.4	2.0	2.4
FY83	1.0	5.5	6.4	1.1	6.3	7.4	0.1	0.8	1.0
FY84	1.0	5.6	6.6	1.1	6.3	7.4	0.1	0.7	0.8
FY85	1.0	5.7	6.6	1.1	6.3	7.4	0.1	0.6	0.7

Year	Product Coal (Mtpa)								
	Baseline Scenario			Project Scenario			Project Only Scenario		
	Thermal	Coking	Total	Thermal	Coking	Total	Thermal	Coking	Total
FY86	1.0	5.6	6.6	1.1	6.2	7.3	0.1	0.6	0.7
FY87	1.0	5.5	6.5	1.1	6.2	7.3	0.1	0.7	0.8
FY88	1.0	5.4	6.4	1.1	6.3	7.4	0.2	0.9	1.0
FY89	0.9	5.0	5.9	1.0	5.5	6.4	0.1	0.5	0.6
FY90	0.6	3.2	3.7	0.7	4.2	4.9	0.2	1.1	1.2
FY91	0.0	0.0	0.0	0.8	4.5	5.3	0.8	4.5	5.3
FY92	0.0	0.0	0.0	0.7	3.7	4.4	0.7	3.7	4.4
FY93	0.0	0.0	0.0	0.2	1.2	1.4	0.2	1.2	1.4

APPENDIX B

Appendix B

Detailed Emission Estimates

Table B.1: Baseline Scenario Detailed Emission Estimates

Year	Scope 1										Scope 2	Scope 3						Direct & Indirect	All scopes
	Vegetation Clearing	Diesel - Stationary	Diesel - Vehicle Transport	LPG - Stationary	Petroleum Greases	Petroleum Oils	Explosives	SF_6	Fugitive	Total Scope 1	Electricity	Electricity	Train	Shipping	Coal combustion	Upstream/ Downstream Fuel	Total Scope 3	Total Scope 1+2	Total Scope 1+2+3
FY27	0	347,721	6,984	5	82	1,802	16,222	25	479,936	852,778	106,585	15,226	163,592	737,430	31,932,308	90,163	32,938,720	959,363	33,898,083
FY28	0	351,762	7,065	5	86	1,878	17,284	25	500,363	878,469	90,195	13,199	165,610	746,527	32,326,217	91,296	33,342,849	968,664	34,311,513
FY29	0	349,944	7,029	6	94	2,054	17,011	25	547,183	923,345	72,206	9,026	185,924	838,097	36,291,372	91,108	37,415,526	995,551	38,411,077
FY30	0	329,258	6,613	5	77	1,698	15,825	25	452,320	805,822	40,695	4,284	153,841	693,477	30,029,045	85,364	30,966,010	846,517	31,812,528
FY31	0	349,515	7,020	6	88	1,931	17,425	25	514,372	890,381	42,119	6,650	178,896	806,420	34,919,688	90,812	36,002,466	932,501	36,934,967
FY32	0	342,100	6,871	6	94	2,062	17,551	25	549,244	917,953	38,402	6,777	193,447	872,012	37,759,967	89,148	38,921,351	956,354	39,877,706
FY33	0	357,342	7,177	5	84	1,839	17,694	25	489,791	873,958	41,555	6,561	163,403	736,580	31,895,473	92,638	32,894,655	915,513	33,810,168
FY34	0	360,389	7,239	6	96	2,107	17,662	25	561,189	948,712	47,741	6,820	194,599	877,202	37,984,714	93,814	39,157,149	996,453	40,153,601
FY35	0	363,524	7,302	6	100	2,185	17,546	25	581,979	972,666	57,462	9,194	201,443	908,055	39,320,694	94,722	40,534,107	1,030,128	41,564,235
FY36	0	387,631	7,786	6	88	1,931	17,204	25	514,438	929,109	57,639	6,651	180,724	814,661	35,276,545	100,394	36,378,975	986,748	37,365,722
FY37	0	391,935	7,872	6	89	1,945	17,759	25	518,084	937,714	53,311	8,885	181,743	819,252	35,475,347	101,496	36,586,723	991,025	37,577,748
FY38	0	399,542	8,025	5	81	1,769	17,736	25	471,157	898,339	49,786	6,494	163,351	736,345	31,885,289	103,139	32,894,617	948,125	33,842,742
FY39	0	401,225	8,059	5	84	1,850	18,049	25	492,718	922,015	50,385	6,572	169,347	763,376	33,055,795	103,686	34,098,776	972,400	35,071,176
FY40	0	400,257	8,039	5	80	1,764	17,974	25	469,836	897,980	49,749	6,489	162,446	732,264	31,708,597	103,311	32,713,107	947,730	33,660,837
FY41	0	372,794	7,488	5	82	1,791	16,962	25	477,156	876,304	49,952	6,516	167,990	757,255	32,790,750	96,450	33,818,960	926,256	34,745,216
FY42	0	396,675	7,967	5	75	1,637	17,984	25	435,985	860,352	48,808	6,366	151,082	681,039	29,490,446	102,216	30,431,149	909,161	31,340,310
FY43	0	394,838	7,931	5	80	1,763	18,530	25	469,647	892,820	49,744	6,488	164,541	741,712	32,117,703	101,948	33,132,393	942,564	34,074,957
FY44	0	371,539	7,463	5	75	1,653	17,207	25	440,467	838,434	48,933	6,383	154,334	695,698	30,125,215	95,923	31,077,553	887,367	31,964,920
FY45	0	348,063	6,991	4	71	1,558	16,693	25	415,161	788,567	48,230	6,291	146,875	662,076	28,669,286	89,877	29,574,405	836,796	30,411,201
FY46	0	349,566	7,021	4	70	1,526	17,005	25	406,476	781,693	47,989	6,259	142,305	641,474	27,777,180	90,205	28,657,423	829,682	29,487,105
FY47	0	334,230	6,713	4	60	1,315	15,948	25	350,199	708,493	46,425	6,055	120,365	542,575	23,494,645	86,027	24,249,666	754,918	25,004,584
FY48	0	315,928	6,346	4	60	1,323	14,918	25	352,369	690,972	46,485	6,063	125,540	565,905	24,504,896	81,439	25,283,843	737,458	26,021,301
FY49	0	270,447	5,432	4	58	1,272	13,008	25	338,876	629,122	46,110	6,014	117,339	528,937	22,904,085	69,929	23,626,304	675,232	24,301,536
FY50	0	298,798	6,001	3	51	1,119	13,876	25	298,021	617,894	44,975	5,866	106,193	478,693	20,728,439	76,820	21,396,013	662,869	22,058,882
FY51	0	268,873	5,400	3	51	1,124	12,462	25	299,383	587,322	45,013	5,871	106,105	478,297	20,711,266	69,306	21,370,845	632,334	22,003,179

