Iron Bridge

Plan

Greenhouse Gas Management Plan

North Star Magnetite Project

July 2022

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Greenhouse Gas Management Plan			
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TABLE OF CONTENTS

List of Tables

List of Figures

EXECUTIVE SUMMARY

Table 1: Management Plan executive summary

Proposal Name	North Star Magnetite Project
Proponent Name	FMG Iron Bridge (Aust) Pty Ltd
Ministerial Statement Number	MS 993
Purpose of the Environmental Management Plan	Avoidance and minimisation of GHG emissions
Key Environmental Factor	Greenhouse Gas Emissions
Proposed Construction and Operation Dates	Construction of the North Star Magnetite Project commenced in August 2019. Construction of the North Star Extension is planned to commence in February 2024. The Mine has an expected 50-year life.

ACRONYMS

The following acronyms, defined in Table 2, have been used throughout this Plan.

Table 2: Acronyms

Acronym	Definition
BMS	Business Management System
EMS	Environmental Management System
EPA	Environmental Protection Authority
Fortescue	Fortescue Metals Group Limited, all subsidiaries and employees
GHG emissions	Greenhouse gas emissions expressed in tonnes of carbon dioxide equivalent (tCO2-e) as calculated in accordance with the definition of “carbon dioxide equivalence” in Section 7 of the *National Greenhouse and Energy Reporting Act 2007*.
LOM	Life of Mine
Scope 1 GHG emissions	GHG emission released to the atmosphere as a direct result of an activity, or series of activities at a facility level.
Scope 2 GHG emissions	GHG emission released to the atmosphere from the indirect consumption of an energy commodity.
Annual GHG emissions	Total Scope 1 GHG emissions for the project, calculated on a financial year basis in accordance with the requirements of the *National Greenhouse and Energy Reporting Act 2007*.
Baseline GHG emissions	Expected GHG emissions based on normal operations of the project.
Target GHG emissions	GHG emissions calculated based on 2% annual reduction in emissions from Baseline GHG Emissions, until 2030, at which time target greenhouse gas emissions become zero.
Project GHG emissions	Annual GHG emissions for the project, comprising elements approved under Ministerial Statement 993 (North Star Magnetite Project) and elements applied for under subsequent amendments to MS 993.

1. INTRODUCTION

Fortescue Metals Group Ltd (Fortescue) is an integrated business comprised of mine, rail and port operations based in the Pilbara region of Western Australia, with its head office located in Perth.

FMG Iron Bridge (Aust) Pty Ltd, a majority owned subsidiary company of Fortescue operates the North Star Magnetite Project (the Project).

1.1 Project description

The Project is located approximately 110 kilometres southeast of Port Hedland in the Pilbara region of Western Australia.

The Project comprises of approved works, under Ministerial Statement 993 (MS 993) of an open cut magnetite iron ore mine and associated infrastructure, including roads, administrative buildings, accommodation camp, aerodrome, borefield, slurry and raw water pipelines and an auxiliary power station. The approved works include clearing of 5,977.9 hectares of vegetation[1].

The mine life is expected to be 50 years.

1.2 Requirement for management plan

This Greenhouse Gas Management Plan (the Plan) was prepared for submission to the Western Australian Environmental Protection Authority (EPA) along with the Environmental Review Document for amendments to the Project[1].

The Plan has been developed accordance with the EPA's *Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans.*

1.3 Objective and scope

The objective of the Plan is to address environmental management activities relevant to the avoidance and minimisation of Greenhouse Gas (GHG) emissions at the Project.

This Plan has been developed to address the "Requirements of the Greenhouse Gas Management Plan" defined in the *Environmental Factor Guideline – Greenhouse Gas Emissions* (EPA, April 2020), including:

- Intended reductions in GHG emissions over the life of the proposal (see Section 2.2)

[1] Referral for the Project in 2022 included an additional 606.9 hectares of clearing and the removal of the 221 megawatt power station.

