



Greenhouse Gas Management Plan

McPhee Creek Iron Ore Project

22/04/2022

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Greenhouse Gas Management Plan

McPhee Creek Iron Ore Project



Authorisation

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Abbreviations

CER	Clean Energy Regulator
CO ₂	Carbon Dioxide
DWER	Department of Water and Environment Regulation
EP Act	Environmental Protection Act 1986
EPA	Environmental Protection Authority
EPA Services	Environmental Protection Authority Services
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ERD	Environmental Review Document
GHG	Green House Gases
GHGMP	GHG Management Plan
Mtpa	Million tonnes per annum
RIWI	Rights in Water and Irrigation Act
ROM	Run of Mine
SGM	Safe Guard Mechanism
tCO ₂ -e	Tonnes of CO ₂ emissions
UNFCCC	United Nations Framework Convention on Climate Change



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1 Introduction

Atlas Iron Pty Ltd (the Proponent) is the proponent for the McPhee Creek Iron Ore Mine, which includes development of a greenfield iron ore mine operation at McPhee Creek (the Proposal), located approximately 30 km north of Nullagine townsite in the Pilbara region of Western Australia.

The Proposal will compose of traditional drill and blast, truck and shovel and on-site primary crushing. Crushed ore will be delivered to a suitable transfer location, where it will be loaded onto quad road trains for transport approximately 120 km to Roy Hill via Marble Bar public road, or to other third parties. The operations are expected to be:

- Total mined: 35 Mtpa (Run of Mine (ROM) product + waste).
- Producing 10 Mtpa of ROM product, noting that the Proposal is seeking approval for up to 14 Mtpa. Regardless of production rate, the emissions intensity will be met.

Due to the remote location of the Proposal a stand-alone power system is proposed. Traditionally for operations like this, power would be provided via diesel generators.

The deposit lifetime is considered to be 15 years with one year for construction (2023 to 2038). Total life of proposal is 16 years.

This Greenhouse Gas (GHG) Management Plan was prepared with reference to "*Instructions on how to prepare Environmental Protection Act 1986 (WA) Part IV Environmental Management Plans*", published by the Western Australian Environment Protection Authority (EPA) (EPA, 2020a).

1.1 Objective

This GHG Management Plan (GHGMP) is prepared for submission to the EPA with the McPhee Creek Iron Ore Project - Environmental Review Document. This GHGMP addresses the EPA's GHG Emissions key environmental factor (EPA, 2020b). The objective of this GHGMP is to illustrate:

- The Proposal will be undertaken in accordance with current Commonwealth and State regulations and policies and is consistent with the State government's aspiration of net zero emissions by 2050.
- The intended reductions of Scope 1 emissions over the life of the Proposal.
- The GHG emission reduction targets that reflect incremental reductions in Scope 1 emissions.
- The measures that have been, or have potential in the future to be, applied to avoid, reduce, and offset the Scope 1 GHG emissions from the Proposal.

1.2 Legislation and Regulatory Framework

The legislation and guidance relevant to the management of GHG emissions in Western Australia include:

- *Environmental Protection Act 1986 (WA)*.
- *National Greenhouse and Energy Reporting Act 2007 (Commonwealth) (NGER Act)*.
- *National Greenhouse and Energy Reporting (Measurement) Determination 2008 (Commonwealth)*.
- *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015 (Commonwealth)*.
- *Environmental Factor Guideline (Greenhouse Gas Emissions) (EPA, 2020)*.
- *Greenhouse Gas Emissions policy for Major Projects (WA Government, 2019)*.