Year	Scope 1										Scope 2	Scope 3						Direct & Indirect	All scopes
	Vegetation Clearing	Diesel - Stationary	Diesel - Vehicle Transport	LPG - Stationary	Petroleum Greases	Petroleum Oils	Explosives	SF_6	Fugitive	Total Scope 1	Electricity	Electricity	Train	Shipping	Coal combustion	Upstream/ Downstream Fuel	Total Scope 3	Total Scope 1+2	Total Scope 1+2+3
FY52	0	273,846	5,500	3	43	935	12,665	25	249,016	542,033	43,613	5,689	89,489	403,396	17,467,905	70,267	18,036,746	585,646	18,622,392
FY53	0	262,371	5,270	2	39	861	12,077	25	229,421	510,068	43,069	5,618	81,754	368,528	15,958,057	67,270	16,481,227	553,136	17,034,363
FY54	0	264,318	5,309	2	38	837	12,228	25	222,952	505,710	42,889	5,594	79,214	357,075	15,462,100	67,722	15,971,704	548,599	16,520,303
FY55	0	262,523	5,273	2	39	853	11,999	25	227,342	508,057	43,011	5,610	81,130	365,715	15,836,250	67,296	16,356,002	551,068	16,907,070
FY56	0	398,527	8,005	5	80	1,746	21,286	25	465,000	894,673	49,615	6,471	170,595	768,999	33,299,312	102,848	34,348,226	944,287	35,292,513
FY57	0	406,648	8,168	5	80	1,746	21,286	25	465,000	902,957	49,615	6,471	169,288	763,107	33,044,139	104,890	34,087,894	952,571	35,040,465
FY58	0	391,508	7,864	5	79	1,741	21,286	25	463,808	886,317	49,582	6,467	165,679	746,841	32,339,800	101,077	33,359,865	935,898	34,295,763
FY59	0	380,090	7,634	5	80	1,746	21,286	25	465,000	875,866	49,615	6,471	164,168	740,030	32,044,884	98,214	33,053,768	925,481	33,979,248
FY60	0	420,786	8,452	5	78	1,700	21,286	25	452,958	905,289	49,280	6,428	162,614	733,023	31,741,464	108,374	32,751,903	954,569	33,706,473
FY61	0	412,638	8,288	5	80	1,746	21,286	25	465,000	909,067	49,615	6,471	165,670	746,798	32,337,924	106,395	33,363,258	958,682	34,321,940
FY62	0	390,291	7,839	5	80	1,746	21,286	25	465,000	886,271	49,615	6,471	159,287	718,025	31,092,021	100,778	32,076,582	935,886	33,012,469
FY63	0	456,247	9,164	5	76	1,672	21,286	25	445,510	933,986	49,073	6,401	158,941	716,467	31,024,539	117,245	32,023,594	983,059	33,006,653
FY64	0	394,246	7,919	5	80	1,746	21,286	25	465,000	890,307	49,615	6,471	160,536	723,656	31,335,838	101,772	32,328,274	939,921	33,268,195
FY65	0	462,038	9,280	5	80	1,746	22,074	25	465,000	960,248	49,615	6,471	164,985	743,712	32,204,300	118,813	33,238,282	1,009,863	34,248,144
FY66	0	416,860	8,373	5	80	1,746	22,074	25	465,000	914,163	49,615	6,471	159,344	718,282	31,103,143	107,457	32,094,697	963,778	33,058,474
FY67	0	480,372	9,649	5	80	1,746	22,074	25	465,000	978,951	49,615	6,471	165,288	745,077	32,263,423	123,422	33,303,681	1,028,565	34,332,246
FY68	0	441,527	8,868	5	80	1,746	22,074	25	465,000	939,325	49,615	6,471	157,227	708,742	30,690,027	113,657	31,676,124	988,940	32,665,065
FY69	0	472,382	9,488	5	80	1,746	22,074	25	465,000	970,800	49,615	6,471	159,936	720,950	31,218,662	121,413	32,227,432	1,020,414	33,247,847
FY70	0	458,761	9,214	5	75	1,648	22,074	25	439,044	930,847	48,893	6,377	152,198	686,071	29,708,325	117,840	30,670,811	979,740	31,650,551
FY71	0	447,476	8,988	5	80	1,746	22,074	25	465,000	945,393	49,615	6,471	160,581	723,858	31,344,588	115,152	32,350,650	995,008	33,345,659
FY72	0	469,898	9,438	5	76	1,663	22,074	25	443,013	946,192	49,004	6,392	152,354	686,775	29,738,821	120,662	30,705,005	995,196	31,700,200
FY73	0	393,568	7,905	5	75	1,654	20,448	25	440,544	864,225	48,935	6,383	150,951	680,448	29,464,864	101,461	30,404,107	913,160	31,317,267
FY74	0	432,664	8,690	4	64	1,408	20,383	25	374,976	838,215	47,113	6,145	128,761	580,423	25,133,543	110,912	25,959,784	885,328	26,845,112
FY75	0	415,296	8,341	3	48	1,047	19,296	25	279,000	723,057	44,446	5,797	93,343	420,767	18,220,095	105,995	18,845,996	767,503	19,613,500
FY76	0	241,316	4,847	3	48	1,047	14,315	25	279,000	540,601	44,446	5,797	93,422	421,121	18,235,437	62,262	18,818,039	585,048	19,403,087
FY77	0	241,077	4,842	3	48	1,047	12,739	25	279,000	538,782	44,446	5,797	97,131	437,842	18,959,477	62,202	19,562,449	583,228	20,145,677
FY78	0	243,628	4,893	3	48	1,047	11,730	25	279,000	540,374	44,446	5,797	93,329	420,706	18,217,459	62,843	18,800,135	584,821	19,384,955
FY79	0	216,889	4,356	3	48	1,047	11,670	25	279,000	513,039	44,446	5,797	95,011	428,287	18,545,755	56,122	19,130,973	557,486	19,688,459
FY80	0	238,613	4,793	3	48	1,047	11,702	25	279,000	535,231	44,446	5,797	89,443	403,187	17,458,835	61,582	18,018,844	579,677	18,598,521