- Regular interim and long-term targets that reflect an incremental reduction in GHG emissions over the life of the proposal (see Section 2.2)
- Strategies which demonstrate that all reasonable and practicable measures have been applied to avoid, reduce and offset a proposal's GHG emissions over the life of the proposal (see Sections 2.5, 2.6 and 2.7).

1.4 Legislation and regulatory framework

Fortescue employees and contractors are obliged to comply with all relevant State and Commonwealth legislation. Legislation directly relevant to the management of GHG emissions are provided in Table 3.

Table 3: Commonwealth and State Legislation relating to GHG emissions management

Legislation	Application
Environmental Protection Act 1986 (WA)	State environmental impact assessment and Ministerial approval process.
National Greenhouse and Energy Reporting Act 2007 (Cwlth)	National framework for reporting greenhouse gas emissions, greenhouse gas projects and energy consumption and production by Corporations in Australia.
National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015 (Cwlth)	Compliance rules and procedures for administering the safeguard mechanism, which applied to facilities with Scope 1 covered emissions of more than 100,000 tCO2-e per year.
National Greenhouse and Energy Reporting (Measurement) Determination 2008 (Cwlth)	Describes the methods, standards and criteria to be applied when estimating greenhouse gas emissions, energy production and consumption.
Environmental Factor Guideline (Greenhouse Gas Emissions) (EPA, 2020)	Describes how the environmental factor (Greenhouse Gas Emissions) is considered by the EPA in the environmental impact assessment process.
Greenhouse Gas Emissions Policy for Major Projects (Government of Western Australia, 2019)	Policy that requires major new projects or project expansions with significant emissions to set interim and long-term emissions reduction targets to support the State's aspiration of net zero emissions by 2050.
Western Australian Climate Policy (Department of Water and Environmental Regulation, 2020)	Policy used to underscore the Western Australian Government's commitment to adapting to climate change and working with all sectors of the economy to achieve net zero greenhouse gas emissions by 2050.

1.5 Key assumptions and uncertainties

Key assumptions and uncertainties for the Plan are detailed in Table 4.

Table 4: Key Assumptions and uncertainties of the Plan

Assumption or uncertainty	Justification / explanation
Product and mine strategy will remain stable throughout the life of the Project.	Product and mine strategies are market driven and may result in changes from time to time. The current Project GHG emissions are based on the current mine plan at the time of the preparation of this Plan.
Alternative and/or innovative sources of energy for mining may become available in the future that can further avoid or minimise GHG emissions.	Alternative and/or innovative energy sources for mining (e.g., renewables, hydrogen) will be investigated when they become viable in the future.

2. RATIONALE AND APPROACH

In March 2021, Fortescue announced its intention to achieve carbon neutrality (Scope 1 and Scope 2) by 2030[2].

The Project GHG emissions will follow an incremental reduction trajectory for Scope 1 GHG emissions until 2030, after which net GHG emissions will be zero.

2.1 Estimation of greenhouse gas emissions

The Project will generate GHG emissions from the following sources:

- Mobile and Stationary Equipment – Scope 1 emissions associated with combustion of fossil fuels for the operation of plant machinery, mining vehicles, small gensets and explosives.
- Auxiliary Power Station – Scope 1 emissions associated with combustion of fossil fuels for the operation of a backup power station, to be used in the event of interruption of power supply from the Pilbara Energy Connect (PEC) network.
- Vegetation Clearing – Scope 1 emissions associated with vegetation clearing and construction. It is expected that up to 5,977.9 hectares of vegetation dominated by "Acacia Shrubland" will be cleared throughout the Life of Mine. Note that soil carbon has been excluded from the clearing estimations due to topsoil being removed and stored for future rehabilitation therefore the soil carbon is assumed to be maintained and not released as an emission.
- Purchased Electricity – Scope 2 emissions associated with purchasing electricity from the Pilbara Energy Connect (PEC) network, made up of gas-fired electricity from the PEG Power Station (subject to a separate Ministerial Statement 1161) and renewable sources. To estimate Scope 2 GHG emissions, the emission factor specified in Section 7.3 of the *National Greenhouse and Energy Reporting (Measurement) Determination 2008* has been used.
- Shipping – Scope 3 emission associated with shipping 25 million tonnes per annum of magnetite to international customers, calculated based on the emission factors for freighting goods via cargo ship specified in *UK Government GHG Conversion Factors for Company Reporting*, 2021.
- Steel Production – Scope 3 emissions associated with processing of sold products, considering typical emission factors associated with steel production.