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2 Proposal Description

The Proposal is located in the Pilbara region of Western Australia, predominantly within mining tenement M45/1243-I and includes the following key elements as well as any associated activities:

- Clearing of a Conceptual Footprint of up to 1,913 ha within a 4,465 ha Development Envelope
- Above and below water table mining of five open cut pits
- Ore crushing and truck loading infrastructure
- Waste dumps, ore stockpiles and topsoil stockpiles.
- Support facilities including small scale power generation at each of the mine facilities including a crusher, telecommunications tower, solar field, workshops, hydrocarbon storage, explosive mixing and storage facilities, laydown areas and offices
- Linear infrastructure, including heavy and light vehicle access roads, pipelines and power, and communications distribution
- Infrastructure for surface water management including diversion drains, levees, and culverts
- Infrastructure for dewatering and groundwater abstraction for water supply and associated infrastructure for discharge of excess water to surface water systems
- Construction and operation workforce accommodation camp/s
- Transport of the ore to the existing Roy Hill project or other third parties

To date, various exploration and investigation activities have been completed in support of the Proposal. These include the clearing of access tracks and drill pads, for both resource and groundwater studies, and the construction of an exploration accommodation camp to support these activities. Clearing of over 27 ha has occurred to date, undertaken in accordance with the *Mining Act 1978*.

The scope of the Proposal subject to assessment under Part IV of the *Environmental Protection Act 1986* and the *Environment Protection and Biodiversity Conservation Act 1999* excludes the following low impact activities:

- Utilisation and/or refurbishment of existing infrastructure including access tracks and exploration accommodation camp.
- Ongoing low impact exploration and investigation activities to inform resource definition and the environmental impact assessment of the Proposal.
- Development and use of groundwater supplies to support the exploration and investigation activities.



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3 Scope and Rationale

3.1 Scope of the GHG Management Plan

This GHGMP applies to Scope 1 (Clean Energy Regulator, 2018) GHG emissions from activities undertaken within the operational control of the Proponent. Since the Proposal location is isolated from a power perspective, the required electricity for the Proposal will be produced on-site using diesel generators and potentially from renewable sources (solar/wind). Therefore, the emissions due to onsite electricity generation are considered as scope 1 emissions, and no scope 2 emissions associated with electricity consumption would be applicable.

The main sources of GHG emissions associated with the Proposal have been classified into two distinct categories: operational activities and energy production. GHG emissions are estimated for the generation of power using diesel generators.

3.1.1 Emission Calculations

Emissions calculations are undertaken using the methodologies described by the National Greenhouse and Energy Reporting (Measurement) Technical Guidelines (Commonwealth of Australia 2017) which provide guidance and commentary to assist reporters in estimating GHG emissions for reporting under the NGER Act.

Method 1 of the Technical Guidelines has been used to calculate emissions for the Proposal. This method specifies emissions from the combustion of individual fuel types by multiplying a (physical) quantity of fuel combusted by a fuel-specific energy content factor and a fuel-specific emission factor. This is performed for each relevant GHG (in this case, carbon dioxide, methane, and nitrous oxide). The emission factors are national average factors determined using the Australian Greenhouse Emissions Information System (DEE, 2020).

3.1.2 Scope 1 Emissions

Scope 1 emissions will be required to be reported under Section 19 of the NGER Act over the lifetime of the Proposal. Estimated emissions reportable under the NGER Act for the Proposal are provided in Table 1.

Table 1:McPhee Creek Iron Ore Project Scope 1 Emissions

Year	Total Annual Emissions (t CO ₂ -e)
2023	75,197
2024	90,995
2025	86,107
2026	79,893
2027	83,284
2028	79,809
2029	49,396
2030	60,520
2031	52,743
2032	41,835

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Year	Total Annual Emissions (t CO ₂ -e)
2033	40,529
2034	43,278
2035	41,545
2036	48,789
2037	20,933
2038	12,524
Total	907,377
Average	56,711

Scope 1 GHG emissions associated with the Proposal include combustion of diesel fuel for:

- drilling and blasting
- excavation
- operation of mobile equipment and vehicles
- onsite electricity generation (generators).

Annual Scope 1 emissions for the overall life of mine are estimated to peak at 90,995 tCO₂-e, with a forecast average of 56,711 tCO₂-e. Total GHG emissions over life of project are estimated at 907,377 MtCO₂-e.

Based on current forecast without adopting GHG reduction measures, Scope 1 emissions are estimated to be higher in the first five full years of operations, reducing slightly and remaining relatively consistent across the remaining life of the mine until the mine closure period when emissions significantly reduce.