Year	Scope 1										Scope 2	Scope 3						Direct & Indirect	All scopes
	Vegetation Clearing	Diesel - Stationary	Diesel - Vehicle Transport	LPG - Stationary	Petroleum Greases	Petroleum Oils	Explosives	SF_6	Fugitive	Total Scope 1	Electricity	Electricity	Train	Shipping	Coal combustion	Upstream/ Downstream Fuel	Total Scope 3	Total Scope 1+2	Total Scope 1+2+3
FY81	0	231,196	4,644	3	48	1,047	11,670	25	279,000	527,633	44,446	5,797	97,116	437,773	18,956,514	59,718	19,556,918	572,079	20,128,997
FY82	0	208,086	4,180	3	48	1,047	9,867	25	279,000	502,256	44,446	5,797	91,777	413,706	17,914,353	53,909	18,479,542	546,703	19,026,245
FY83	0	153,667	3,086	3	48	1,047	9,444	25	279,000	446,321	44,446	5,797	89,479	403,350	17,465,897	40,230	18,004,753	490,767	18,495,521
FY84	0	147,895	2,971	3	48	1,047	8,738	25	279,000	439,728	44,446	5,797	92,119	415,248	17,981,105	38,779	18,533,047	484,174	19,017,222
FY85	0	143,383	2,880	3	48	1,047	8,245	25	279,000	434,632	44,446	5,797	92,383	416,441	18,032,787	37,645	18,585,054	479,078	19,064,132
FY86	0	116,001	2,330	3	48	1,047	6,637	25	279,000	405,091	44,446	5,797	91,856	414,063	17,929,825	30,762	18,472,304	449,538	18,921,841
FY87	0	90,947	1,827	3	48	1,047	5,758	25	279,000	378,655	44,446	5,797	90,414	407,563	17,648,333	24,464	18,176,571	423,102	18,599,673
FY88	0	101,132	2,031	3	48	1,047	5,775	25	279,000	389,061	44,446	5,797	88,614	399,449	17,296,996	27,024	17,817,880	433,508	18,251,388
FY89	0	93,086	1,870	3	43	937	5,774	25	249,601	351,339	43,630	5,691	81,659	368,097	15,939,392	24,833	16,419,672	394,969	16,814,640
FY90	0	84,435	1,696	2	29	637	4,924	25	169,664	261,412	41,408	5,401	51,541	232,336	10,060,652	22,199	10,372,130	302,821	10,674,950
FY91	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FY92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FY93	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table B.2: Project Scenario Detailed Emission Estimates

Year	Scope 1										Scope 2	Scope 3						Direct & Indirect	All scopes
	Vegetation Clearing	Diesel - Stationary	Diesel - Vehicle Transport	LPG - Stationary Equipment	Petroleum Greases	Petroleum Oils	Explosives	SF_6	Fugitive	Total Scope 1	Electricity	Electricity	Train	Shipping	Coal combustion	Upstream\ Downstream Fuel	Total Scope 3	Total Scope 1+2	Total Scope 1+2+3
FY27	9,028	358,193	7,194	5	82	1,804	15,772	25	480,500	872,604	106,618	15,231	190,362	858,102	37,157,647	92,799	38,314,140	979,223	39,293,363
FY28	9,028	360,608	7,243	6	91	1,990	16,242	25	530,100	925,334	91,668	13,415	204,257	920,737	39,869,884	93,691	41,101,983	1,017,002	42,118,985
FY29	9,028	349,505	7,020	5	84	1,850	15,535	25	492,900	875,953	70,108	8,763	187,583	845,575	36,615,200	90,686	37,747,807	946,061	38,693,867
FY30	9,028	428,131	8,599	5	79	1,722	18,444	25	458,800	924,834	40,844	4,299	187,583	845,575	36,915,288	110,254	38,062,999	965,678	39,028,677
FY31	9,028	469,213	9,424	6	93	2,037	19,322	25	542,500	1,051,648	42,765	6,752	209,815	945,791	41,170,518	121,062	42,453,938	1,094,412	43,548,350
FY32	9,028	551,420	11,076	6	101	2,211	21,861	25	589,000	1,184,729	39,218	6,921	240,384	1,083,589	46,855,194	141,993	48,328,080	1,223,947	49,552,027
FY33	9,028	545,153	10,950	6	101	2,211	21,474	25	589,000	1,177,948	43,832	6,921	233,436	1,052,271	45,360,864	140,418	46,793,910	1,221,781	48,015,690
FY34	9,028	529,283	10,631	6	98	2,141	21,273	25	570,400	1,142,886	47,974	6,853	220,931	995,899	43,281,912	136,322	44,641,917	1,190,861	45,832,778
FY35	9,028	534,672	10,739	6	101	2,211	20,165	25	589,000	1,165,948	57,674	9,228	236,215	1,064,798	46,156,692	137,783	47,604,716	1,223,622	48,828,339
FY36	9,028	484,256	9,727	6	101	2,211	18,872	25	589,000	1,113,226	59,981	6,921	237,605	1,071,062	46,432,782	125,110	47,873,479	1,173,207	49,046,687
FY37	9,028	552,730	11,102	6	101	2,211	21,216	25	589,000	1,185,420	55,367	9,228	213,983	964,582	42,160,998	142,322	43,491,113	1,240,787	44,731,900
FY38	9,028	544,447	10,935	6	101	2,211	21,985	25	589,000	1,177,740	53,060	6,921	236,215	1,064,798	45,913,044	140,240	47,361,218	1,230,800	48,592,019
FY39	9,028	540,835	10,863	6	101	2,211	20,484	25	589,000	1,172,554	53,060	6,921	232,047	1,046,008	45,166,212	139,332	46,590,519	1,225,614	47,816,134
FY40	9,028	515,632	10,357	6	101	2,211	18,684	25	589,000	1,145,045	53,060	6,921	230,657	1,039,744	44,857,680	132,997	46,267,999	1,198,105	47,466,105
FY41	9,028	566,328	11,375	6	101	2,211	21,386	25	589,000	1,199,460	53,060	6,921	209,815	945,791	41,202,960	145,740	42,511,227	1,252,521	43,763,748
FY42	9,028	569,599	11,441	6	101	2,211	22,403	25	589,000	1,203,815	53,060	6,921	220,931	995,899	43,428,234	146,563	44,798,548	1,256,875	46,055,423
FY43	9,028	565,686	11,362	6	101	2,211	21,474	25	589,000	1,198,895	53,060	6,921	219,541	989,636	43,119,702	145,579	44,481,379	1,251,955	45,733,334
FY44	9,028	579,673	11,643	6	101	2,211	22,029	25	589,000	1,213,716	53,060	6,921	208,425	939,528	40,797,102	149,095	42,101,071	1,266,776	43,367,847
FY45	9,028	602,793	12,107	6	94	2,060	22,802	25	548,700	1,197,616	51,940	6,775	215,373	970,845	42,177,552	154,675	43,525,220	1,249,557	44,774,777
FY46	9,028	611,717	12,287	6	100	2,188	22,944	25	582,800	1,241,095	52,888	6,898	211,204	952,055	41,349,282	157,114	42,676,553	1,293,983	43,970,536
FY47	9,028	593,524	11,921	6	87	1,908	22,166	25	508,400	1,147,066	50,821	6,629	173,688	782,940	33,902,963	152,113	35,018,332	1,197,886	36,216,218
FY48	9,028	610,473	12,262	6	90	1,967	22,706	25	523,900	1,180,456	51,251	6,685	194,530	876,893	38,490,390	156,463	39,724,961	1,231,707	40,956,668
FY49	9,028	594,023	11,931	6	91	2,002	22,327	25	533,200	1,172,634	51,510	6,719	225,099	1,014,690	43,785,762	152,382	45,184,651	1,224,143	46,408,795
FY50	9,028	629,474	12,643	6	97	2,118	23,014	25	564,200	1,240,606	52,371	6,831	219,541	989,636	42,973,380	161,471	44,350,859	1,292,977	45,643,836
FY51	9,028	625,182	12,557	6	96	2,095	21,534	25	558,000	1,228,522	52,199	6,809	212,594	958,318	41,739,252	160,356	43,077,329	1,280,721	44,358,050
FY52	9,028	624,448	12,542	5	77	1,699	22,741	25	452,600	1,123,166	49,270	6,427	152,845	688,987	29,834,607	159,566	30,842,432	1,172,436	32,014,868
FY53	9,028	630,239	12,659	6	89	1,955	21,898	25	520,800	1,196,700	51,165	6,674	194,530	876,893	37,582,014	161,414	38,821,524	1,247,865	40,069,389
FY54	9,028	616,058	12,374	5	78	1,711	22,132	25	455,700	1,117,110	49,356	6,438	169,519	764,149	32,547,510	157,475	33,645,091	1,166,467	34,811,558