Other Scope 3 emission sources have been excluded from the emission estimates, due to lack of availability of estimates and the immateriality of emissions.

[2] ASX Release, 15 March 2021 https://www.fmgl.com.au/docs/default-source/announcements/2189340.pdf?sfvrsn=ac9b01d9_6)

The Baseline GHG emissions from the Project are presented in Table 5.

Table 5: Baseline GHG emissions

Emission source	Emission scope	Estimated emission intensity	Estimated production output	Estimated annual GHG emissions (tCO2-e)	Percent of annual emissions
Mobile and Stationary Equipment	Scope 1	0.0099 tCO2-e/wmt	25 million tonnes/annum	246,914	0.5%
Auxiliary Power Station	Scope 1	0.694 tCO2-e/MWh	40 MW auxiliary power station	11,104	0.02%
Vegetation Clearing	Scope 1	49.12 tCO2-e/ha	5,977.9 ha total for Life of Mine	5,872	0.01%
Purchased Electricity[3]	Scope 2	0.57 tCO2-e/MWh	1,278,900 MWh/annum	728,973	1.5%
Shipping	Scope 3	0.011 t CO2-e/wmt[4]	25 million tonnes/annum	278,544	0.6%
Steel Production	Scope 3	1.85 tCO2-e/wmt[5]	25 million tonnes/annum	46,250,000	97.3%
Total Annual GHG Emissions Per Annum				47,521,407	100%
Total Life of Mine GHG Emissions (LOM = 50 years)				2,376,070,355	

2.2 Emission reduction targets

The Project will meet the following Target GHG Emissions that reflect an incremental reduction in Annual Scope 1 GHG emissions, from Baseline GHG Emissions (i.e., 258,018 $tCO_{2\text{-}e}$/annum), over the life of the proposal.

Table 6: Target GHG emissions

Target timeframe	Unabated cumulative emissions (Σ t CO2-e)	Target cumulative emissions (Σ t CO2-e)	Comment
Short term – by end FY25	791,671	760,004	2% annual reduction, from baseline
Medium term – by end of FY30	2,111,122	1,921,121	2% annual reduction, from baseline
Long term – by end of FY72 (Life of Mine)	13,194,515	1,921,121	Net zero emissions after FY30

[3] North Star's Scope 2 electricity emissions will be the Scope 1 emissions of the PEG Power Station, subject to emission reduction targets imposed under Ministerial Statement 1161.
[4] Adapted from the Scope 3 Freighting Goods (Bulk Carrier) emission factors presented in *UK Government GHG Conversion Factors for Company Reporting* (Department of Business, Energy & Industrial Strategy, 2021) https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021. The *Corporate Value Chain (Scope 3) Accounting and Reporting Standard* (Greenhouse Gas Protocol) (https://ghgprotocol.org/standards/scope-3-standard) defines the boundary for "downstream transportation and distribution" Scope 3 emissions as the laden leg only. Fortescue has calculated the laden leg of a Capesize ore carrier as accounting for 57.5% of greenhouse gas emissions.
[5] *Climate Change and Production of Iron and Steel* (World Steel Association, 2021) https://worldsteel.org/wp-content/uploads/Climate-change-production-of-iron-and-steel-2021.pdf

Target Scope 1 GHG emissions for the project, compared to the baseline are illustrated in Figure 1, as well as the indicative offsets that the Project will surrender to meet any target exceedances.