A summary of estimated Scope 1 GHG emissions per year over the life of the Proposal is shown in Figure 1.

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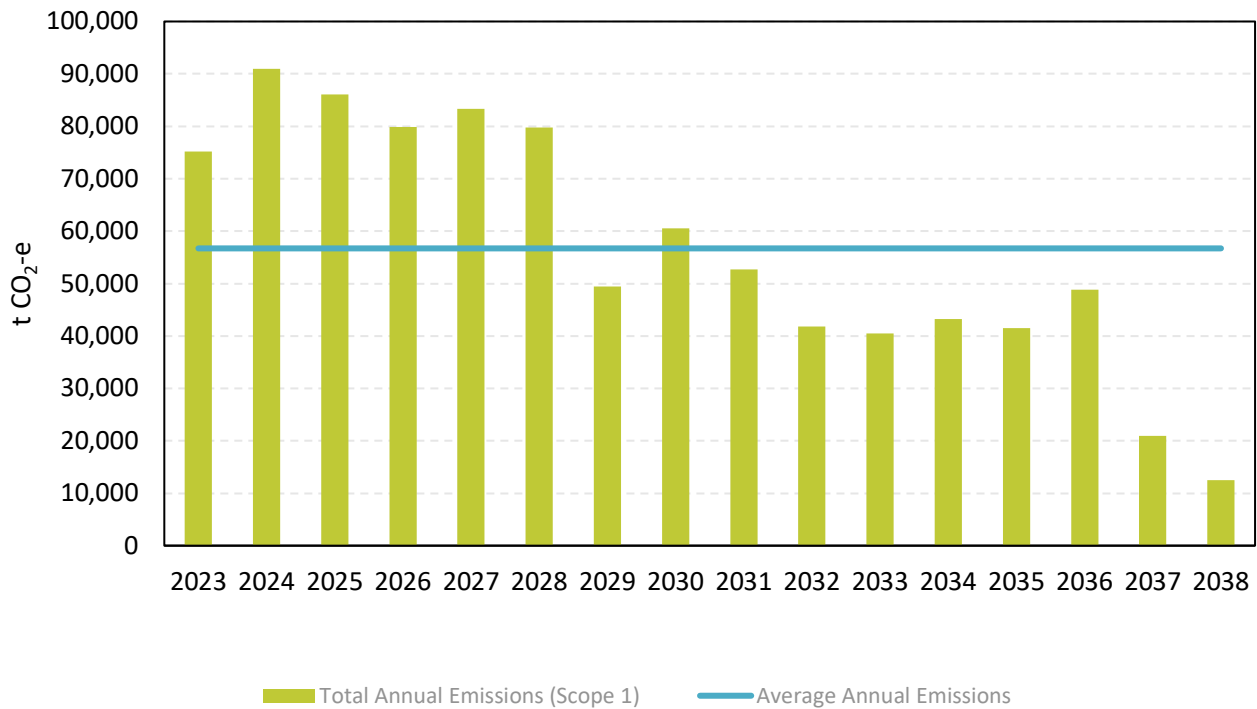


Figure 1 McPhee Creek Iron Ore Project Estimated Annual Scope 1 Emissions

3.1.2.1 Emission Intensity and Benchmarking McPhee Creek against other Iron Ore Mines

Emission intensity is defined as the amount of Emission emitted per unit of saleable product/service and is calculated from **Equation 1**:

$$\text{Emission Intensity} = \frac{\text{Annual Scope 1 Emissions (t CO}_2\text{-e)}}{\text{Annual Iron Ore Production (t)}} \quad \text{Equation 1}$$

Emission intensity of the Proposal has been benchmarked against similar iron ore mines located in the Pilbara region. Based on the total annual ore produced at the Proposal (10 Mtpa), and CO₂ equivalent emissions from 2023 to 2038 in Table 1, emission intensity for the Proposal is listed in Table 2 and shown in Figure 2. The calculation is based on an average production rate of 10 Mtpa of ore; however, the Proposal is seeking approval for up to 14 Mtpa. Regardless of production rate, the Proposal will aim to meet the emissions intensity.