Year	Scope 1										Scope 2	Scope 3						Direct & Indirect	All scopes
	Vegetation Clearing	Diesel - Stationary	Diesel - Vehicle Transport	LPG - Stationary Equipment	Petroleum Greases	Petroleum Oils	Explosives	SF_6	Fugitive	Total Scope 1	Electricity	Electricity	Train	Shipping	Coal combustion	Upstream\ Downstream Fuel	Total Scope 3	Total Scope 1+2	Total Scope 1+2+3
FY55	9,028	598,701	12,025	5	85	1,862	21,815	25	496,000	1,139,547	50,476	6,584	188,972	851,839	36,412,770	153,344	37,613,508	1,190,023	38,803,532
FY56	0	537,670	10,799	5	85	1,862	20,879	25	496,000	1,067,326	50,476	6,584	180,889	815,400	35,308,565	138,003	36,449,440	1,117,802	37,567,242
FY57	0	452,229	9,083	5	85	1,862	20,879	25	496,000	980,169	50,476	6,584	178,691	805,492	34,879,531	116,525	35,986,823	1,030,645	37,017,468
FY58	0	466,216	9,364	5	85	1,862	20,879	25	496,000	994,436	50,476	6,584	178,742	805,725	34,889,595	120,041	36,000,687	1,044,912	37,045,600
FY59	0	522,417	10,493	5	85	1,862	20,879	25	496,000	1,051,766	50,476	6,584	178,661	805,358	34,873,699	134,168	35,998,470	1,102,242	37,100,712
FY60	0	540,762	10,861	5	85	1,862	20,879	25	496,000	1,070,480	50,476	6,584	175,256	790,009	34,209,068	138,780	35,319,696	1,120,956	36,440,652
FY61	0	464,114	9,322	5	85	1,862	20,879	25	496,000	992,293	50,476	6,584	173,623	782,651	33,890,452	119,513	34,972,824	1,042,769	36,015,592
FY62	0	544,255	10,932	5	85	1,862	20,879	25	496,000	1,074,043	50,476	6,584	172,935	779,550	33,756,173	139,658	34,854,900	1,124,519	35,979,419
FY63	0	485,795	9,757	5	85	1,862	20,879	25	496,000	1,014,409	50,476	6,584	173,928	784,026	33,949,974	124,963	35,039,474	1,064,885	36,104,359
FY64	0	508,866	10,221	5	85	1,862	20,879	25	496,000	1,037,943	50,476	6,584	173,246	780,948	33,816,701	130,762	34,908,240	1,088,419	35,996,659
FY65	0	568,214	11,413	5	74	1,622	21,652	25	432,163	1,035,168	48,702	6,352	149,115	672,173	29,106,518	145,313	30,079,471	1,083,870	31,163,342
FY66	0	520,698	10,458	5	85	1,862	21,652	25	496,000	1,050,786	50,476	6,584	175,772	792,337	34,309,882	133,736	35,418,311	1,101,262	36,519,573
FY67	0	547,660	11,000	5	85	1,862	21,652	25	496,000	1,078,290	50,476	6,584	173,813	783,504	33,927,384	140,514	35,031,798	1,128,766	36,160,564
FY68	0	542,705	10,900	5	79	1,743	21,652	25	464,230	1,041,340	49,593	6,469	159,674	719,771	31,167,635	139,086	32,192,635	1,090,933	33,283,568
FY69	0	556,207	11,172	5	85	1,862	21,652	25	496,000	1,087,008	50,476	6,584	174,944	788,603	34,148,190	142,662	35,260,983	1,137,485	36,398,468
FY70	0	616,966	12,392	5	84	1,836	21,652	25	489,041	1,142,002	50,283	6,559	172,739	778,662	33,717,723	157,895	34,833,577	1,192,284	36,025,861
FY71	0	521,817	10,481	5	79	1,736	21,652	25	462,460	1,018,255	49,544	6,462	160,775	724,731	31,382,409	133,825	32,408,202	1,067,799	33,476,002
FY72	0	545,153	10,950	5	85	1,862	21,652	25	496,000	1,075,732	50,476	6,584	173,222	780,839	33,812,003	139,883	34,912,531	1,126,208	36,038,739
FY73	0	597,500	12,001	4	71	1,557	21,652	25	414,717	1,047,527	48,218	6,289	140,618	633,869	27,447,862	152,575	28,381,212	1,095,745	29,476,957
FY74	0	542,842	10,903	5	74	1,629	21,652	25	434,000	1,011,131	48,753	6,359	152,034	685,333	29,676,377	138,946	30,659,050	1,059,884	31,718,934
FY75	0	610,433	12,261	5	74	1,629	21,652	25	434,000	1,080,080	48,753	6,359	152,374	686,862	29,742,584	155,937	30,744,116	1,128,833	31,872,949
FY76	0	557,278	11,193	5	74	1,629	21,652	25	434,000	1,025,857	48,753	6,359	149,892	675,677	29,258,242	142,575	30,232,745	1,074,610	31,307,356
FY77	0	598,084	12,013	5	74	1,629	21,652	25	434,000	1,067,482	48,753	6,359	148,875	671,090	29,059,616	152,832	30,038,772	1,116,236	31,155,008
FY78	0	536,585	10,778	5	74	1,629	21,652	25	434,000	1,004,748	48,753	6,359	144,694	652,243	28,243,509	137,374	29,184,179	1,053,502	30,237,680
FY79	0	630,450	12,663	5	74	1,629	21,652	25	434,000	1,100,498	48,753	6,359	152,102	685,637	29,689,559	160,968	30,694,625	1,149,251	31,843,877
FY80	0	459,978	9,239	5	74	1,629	17,997	25	434,000	922,947	48,753	6,359	143,923	648,769	28,093,087	118,117	29,010,256	971,701	29,981,957
FY81	0	475,631	9,553	4	67	1,464	17,186	25	389,978	893,908	47,530	6,200	131,060	590,785	25,582,248	121,799	26,432,091	941,438	27,373,530
FY82	0	471,310	9,466	4	63	1,374	17,198	25	366,098	865,539	46,867	6,113	125,175	564,258	24,433,559	120,575	25,249,680	912,406	26,162,086
FY83	0	529,401	10,633	3	53	1,164	17,229	25	310,000	868,508	45,308	5,910	103,353	465,891	20,174,055	134,855	20,884,063	913,816	21,797,880
FY84	0	491,055	9,863	3	53	1,164	16,942	25	310,000	829,106	45,308	5,910	103,278	465,551	20,159,371	125,216	20,859,326	874,413	21,733,740