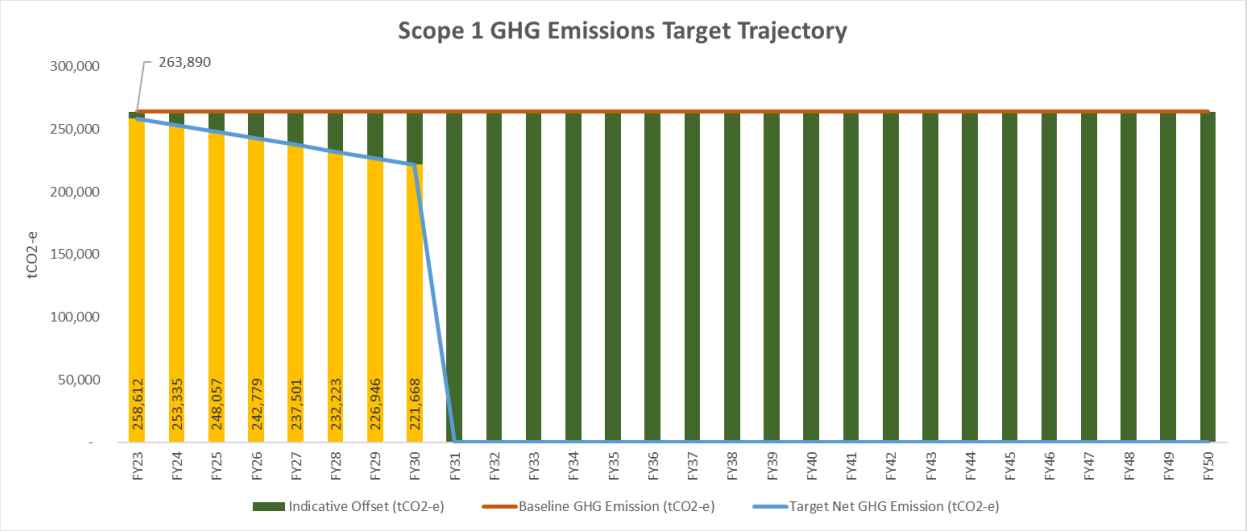

Figure 1: Scope 1 GHG emissions target trajectory

2.3 Benchmarking

Fortescue has benchmarked the estimated Scope 1 and Scope 2 GHG emission intensity of the Project against the emissions of other magnetite mines within Western Australia, as well as the default emission intensity for iron ore specified in the *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015* (Safeguard Mechanism).

Table 7: Benchmarked GHG emission intensities

Mine	Scope 1 emission intensity (tCO2-e/wmt saleable iron ore)	Scope 2 emission intensity (tCO2-e/wmt saleable iron ore)
North Star Magnetite Project (Baseline GHG emissions)	0.0106	0.0292
Karara Iron Ore Project[6]	0.0115	0.0540
Sino Iron Project – Cape Preston [7]	0.0591	NA
Default emission intensity (Safeguard Mechanism)[8]	0.00476	NA

[6] Source: Karara Iron Ore Project – Mine Life Extension (pp. 129 – 131)
[7] Source: Safeguard Facility Reported Emissions 2020-21 and Citic Limited Annual Report 2021 (p.39)
[8] Source: *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015* (Sch. 2, Pt 14)