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Table 2: McPhee Creek Iron Ore Project Emissions Intensity against other Iron Ore Projects in Pilbara region

Project	Ore Production (tonnes per annum)	Total Scope 1 Emissions (tCO ₂ -e per annum)	Emissions Intensity (tCO ₂ -e/t ore)	Source
Roy Hill Iron Ore Mine	59,100,000	466,000	0.0079	(Roy Hill, 2021)
BHP Mining Area C	150,000,000	1,200,000	0.0080	(BHP, 2017)
BHP Jimblebar	50,673,195	414,000	0.0082	(BHP, 2019)
FMG Solomon	39,650,000	324,651	0.0082	(FMG, 2018)
Rio Tinto West Angelas	35,000,000	315,825	0.0090	(Rio Tinto, 2018)
West Australian Iron Ore Industry	- 1	- 1	0.0098	(Norgate T. and Haque N, 2010)
Rio Tinto Pilbara	325,000,000	3,200,000	0.010	(Rio Tinto, 2019)
McPhee Creek Iron Ore (excluding transport)	10,000,000	56,711	0.0057	

1 Data not available.

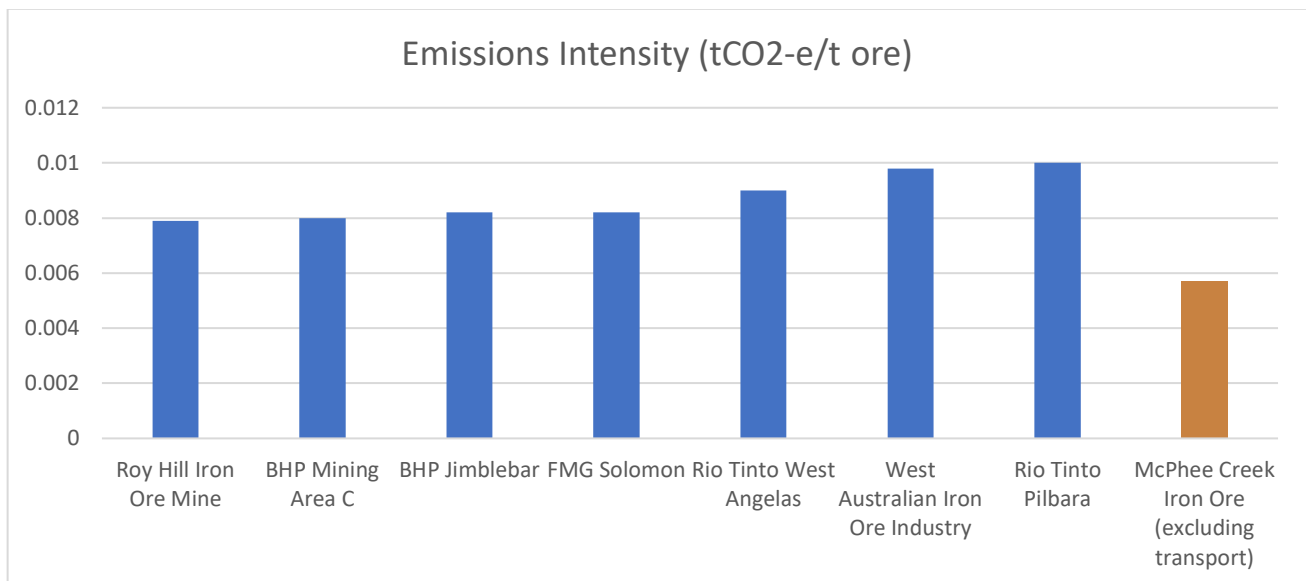


Figure 2: Emissions Intensity Benchmarking McPhee Creek against other Western Australian Iron Ore Projects (excluding transport of ore)

3.1.3 Scope 2 Emissions

The Proposal location is isolated and obtaining electricity from the grid is not considered as a practicable power supply scenario, therefore there are no scope 2 emissions associated with the Proposal as all electricity generation will be undertaken onsite.