Year	Scope 1										Scope 2	Scope 3						Direct & Indirect	All scopes
	Vegetation Clearing	Diesel - Stationary	Diesel - Vehicle Transport	LPG - Stationary Equipment	Petroleum Greases	Petroleum Oils	Explosives	SF_6	Fugitive	Total Scope 1	Electricity	Electricity	Train	Shipping	Coal combustion	Upstream\ Downstream Fuel	Total Scope 3	Total Scope 1+2	Total Scope 1+2+3
FY85	0	372,486	7,482	3	53	1,164	13,101	25	310,000	704,314	45,308	5,910	102,225	460,803	19,953,742	95,412	20,618,091	749,622	21,367,712
FY86	0	190,145	3,819	3	53	1,164	8,945	25	310,000	514,154	45,308	5,910	101,195	456,161	19,752,754	49,577	20,365,598	559,462	20,925,060
FY87	0	169,925	3,413	3	53	1,164	8,411	25	310,000	492,995	45,308	5,910	101,647	458,199	19,840,978	44,495	20,451,228	538,303	20,989,531
FY88	0	140,755	2,827	3	53	1,164	7,365	25	310,000	462,192	45,308	5,910	103,193	465,167	20,142,731	37,162	20,754,163	507,500	21,261,664
FY89	0	124,281	2,496	3	47	1,035	5,650	25	275,818	409,356	44,358	5,786	89,614	403,959	17,492,269	32,825	18,024,453	453,714	18,478,167
FY90	0	138,909	2,790	2	38	824	5,680	25	219,601	367,870	42,796	5,582	68,769	309,995	13,423,462	36,179	13,843,987	410,666	14,254,653
FY91	0	129,161	2,594	2	38	840	5,678	25	223,751	362,090	42,911	5,597	73,433	331,018	14,333,763	33,752	14,777,563	405,002	15,182,565
FY92	0	134,584	2,703	2	33	721	5,711	25	192,000	335,779	42,029	5,482	60,990	274,926	11,904,874	34,933	12,281,205	377,808	12,659,013
FY93	0	20,523	412	1	11	249	1,458	25	66,448	89,129	38,541	5,027	19,500	87,900	3,806,238	5,541	3,924,205	127,669	4,051,874