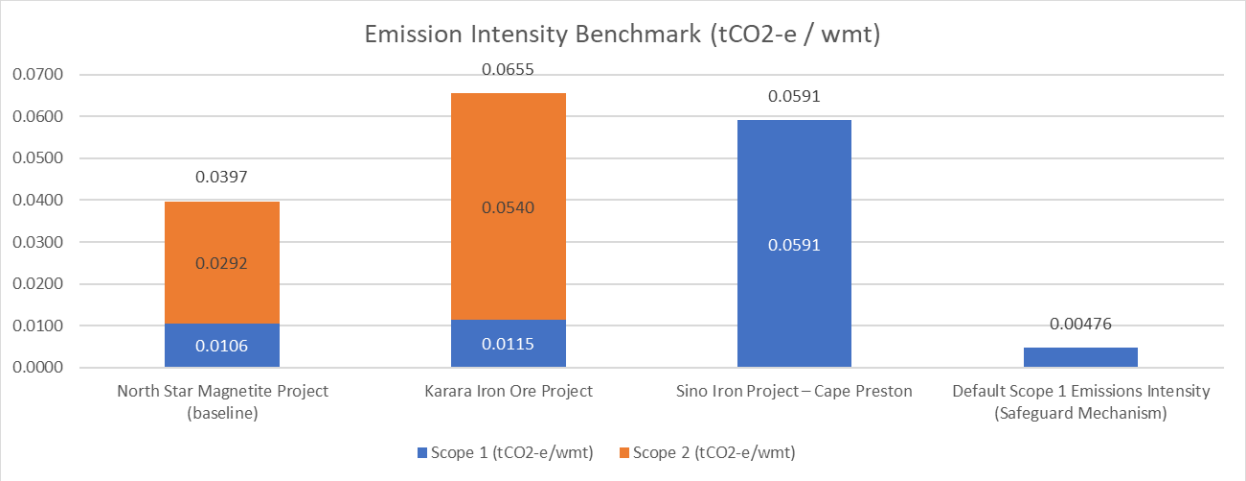

Figure 2: Benchmarked GHG emission intensity

Scope 1 emission intensity

In comparison to the two other significant magnetite projects within Western Australia, the estimated Scope 1 emission intensity of the Project is expected to perform well. The Project most closely resembles the Karara Iron Ore Project, in that neither project will produce significant onsite electricity from Scope 1 emission sources (e.g., diesel or gas-fired power stations), while the Sino Iron Project produces all electricity from onsite Scope 1 sources, which significantly increases the Scope 1 emission intensity of that project.

The Project performs poorly against the Australian Governments default Scope 1 emissions intensity specified by the Safeguard Mechanism. The default emission intensity is derived from an industry average, accounting for both high intensity iron ore mines (e.g., magnetite) and lower intensity haematite iron ore mines. Magnetite iron ore mines result in higher emissions per tonne of iron ore output due to mining in harder rock locations and the need for additional processing to produce the magnetite concentrate.

Scope 2 emission intensity

The Project's estimated Scope 2 emission intensity is derived from the available emission factors specified in Section 7.3 of the *National Greenhouse and Energy Reporting (Measurement) Determination 2008*, and performs considerably better that the Karara Iron Ore Project, potentially due to the source of energy used to generate the purchased electricity.

Total (Scope 1 and Scope 2) emission intensity

The estimated total emission intensity of the Project (both Scope 1 and Scope 2 emission sources) is considerably better that the two other significant magnetite projects within Western Australia.

2.4 Monitoring

Fortescue measures and monitors GHG emissions in accordance with the requirements of the *National Greenhouse and Energy Reporting (Measurement) Determination 2008.*

2.5 Design of project to minimise greenhouse gas emissions

The Project has been designed by taking into consideration the mitigation hierarchy of avoidance or minimisation. The following elements have been included:

Table 8: Project GHG emission mitigation measures

Mitigation hierarchy	Management actions
Avoidance	• Fortescue will continue to review greater business opportunities to avoid GHG emissions where practicable. • Fortescue will avoid Scope 1 emissions from electricity generation by purchasing electricity from the Pilbara Energy Connect (PEC) network, consisting of a highly energy efficient gas-fired power station and significant amounts of renewable (solar) electricity (100MW solar project construction proposed to commence in 2022 following receipt of all approvals).
Minimisation	• Clearing of native vegetation will be minimised. • The use of energy-efficient technology will be used wherever possible. • Opportunities to utilise renewable energy technology will be explored and applied to the Proposal where practicable. • All machinery will be maintained in good working order, to manufacturers requirements. • The use of fossil fuels for the operation of the Proposal will be continually monitored. Opportunities to reduce and/or optimise use will be explored on an on-going basis.