3.1.4 Scope 3 Emissions

The most significant contributors to Scope 3 emissions result from:



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- the transport of ore (ROM product) from McPhee Mine to Roy Hill or other third party locations;
- the processing of the ROM product at Roy Hill mine or other third parties, transport to and loading at Port;
- the downstream transport (shipping); and
- processing of the ore into steel.

Other Scope 3 emissions include the upstream and downstream emissions associated with the materials produced by the Proposal (SLR 2021). This includes the upstream indirect emissions related to purchased materials and services; and the downstream indirect emissions associated with sold materials and services. These Scope 3 emissions are under the control of entities outside of the Proponent and are therefore difficult to predict, optional to report and not included in the NGER scheme.

Scope 3 emissions from the projected life of mine are estimated to be as follows:

- Transport of ore to Roy Hill: 26ML/per annum of diesel is expected to be required for quad road train haulage. This equates to approximately 70,450 t CO₂-e per annum.
- Processing of ROM product, transport to Port and loading to ships: Utilising existing Roy Hill data, 196,000t CO₂-e per annum is expected (based on a carbon intensity of 0.014 t CO₂-e per tonne of iron ore). Emissions from processing of ore at Roy Hill have been assessed as Scope 1 emissions under the Roy Hill Revised Proposal (EPA Assessment no. 2214).
- Shipping is approximately 1.12Mt CO₂-e per annum (based on 0.08t CO₂-e per tonne of iron ore).
- Steelmaking is approximately 12.32Mt to 18.9Mt CO₂-e per annum (based on 0.88-1.35 t CO₂e per tonne of iron ore).

The emissions estimate assumes the integrated steelmaking route, based on the blast furnace and basic oxygen furnace, which uses raw materials including iron ore, coal, limestone and recycled steel. On average, this route uses 1,370kg of iron ore, 785kg of metallurgical coal, 270kg of limestone, and 125kg of recycled steel to produce 1,000kg of crude steel.

The shipping and steelmaking emissions estimates are consistent with that assumed for Roy Hill mine, as the McPhee ore will be processed with Roy Hill product. Should the McPhee ore be transported to other third parties, it is assumed the scope 3 emissions for shipping or steelmaking would not differ greatly.

3.2 Key Environmental Factors

The Greenhouse Gas Emissions key environmental factor (EPA, 2020b) states that the EPA's objective for the factor GHG Emissions is "To reduce greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change".

Proponents of major greenhouse emitting projects (projects with annual GHG emissions of 100,000 t CO₂-e or more) are required to show how they can reasonably and practically avoid, reduce, and offset emissions. The requirements of this guideline have been considered in the preparation of this GHGMP.

3.3 Condition Requirements

The Proposal is assessed under Part IV of the EP Act, and EPBC Act. This GHGMP outlines the management approach to GHG emissions of the Proposal to ensure environmental outcomes and objectives are achieved.



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3.4 Rationale and Approach

This GHGMP demonstrates reasonable and practicable measures to reduce GHG emissions, outlines intended reductions of Scope 1 emissions over the life of the Proposal and demonstrates the application of contemporary policy and regulation.

3.4.1 Survey and Study Findings

The Proponent has engaged air quality consultant SLR to prepare a GHG assessment for the Proposal. The emissions projections in this GHGMP have been based on this assessment (SLR, 2021).

As the Proposal is located at a greenfield site, the Proponent has yet to report GHG emissions and energy data in accordance with the NGER Act.

3.4.2 Management Approach

The Proponent maintains an Environmental Management System (EMS) supported by an Environmental Management Plan (EMP) for each operational site. The Proponent has been operating iron ore mines in the Pilbara since 2008. During this time, the Proponent has developed, implemented and refined its Environmental Management Plans and Procedures.

3.4.3 Commonwealth Regulation and Policy

The *National Greenhouse and Energy Reporting Act 2007* (NGER Act) is a single, national system for reporting GHG emissions, abatement actions, and energy consumption and production by corporations. Under the NGER Act, entities are required to register and report GHG emissions, energy production and energy consumption information if specific requirements are met (either at a facility or corporate group level). The methods and criteria for calculating GHG emissions and energy data under the NGER Act are detailed in the National Greenhouse and Energy Reporting (Measurement) Determination 2008.