Table B.3: Project Only Scenario Detailed Emission Estimates

Year	Scope 1										Scope 2	Scope 3							Direct & Indirect	All scopes
	Vegetation Clearing	Diesel - Stationary	Diesel - Vehicle Transport	LPG - Stationary Equipment	Petroleum Greases	Petroleum Oils	Explosives	SF_6	Fugitive	Total Scope 1	Electricity	Electricity	Train	Shipping	Coal combustion	Upstream\ Downstream Fuel	Total Scope 3	Total Scope 1+2	Total Scope 1+2+3
FY27	9,028	10,472	210	0	0	2	-450	0	564	19,826	33	5	26,770	120,672	5,225,339	2,635	5,375,421	19,860	5,395,280
FY28	9,028	8,847	178	0	5	112	-1,042	0	29,737	46,865	1,473	216	38,647	174,210	7,543,667	2,395	7,759,134	48,338	7,807,472
FY29	9,028	(439)	(9)	(1)	(9)	(204)	-1,476	0	(54,283)	(47,392)	(2,099)	(262)	1,659	7,478	323,828	(422)	332,280	(49,490)	282,790
FY30	9,028	98,873	1,986	0	1	24	2,619	0	6,480	119,012	149	16	33,741	152,098	6,886,243	24,891	7,096,989	119,160	7,216,149
FY31	9,028	119,698	2,404	0	5	106	1,897	0	28,128	161,266	646	102	30,918	139,372	6,250,830	30,250	6,451,472	161,912	6,613,384
FY32	9,028	209,321	4,204	0	7	149	4,310	0	39,756	266,776	816	144	46,936	211,577	9,095,227	52,845	9,406,729	267,593	9,674,322
FY33	9,028	187,811	3,772	1	17	372	3,780	0	99,209	303,991	2,277	360	70,033	315,691	13,465,391	47,780	13,899,254	306,268	14,205,522
FY34	9,028	168,895	3,392	0	2	35	3,611	0	9,211	194,174	234	33	26,332	118,698	5,297,198	42,508	5,484,769	194,408	5,679,177
FY35	9,028	171,149	3,438	0	1	26	2,619	0	7,021	193,282	212	34	34,772	156,744	6,835,998	43,062	7,070,609	193,494	7,264,104
FY36	9,028	96,625	1,941	1	13	280	1,668	0	74,562	184,118	2,342	270	56,880	256,401	11,156,237	24,717	11,494,505	186,460	11,680,965
FY37	9,028	160,795	3,230	1	12	266	3,458	0	70,916	247,706	2,056	343	32,240	145,330	6,685,651	40,826	6,904,390	249,762	7,154,153
FY38	9,028	144,906	2,910	1	20	442	4,249	0	117,843	279,401	3,274	427	72,864	328,454	14,027,755	37,102	14,466,602	282,675	14,749,277
FY39	9,028	139,611	2,804	1	16	361	2,435	0	96,282	250,539	2,675	349	62,699	282,632	12,110,417	35,647	12,491,743	253,215	12,744,958
FY40	9,028	115,375	2,317	1	20	447	710	0	119,164	247,065	3,311	432	68,211	307,480	13,149,083	29,686	13,554,892	250,376	13,805,268
FY41	9,028	193,533	3,887	1	19	420	4,424	0	111,844	323,157	3,108	405	41,825	188,536	8,412,210	49,291	8,692,267	326,264	9,018,532
FY42	9,028	172,925	3,473	2	26	574	4,419	0	153,015	343,463	4,252	555	69,849	314,860	13,937,788	44,347	14,367,398	347,715	14,715,113
FY43	9,028	170,848	3,432	1	20	448	2,944	0	119,353	306,074	3,316	433	55,000	247,924	11,001,999	43,631	11,348,987	309,391	11,658,377
FY44	9,028	208,134	4,180	2	25	558	4,822	0	148,533	375,283	4,127	538	54,091	243,830	10,671,887	53,171	11,023,517	379,410	11,402,927
FY45	9,028	254,731	5,116	1	23	501	6,110	0	133,539	409,050	3,711	484	68,498	308,770	13,508,266	64,798	13,950,815	412,760	14,363,576
FY46	9,028	262,151	5,265	2	30	662	5,939	0	176,324	459,401	4,899	639	68,899	310,581	13,572,102	66,909	14,019,131	464,301	14,483,431
FY47	9,028	259,294	5,208	2	27	594	6,218	0	158,201	438,572	4,396	573	53,323	240,365	10,408,318	66,087	10,768,666	442,968	11,211,634
FY48	9,028	294,545	5,916	2	29	644	7,788	0	171,531	489,483	4,766	622	68,990	310,988	13,985,494	75,025	14,441,117	494,250	14,935,367
FY49	9,028	323,576	6,499	2	33	729	9,319	0	194,324	543,512	5,399	704	107,760	485,753	20,881,677	82,453	21,558,348	548,911	22,107,259
FY50	9,028	330,676	6,642	3	46	999	9,139	0	266,179	622,712	7,396	965	113,348	510,943	22,244,941	84,651	22,954,846	630,108	23,584,954
FY51	9,028	356,309	7,157	3	44	971	9,072	0	258,617	641,201	7,186	937	106,488	480,022	21,027,986	91,050	21,706,484	648,387	22,354,871
FY52	9,028	350,602	7,042	2	35	764	10,076	0	203,584	581,133	5,657	738	63,356	285,591	12,366,702	89,300	12,805,686	586,790	13,392,476
FY53	9,028	367,868	7,389	3	50	1,094	9,821	0	291,379	686,632	8,096	1,056	112,776	508,364	21,623,957	94,144	22,340,298	694,728	23,035,026
FY54	9,028	351,740	7,065	3	40	874	9,904	0	232,748	611,400	6,467	844	90,305	407,074	17,085,410	89,753	17,673,387	617,868	18,291,254

Year	Scope 1										Scope 2	Scope 3						Direct & Indirect	All scopes
	Vegetation Clearing	Diesel - Stationary	Diesel - Vehicle Transport	LPG - Stationary Equipment	Petroleum Greases	Petroleum Oils	Explosives	SF_6	Fugitive	Total Scope 1	Electricity	Electricity	Train	Shipping	Coal combustion	Upstream\ Downstream Fuel	Total Scope 3	Total Scope 1+2	Total Scope 1+2+3
FY55	9,028	336,178	6,752	3	46	1,009	9,816	0	268,658	631,490	7,465	974	107,842	486,123	20,576,520	86,048	21,257,506	638,955	21,896,461
FY56	0	139,144	2,795	0	5	116	-407	0	31,000	172,653	861	112	10,294	46,401	2,009,253	35,154	2,101,214	173,515	2,274,729
FY57	0	45,582	916	0	5	116	-407	0	31,000	77,212	861	112	9,403	42,386	1,835,393	11,636	1,898,929	78,073	1,977,003
FY58	0	74,707	1,501	0	6	121	-407	0	32,192	108,120	894	117	13,063	58,884	2,549,795	18,964	2,640,822	109,014	2,749,836
FY59	0	142,327	2,859	0	5	116	-407	0	31,000	175,900	861	112	14,492	65,327	2,828,816	35,954	2,944,702	176,762	3,121,464
FY60	0	119,976	2,410	0	7	162	-407	0	43,042	165,190	1,196	156	12,642	56,986	2,467,603	30,405	2,567,792	166,386	2,734,179
FY61	0	51,476	1,034	0	5	116	-407	0	31,000	83,225	861	112	7,954	35,853	1,552,529	13,118	1,609,566	84,087	1,693,652
FY62	0	153,964	3,092	0	5	116	-407	0	31,000	187,772	861	112	13,649	61,525	2,664,152	38,880	2,778,317	188,633	2,966,950
FY63	0	29,548	593	1	9	190	-407	0	50,490	80,423	1,403	183	14,987	67,559	2,925,434	7,718	3,015,881	81,826	3,097,707
FY64	0	114,619	2,302	0	5	116	-407	0	31,000	147,636	861	112	12,710	57,292	2,480,862	28,990	2,579,966	148,498	2,728,464
FY65	0	106,176	2,133	(0)	(6)	(123)	-422	0	(32,837)	74,920	(912)	(119)	(15,870)	(71,539)	(3,097,783)	26,501	(3,158,810)	74,008	(3,084,803)
FY66	0	103,838	2,086	0	5	116	-422	0	31,000	136,623	861	112	16,428	74,055	3,206,739	26,280	3,323,614	137,485	3,461,099
FY67	0	67,288	1,352	0	5	116	-422	0	31,000	99,339	861	112	8,525	38,427	1,663,961	17,092	1,728,117	100,201	1,828,318
FY68	0	101,177	2,032	(0)	(0)	(3)	-422	0	(770)	102,014	(21)	(3)	2,447	11,030	477,608	25,428	516,510	101,993	618,503
FY69	0	83,825	1,684	0	5	116	-422	0	31,000	116,209	861	112	15,008	67,653	2,929,528	21,249	3,033,551	117,070	3,150,621
FY70	0	158,206	3,178	1	9	188	-422	0	49,997	211,155	1,389	181	20,540	92,591	4,009,398	40,055	4,162,766	212,544	4,375,310
FY71	0	74,341	1,493	(0)	(0)	(10)	-422	0	(2,540)	72,862	(71)	(9)	194	873	37,822	18,672	57,552	72,791	130,343
FY72	0	75,255	1,512	1	9	199	-422	0	52,987	129,540	1,472	192	20,867	94,064	4,073,182	19,221	4,207,526	131,013	4,338,539
FY73	0	203,932	4,096	(0)	(4)	(97)	1,204	0	(25,827)	183,303	(718)	(94)	(10,333)	(46,580)	(2,017,002)	51,113	(2,022,895)	182,585	(1,840,310)
FY74	0	110,178	2,213	1	10	222	1,269	0	59,024	172,916	1,640	214	23,273	104,910	4,542,834	28,034	4,699,266	174,556	4,873,822
FY75	0	195,137	3,919	2	27	582	2,356	0	155,000	357,023	4,307	562	59,031	266,095	11,522,490	49,942	11,898,119	361,330	12,259,449
FY76	0	315,962	6,346	2	27	582	7,338	0	155,000	485,256	4,307	562	56,471	254,556	11,022,805	80,313	11,414,706	489,562	11,904,268
FY77	0	357,007	7,171	2	27	582	8,914	0	155,000	528,701	4,307	562	51,744	233,248	10,100,139	90,630	10,476,323	533,008	11,009,331
FY78	0	292,958	5,884	2	27	582	9,922	0	155,000	464,374	4,307	562	51,364	231,537	10,026,050	74,531	10,384,044	468,681	10,852,725
FY79	0	413,560	8,307	2	27	582	9,982	0	155,000	587,459	4,307	562	57,091	257,350	11,143,804	104,846	11,563,652	591,766	12,155,418
FY80	0	221,365	4,446	2	27	582	6,295	0	155,000	387,717	4,307	562	54,480	245,583	10,634,253	56,535	10,991,412	392,023	11,383,435
FY81	0	244,435	4,910	1	19	417	5,516	0	110,978	366,275	3,084	402	33,944	153,012	6,625,735	62,081	6,875,173	369,359	7,244,532
FY82	0	263,224	5,287	1	15	327	7,332	0	87,098	363,283	2,420	316	33,398	150,552	6,519,206	66,666	6,770,138	365,703	7,135,842
FY83	0	375,734	7,547	0	5	116	7,784	0	31,000	422,187	861	112	13,874	62,541	2,708,157	94,625	2,879,310	423,049	3,302,359