2.5.1 Design alternatives considered

The Project was previously approved with a 221 MW gas or diesel-fired power station, located onsite. The primary power station has subsequently been removed from the Project scope in favour of purchasing electricity from the PEC Project, and maintaining a smaller auxiliary (backup) power station onsite, which has resulted in a significant reduction in estimated Scope 1 greenhouse gas emissions.

2.6 Potential emission reduction measures & continuous improvement

Fortescue will pursue further opportunities to reduce greenhouse gas emissions where practicable, including balancing the opportunity against the necessity, effort and cost of implementing the opportunity at that time. Implementation of opportunities are dependent on the technology available at the time and the business case, including risk and cost.

The following opportunities will be considered during the operation stage of the project:

- Alternative and/or innovative sources of energy for mobile plant and machinery to avoid or minimise GHG emissions.
- Alternative and/or innovative methods of mining (e.g., autonomous vehicles) to avoid or minimise GHG emissions.

Potential Project GHG emission reduction projects that are being investigated, are presented in Table 9.

Table 9: Proposed Project GHG emission reduction projects

Project	Mitigation hierarchy	Indicative timeframe	Estimated Project GHG emission reduction	Status
Diesel replacement in mining fleet, by utilising large battery or hydrogen fuel cell technology.	Avoidance	By 2030	200,000 tCO2-e/annum	In Progress
Installation of large-scale battery storage in PEC network to remove reliance on diesel-fired auxiliary electricity generation.	Avoidance	By 2030	11,104 tCO2-e/annum	In Progress

2.7 Carbon credits

Fortescue's Corporate-wide target of carbon neutrality by 2030 is underpinned by the commitment to acquire and surrender carbon credits, where efficiency and decarbonisation efforts do not achieve that target.

Fortescue will acquire and surrender the following types of carbon credits for GHG emissions above the Scope 1 emission Reduction Targets specified in Table 6:

- Australian Carbon Credit Units (ACCUs) issued under the *Carbon Credits (Carbon Farming Initiative) Act 2011*, and/or
- Verified Emission Reductions issued under the Gold Standard program, and/or
- Verified Carbon Units issued under the Verified Carbon Standard program, and/or
- Other carbon credit units agreed by the Western Australian Environmental Protection Authority (WA EPA).

3. COMPLIANCE

Fortescue ensures compliance with its legal obligations through first party quality assurance by site environment teams with a focus on effective environmental management through the corporate Environmental Management System (EMS).

Fortescue has adopted a risk-based approach to monitor compliance with its legal obligations. Site environment teams will monitor their compliance with this Plan and any site-specific management and monitoring programs using the *Environmental Compliance Obligation Management Procedure* (100-PR-EN-1046).

Where non-conformance issues are identified these will be documented and managed via Fortescue's Business Management System (BMS).

4. REPORTING

Fortescue complies with the requirements of the *National Greenhouse and Energy Reporting Act 2007*, by monitoring monthly and reporting annually the GHG emissions of all facilities under Fortescue's operational control, including the Project.

Fortescue's annual GHG emissions are audited by an independent and appropriately qualified auditor and reported to the Clean Energy Regulator in accordance with Section 19 of the *National Greenhouse and Energy Reporting Act 2007*. Emission numbers are reported to the public by the Clean Energy Regulator.

Cumulative GHG emissions will be reported annually in the Compliance Assessment Report (required by Condition 4-6 of MS 993) against Scope 1 emission Reduction Targets specified in Table 6. GHG emission numbers will be reported for the previous financial year and will be the same Scope 1 reported under the *National Greenhouse and Energy Reporting Act 2007.*

5. ADAPTIVE MANAGEMENT & REVIEW OF THE PLAN

Review and revision of this Plan will be undertaken in response to a change to the proposal that results in a material risk that the emission reduction targets will not be achieved. Revisions of this Plan will be submitted to the relevant State Governments for approval, in accordance with relevant approval conditions.