3.4.4 State Regulation and Policy

The *Environmental Protection Act 1986* (WA) is relevant for the reporting of GHG emissions in Western Australia.

The Western Australian Government's GHG Emissions Policy for Major Projects (the State GHG Policy) commits the State Government to work with all sectors of the Western Australian economy to achieve net-zero GHG emissions by 2050 and commits to working with the Commonwealth Government's interim target of emission reductions of 26 to 28 per cent by 2030. In accordance with the Environmental Factor Guideline – GHG Emissions (EPA, 2020b) a GHGMP should outline:

- Intended reductions in scope 1 emissions over the life of the proposal.
- Regular interim and long-term targets that reflect an incremental reduction in scope 1 emissions over the life of the proposal.
- Strategies which demonstrate that all reasonable and practicable measures have been applied to avoid, reduce, and offset a proposal's scope 1 emissions over the life of the proposal.

3.4.5 Rationale for choice of Provisions

In accordance with the Environmental Factor Guideline – GHG Emissions (EPA, 2020b), the EPA may request information on any considered and proposed mitigations that demonstrate that all reasonable and practicable measures have been applied at each step of the mitigation hierarchy, including:



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- Avoiding emissions through best practice design. This may involve comparing emissions and energy intensity performance metrics with comparable facilities and ensuring emissions and energy intensity are minimised at the design stage and/or a particular level of emissions intensity performance is attained through adoption of renewable/low emissions technologies.
- Continuous improvement to reduce emissions over the project life through consideration of measures to improve performance or setting targets for emissions intensity improvement over time.
- Offsetting emissions (carbon offsets) through the implementation of a GHG emissions offset package to offset some or all residual emissions.

In line with the mitigation hierarchy, the management provisions outlined in Section 4 have been proposed based on the following rationale:

- GHG abatement opportunities adopted in this GHGMP have been assessed to determine whether they are reasonable and practicable in terms of safety, technical performance, operability, emissions reduction, availability, scale, and economic return.
- There is potential for substantial changes in technology over the lifetime of the Proposal, which may influence the reasonableness or practicability of GHG abatement measures. As this GHGMP is dynamic, periodic reviews of policies, markets, technology, and infrastructure will be carried out as part of the adaptive management approach.



4 Management Plan Provisions

This section outlines outcome-based provisions and objective-based provisions to achieve the objective of the GHG emissions environmental factor and minimise emissions.

Outcome-based provisions are performance-based; they focus on monitoring and evaluating specific measurable outcomes and are typically driven by trigger and threshold criteria. The outcome-based provisions are outlined in Table 3.

Table 3: Outcome-based provisions

Provision No.	Outcome	Monitoring	Reporting	Offset
1	Manage changes to operational aspects to achieve scope 1 GHG emissions targets identified in Table 5 and Figure 3	GHG emissions will be measured in accordance with the requirements of the National Greenhouse and Energy Reporting Measurement Determination	Exceedances of the target will be reported in the annual compliance audit report submitted to EPA.	Allowable offsets will be purchased and surrendered equivalent to the amount of emissions above targets identified in Table 5 and Figure 3.

Objective-based provisions relate to monitoring and management actions, where specific trigger or threshold criteria may not be appropriate for the circumstances. The objective-based provisions are outlined in Table 4.

Table 4: Objective-based provisions

Provision No.	Management action	Target	Monitoring	Reporting
1	Set annual target for fuel usage	Specific target will be set annually and notified internally. Targets will consider energy efficiency measures available at the time	Fuel usage will be metered at each point of supply	Performance against fuel usage targets will be reported in annual audit compliance reports submitted to EPA
2	Monitor GHG emissions in accordance with the NGER Act	No non-compliances with the monitoring and reporting requirements of the NGER Act	Annual internal audit	Annual NGER report submitted to the Clean Energy Regulator
3	Carry out two-yearly (or as required) assessment of the reasonable and practicable GHG emission reduction technologies or techniques that have or could be implemented.	Carry out one review at least every two years	Annual internal audit	Outcomes of the two-yearly reviews will be summarised in the annual compliance audit report submitted to EPA.