Year	Scope 1										Scope 2	Scope 3						Direct & Indirect	All scopes
	Vegetation Clearing	Diesel - Stationary	Diesel - Vehicle Transport	LPG - Stationary Equipment	Petroleum Greases	Petroleum Oils	Explosives	SF_6	Fugitive	Total Scope 1	Electricity	Electricity	Train	Shipping	Coal combustion	Upstream\ Downstream Fuel	Total Scope 3	Total Scope 1+2	Total Scope 1+2+3
FY84	0	343,159	6,893	0	5	116	8,204	0	31,000	389,378	861	112	11,159	50,304	2,178,266	86,437	2,326,279	390,239	2,716,518
FY85	0	229,103	4,602	0	5	116	4,855	0	31,000	269,682	861	112	9,841	44,362	1,920,955	57,767	2,033,037	270,543	2,303,580
FY86	0	74,144	1,489	0	5	116	2,308	0	31,000	109,063	861	112	9,339	42,098	1,822,929	18,815	1,893,294	109,924	2,003,218
FY87	0	78,978	1,586	0	5	116	2,653	0	31,000	114,340	861	112	11,233	50,636	2,192,645	20,031	2,274,658	115,201	2,389,858
FY88	0	39,623	796	0	5	116	1,590	0	31,000	73,131	861	112	14,579	65,718	2,845,736	10,138	2,936,283	73,992	3,010,275
FY89	0	31,195	627	0	4	98	-125	0	26,217	58,017	728	95	7,956	35,861	1,552,877	7,992	1,604,781	58,745	1,663,526
FY90	0	54,474	1,094	1	9	187	756	0	49,938	106,458	1,388	181	17,228	77,659	3,362,810	13,980	3,471,858	107,846	3,579,703
FY91	0	129,161	2,594	2	38	840	5,678	25	223,751	362,090	42,911	5,597	73,433	331,018	14,333,763	33,752	14,777,563	405,002	15,182,565
FY92	0	134,584	2,703	2	33	721	5,711	25	192,000	335,779	42,029	5,482	60,990	274,926	11,904,874	34,933	12,281,205	377,808	12,659,013
FY93	0	20,523	412	1	11	249	1,458	25	66,448	89,129	38,541	5,027	19,500	87,900	3,806,238	5,541	3,924,205	127,669	4,051,874

Whitehaven

Blackwater North Extension Project

Appendix C
Loop Decarbonisation Services Peer Review



POWERED BY Mitchell TALISMAN

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Level 3, 10 Market St, Brisbane, 4000

Subject: Independent Peer Review – Greenhouse Gas Management and Abatement Plan

Project: Blackwater North Extension Project

Date: 13 April 2026

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1. Introduction

At the request of Whitehaven Blackwater Pty Ltd (Whitehaven Blackwater), I have undertaken an independent peer review of the Greenhouse Gas Management and Abatement Plan (April 2026, Document No. 01315554) (GMAP) prepared for the Blackwater North Extension Project (the Project).

This peer review evaluates the GMAP's methodology, technical soundness, and regulatory alignment with both current and emerging greenhouse gas (GHG) management and abatement expectations in Queensland and under Commonwealth frameworks, specifically the Queensland Greenhouse Gas Emissions Guideline - Version 1.02 - ESR/2024/6819 (QLD GHG Guideline) and the Commonwealth Safeguard Mechanism. It is acknowledged that this is a qualitative evaluation appropriate to the current environmental approvals stage of the Project. The GMAP is positioned as an initial input into further planning and is intended to inform forthcoming Project phases.

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 a PhD candidate in Australian energy policy 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 bodies, industry bodies, and universities on best practice emissions reduction in the mining and energy sectors. Additionally, I plan and execute operational decarbonisation projects within active mining operations.