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4.1 Establish and Achieve Interim Emissions Reduction Targets

Reduction targets will be set for the emissions that will arise from the Proposal to achieve an incremental reduction in emissions over the life of the project in line with the state's aspiration to achieve zero net emissions by 2050. The zero net emissions trajectory for the Proposal will start in Year 2024 as this is the first full year of mining at McPhee Creek Iron Ore Mine.

The current forecast of emissions arising from the Proposal are shown in Figure 3 and the proposed interim reduction targets are shown in Table 5. The targets proposed are for cumulative 5-year periods and are consistent with the zero net emissions by 2050 trajectory. To meet these targets emission reduction initiatives will be implemented to either avoid, reduce, or offset emissions.

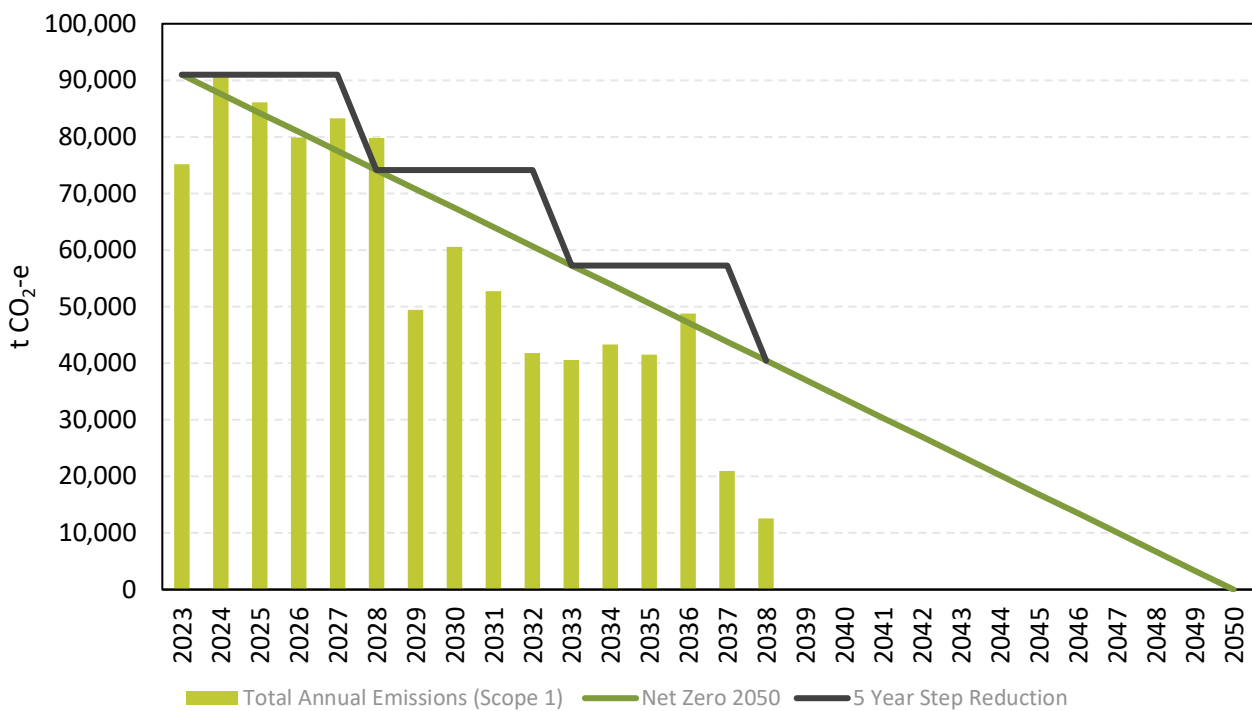


Figure 3: McPhee Creek Iron Ore Project Interim Emissions Targets - Scope 1 emissions

Table 5: Interim Emissions Targets - Scope 1 emissions

Year	FY 2023	FY 2028	FY 2032	FY 2036
Annual Emissions Targets (tCO ₂ -e)	90,995	74,144	57,293	40,442

In the event that the Proponent is not able to meet the proposed targets, the Proponent will offset the excess emissions by purchasing carbon credits (local or international) that meet offset integrity principles and are based on clear, enforceable and accountable methods.



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In accordance with the EPA guidance (EPA, 2020b), compliance offsets that may be required under the Safeguard Mechanism would be recognised as a contribution to the proposed interim GHG emissions reduction targets under this GHG Management Plan.

4.2 Set Annual Target for Fuel Usage

Internal targets will be set annually for fuel use at the mine and notified to relevant departments. Targets will consider energy efficiency and renewable energy measures available at the time.

Performance against fuel usage targets will be summarised in the annual audit compliance report submitted to EPA.

4.3 Monitor and Report GHG Emissions in Accordance with the NGER Act

Monitoring, auditing, and reporting of GHG emissions for the Proposal will be used to measure ongoing performance and provide data that aids in the identification of improvement opportunities. Monitoring, and reporting of GHG emissions is carried out in accordance with the requirements of the NGER Act.

Auditing of the environmental and GHG emission performance of the Proposal will include:

- Internal and external environmental audits (as required) of compliance to its statutory obligations and management plans.
- Internal auditing of GHG emissions data reporting as required under the NGER Act.

4.4 Carry out Regular Assessment of the Reasonable and Practicable GHG Emission Reduction Technologies

The mining industry is currently undergoing rapid change facilitated by the global commitment to reaching zero emissions targets and there are numerous technologies that are being identified and developed for commercial use. Regular GHG emissions reviews and assessments of the reduction technologies will be undertaken at McPhee Creek to achieve reductions in scope 1 emissions.

Mitigation measures to investigate may include:

- Fuel Efficiency - optimisation of haul routes and truck operation – transportation emissions account for approximately one third of the total annual emissions (on average) for the Proposal.
- Energy Efficiency – maintenance and renewal of key power using equipment, optimisation of mine plan to minimise the pump/conveyor distances.
- Renewable Energy
- Trial for hydrogen powered light vehicles
- Research and Development (R&D)



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5 Adaptive Management and Review

5.1 GHG Management Plan Review

This GHGMP will be reviewed as required or in response to the following triggers:

- Introduction of a new process or activity that could introduce new or amend existing GHG emissions
- Outcomes of relevant technical studies and investigations into new GHG emission reduction opportunities.
- Changes in relevant state or commonwealth legislation
- Comments from the EPA during the environmental assessment process.

Independent verification of the GHG inventory will be conducted as required for quality assurance purposes and to provide feedback on managing data collection and inventory quality.

5.2 Review of Mitigation Measures

Four-yearly reviews of potential equipment, technologies and techniques will be undertaken to improve the GHG emissions performance. The reviews will consider the aspects described in Table 6.

Table 6: McPhee Creek Iron Ore Project GHG emission Mitigation Measures

Aspect	Measure	Aspects for review
Fuel efficiency	Fuel efficiency of mobile equipment	Maintenance and renewal of haul fleet Use of alternative fuels (e.g., biodiesel, hydrogen) Use of electric vehicles and equipment (electrification) Recycling and reuse of waste oil and hydrocarbons Evolution of mine plan to minimise haul distances
Energy efficiency	Energy/fuel efficiency of site electricity generation	Maintenance and renewal of key power using equipment Use of diesel-powered back-up generators and mobile lighting rigs Evolution of infrastructure layout to minimise pump distances
Renewable energy	Options for electricity generation for lighting and in accommodation camps and ancillary/support buildings	Use of renewable energy, including: Small to medium wind turbines Solar thermal and voltaic panels Hybrid systems, utilising more than one technology
Research and development	Technological advances regarding management of GHG emissions	Technological developments identified through regulator, peak-industry groups, academia, or other organisations Participation in research for energy efficiency technologies in iron ore mining



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