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 Queensland Greenhouse Gas Emissions Guideline - Version 1.02 - ESR/2024/6819 and the Commonwealth Safeguard Mechanism;

- 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 through the Three-Year Action Plan;
- Provision of feedback on draft Report for inclusion in final Report.

3. Summary of Findings

3.1. QLD GHG Guideline Compliance and Framing

The GMAP has been prepared in accordance with the QLD GHG Guideline, with each content requirement for a Greenhouse Gas Abatement Plan addressed across the document (Table 5 of the GMAP). This is a notable strength of the document and reflects a disciplined approach to regulatory alignment.

The GMAP 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 through a Three-Year Action Plan and subsequent GMAP revisions. 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 well-structured. The GMAP clearly categorises proposed measures according to the GHG mitigation hierarchy (avoid, reduce, substitute, offset) and provides site-specific commentary on the feasibility of each abatement opportunity at the Blackwater Mine (BWM).

The adoption of the ARENA Technology Readiness Level and Commercial Readiness Level (TRL/CRL) framework is consistent with industry best practice and provides a transparent basis for comparing abatement options across differing stages of technical maturity.

The polycentric evaluation approach, which balances cost, technology readiness, and site-specific operational constraints, is a notable strength. For an operation with the complexity and scale of the BWM, this multi-criteria lens is appropriate and avoids an overly simplistic ranking of abatement measures.

3.3. Emissions Context and Safeguard Mechanism

The GMAP clearly articulates the BWM's emissions intensity position relative to other Australian ROM coal facilities, noting the existing EID of 0.0527 t CO_2-e/t ROM ranks BWM 29th lowest among approximately 68 Australian coal mining facilities with published EIDs, below the industry default value of 0.0653 t CO2-e/t ROM. This contextualisation is useful for assessing the Project's relative performance under the Safeguard Mechanism.

The GMAP appropriately acknowledges that the current EID is based on NGER Method 1 fugitive estimates and that Whitehaven Blackwater is progressing transition to Method 2. This is a material disclosure and the Three-Year Action Plan's prioritisation of the Method 2 transition as Year 1 activity is technically sound and operationally appropriate. Transition to Method 2 is a necessary prerequisite for meaningful gas drainage feasibility assessment and for accurately accounting for any future abatement achieved.

The indicative Safeguard Mechanism baseline forecast presented in Table 8 of the GMAP, extending through to net zero by FY2050, provides a clear long-term compliance trajectory consistent with Whitehaven's corporate commitments and the reformed Safeguard Rule's requirements.

3.4. Scope of Mitigation Options and Technical Maturity

A comprehensive range of mitigation opportunities is presented across Scope 1 fugitive, Scope 1 diesel combustion, and Scope 2 electricity categories. Each option's feasibility is evaluated with regard to TRL and CRL, which is consistent with industry frameworks.

The treatment of fugitive emissions abatement is pragmatic and appropriately reflects the current stage of site-specific characterisation. The GMAP acknowledges that gas drainage, capture and abatement effectiveness cannot be adequately assessed under Method 1, and that the applicability of pre-mining gas drainage at the BWM is contingent on Method 2 outputs and supporting gas domain data. This is technically defensible and consistent with emerging industry practice in the Australian coal industry.

For diesel combustion, the evaluation of hybrid diesel-electric vehicles as a priority near-term pathway, alongside the deferral of battery electric vehicles to a monitoring and review posture, is well-reasoned given current commercial readiness constraints for ultra-class haulage equipment. The treatment of renewable diesel (HVO) is thorough, with appropriate reference to the Maules Creek Coal Mine trial outcomes and the current price and supply limitations in the Australian market.

3.5. Three-Year Action Plan

The Three-Year Action Plan (Tables 11–13) is a well-structured, staged work program that appropriately prioritises the collection of site-specific data, including the transition to Method 2 and a concept-level assessment of methane pre-drainage, before committing to specific abatement investments. This approach is appropriate to the current stage of the Project and consistent with the QLD GHG Guideline's requirement for a GHG emission reduction program detailing measures across the life of the project.

The framing of Year 1 as indicatively FY2027, and the explicit commitment to revisit and revise the GMAP and Three-Year Action Plan at least every three years, reflects sound adaptive

management intent consistent with the QLD GHG Guideline and the Safeguard Mechanism's compliance obligations.

3.6. Forward Planning and Quantitative Commitments

The GMAP appropriately identifies that detailed quantitative evaluation of specific abatement measures will be undertaken post-approval and incorporated into future GMAP revisions as part of the ongoing adaptive management framework. The acknowledgment that greenhouse gas calculations prepared by RWDI (Appendix B) conservatively exclude potential emission reductions is a transparent and appropriate disclosure at this stage of project development.

4. Provision of Feedback on Draft GMAP

Feedback was provided during the peer review process on the draft GMAP to Whitehaven Blackwater. Feedback focused predominantly on the treatment of TRLs and CRLs for individual abatement technologies, the contextualisation of fugitive emissions, and the articulation of the Three-Year Action Plan rationale for fugitive emissions management. The comments and suggestions made to Whitehaven Blackwater were adequately considered and incorporated into the final GMAP.

5. Conclusion

The Greenhouse Gas Management and Abatement 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 Whitehaven Blackwater's commitment to identifying and implementing reasonable and feasible mitigation options across the life of the Project.

The GMAP is robust, meets the content requirements of the Queensland GHG Guideline for a Greenhouse Gas Abatement Plan, and reflects emerging industry practice in fugitive emissions characterisation and diesel decarbonisation for open cut coal mines in Queensland.

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 Whitehaven Coal or the Blackwater North Extension 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.

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Steph Byrom

General Manager, Decarbonisation Services

SUMMARY

Steph is a dedicated professional with fifteen years of experience in the field of mine decarbonisation and policy, currently serving as the General Manager of Decarbonisation at Loop Decarbonisation Solutions. Loop is at the forefront of providing strategic and technical solutions, particularly 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.

Steph has extensive experience as an independent peer reviewer of GHG Abatement Assessments and approvals documentation for coal mines across both Queensland and New South Wales, providing rigorous technical review of emissions reduction pathways and compliance frameworks. This peer review work spans a breadth of mine types and regulatory contexts, encompassing assessments prepared under the NSW EPA Guide for Large Emitters as well as the Queensland Greenhouse Gas Emissions Guideline, and reflects her deep familiarity with the methodological and regulatory standards expected of credible abatement analysis.

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 Decarb / Talisman Technical, 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 open cut predrainage in the Bowen Basin.
- 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.