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PILBARA IRON ORE AND INFRASTRUCTURE PROJECT

Greenhouse Gas Management Plan

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1. INTRODUCTION

1.1 PROJECT BACKGROUND

Fortescue Metals Group Limited (Fortescue) is proposing to develop the Pilbara Iron Ore and Infrastructure Project (the Project), which involves a series of iron ore mines in the Pilbara region of Western Australia, with rail and port infrastructure for export of iron ore through Port Hedland (Figure 1).

The Project has been assessed under the Western Australian *Environmental Protection Act 1986*. Assessment occurred in three stages:

- Stage A Project: Port and a 345km long north-south railway from north of the Chichester Ranges in the Central Pilbara to Port Hedland (Ministerial Statement 690);
- Stage B Project: Christmas Creek and Mindy Mindy mines and a 111km long east-west rail spur from the north-south rail line (Ministerial Statement 707); and
- Cloud Break Project: The Cloud Break mining operations (Ministerial Statement 721).

The Port is located in Port Hedland on the Pilbara coast. Port Hedland is a heavy industry town, currently utilised by resource companies such as Dampier Salt and BHP Billiton Iron Ore (BHPBIO). Fortescue's Port will be located at Anderson Point on the south-east side of the Port Hedland Harbour near BHPBIO's Finucane Island berth. In the first few years of operations, mining will occur only at Cloud Break and, at this stage, the rail will extend only to Cloud Break and not to the Christmas Creek and Mindy Mindy mines.

The Project is located within the Pilbara Bioregion as described in the Interim Biogeographic Regionalisation for Australia (IBRA) (Thackway and Cresswell, 1995; Environment Australia, 2000).

1.2 GREENHOUSE GAS EMISSIONS

The Greenhouse Effect is a natural phenomenon where light energy from the sun passes through the atmosphere and heats the earth's surface. Greenhouse gases in the atmosphere include carbon dioxide, water vapour, methane, nitrous oxide, non-methane volatile organic compounds, halocarbons, carbon monoxide and sulphur hexafluoride. These gases within the atmosphere trap heat reflected from the earth's surface thereby maintaining temperatures at a level capable of supporting life.

Human activities such as the combustion of fossil fuels and land clearing have resulted in

an increase in the concentration of greenhouse gases in the earth's atmosphere. This is believed to have the potential to cause an enhanced greenhouse effect leading to an increase in the average temperature of the earth's surface.

The Intergovernmental Panel on Climate Change has reported that the global average surface temperature has increased by 0.6ºC since 1861. Globally it is estimated that the 1990s was the warmest decade and 1998 the warmest year, in the instrumented record (1861–2000). The Intergovernmental Panel on Climate Change predicts that the mean surface temperature is likely to rise within a range of 1.4 to 5.8ºC over the period 1990–2100 (EPA 2002).

Australia will be hotter and drier in coming decades according to CSIRO's climate change estimates. Over most of the continent, annual average temperatures are predicted to be 0.4 to 2°C greater than 1990 by 2030. By 2070, average temperatures are predicted to increase by 1 to 6°C (AGO 2005).

The main anthropogenic greenhouse gas is CO_2, which has increased in concentration in the atmosphere by about 31% over the last 200 years. To give a common base for considering the impact of various gases, greenhouse gases are usually expressed in terms of carbon dioxide equivalents (CO_2-e), where the potential of each gas to increase heating in the atmosphere is expressed as a multiple of the heating potential of CO_2 (EPA 2002). This is termed its 'global warming potential'. For instance, methane has a global warming potential of 21 and nitrous oxide a global warming potential of 310.

The combustion of fossil fuels is the major source of anthropogenic CO_2emissions.

The CSIRO has examined the potential climate change scenarios for the south west of Western Australia. These scenarios are based on modelling carried out by the Intergovernmental Panel on Climate Change which has been interpreted on a national scale by the CSIRO.

The expected trend for the Pilbara region is for temperature increases of 2^oC and 6^oC by 2030 and 2070 respectively (Western Australian Greenhouse Taskforce 2004). This may significantly impact on water supplies as well as potentially leading to structural and compositional changes in vegetation communities.

The most recent estimate of Western Australian greenhouse gas emissions was made in 2002 as part of the development of the Western Australian Greenhouse Strategy (Western Australian Greenhouse Taskforce 2004) and is estimated to be almost 66 Mtpa – a 15% increase from 1990 levels. The energy producer sector represents the biggest emission source in Western Australia (Table 1).

Table 1: WA greenhouse Gas Emission Estimates for 2002

Sector	2002 Emission (Mtpa)
Energy	48.1
Industrial process	1.0
Agriculture	18.7
Land use change and forestry	-3.6
Waste	1.7
Total (net) emissions	**65.9**

Western Australian Greenhouse Taskforce 2004

Western Australia contributes 12% of the total Australian greenhouse gas emissions of 539 Mtpa (based on 2002 estimate). On a world scale, Australia is estimated to contribute 1% of global greenhouse gas emissions (Western Australian Greenhouse Taskforce 2004).

1.3 PURPOSE

This Greenhouse Gas Management Plan (GGMP) has been prepared to fulfil Commitment 10 and Commitments 18 and 19 of Schedule 2 of Ministerial Statement No. 707 and 721 respectively, which is to:

- Develop a Greenhouse Gas Management Plan which addresses efficient use of resources and equipment and other measures to reduce greenhouse gas emissions.
- Implement the Greenhouse Gas Management Plan

The plan constitutes one of a number of management plans that Fortescue will use to manage environmental issues at their operations.

Although greenhouse gas emissions are dominated by the mine sites, the Plan applies across the project and describes actions for consideration to decrease project emissions and improve greenhouse gas efficiency.

1.4 SCOPE

The GGMP will apply to emissions from sources within the mine site areas as well as emissions associated with transport along the railway. This plan also addresses how Fortescue intends to assess and report on its performance.

1.5 OBJECTIVE

Fortescue will meet its requirements and commitments through:

- Recording fuel and energy use, land clearing and other greenhouse gas emitting activities;
- Assessing greenhouse gas emissions and efficiencies during construction and the first two years of operations; and
- Developing methods for minimising emissions and improving greenhouse gas efficiencies for its ongoing rail and minesite operations.

1.6 STAKEHOLDER CONSULTATION

Fortescue has undertaken an extensive stakeholder consultation program whereby landowners, regulators and other relevant parties have been consulted with regard to investigation and design of the port and railway corridor (see Section 7 in Environ 2004, 2005). The Department of Environment and Conservation (DEC) will review this plan prior to granting approval.

2. POTENTIAL IMPACTS

In the construction and operation of the Project, greenhouse gases will be released to the atmosphere by:

- decomposition of cleared vegetation and release of carbon from the soil (an estimated 17,107 ha will be cleared over 20 years); and
- combustion of diesel fuel for the mining vehicles (50MLpa of diesel consumed); and
- combustion of diesel fuel for mobile equipment at the railway and port;
- combustion of diesel fuel for the locomotives; and
- combustion of diesel/gas to meet the Project's power requirements (45MW).

Table 2 below shows the estimated greenhouse gas emissions for the project for the first five years. Christmas Creek will not be in operation during this period, therefore greenhouse gas emissions for the mine has not been included. It is expected that Christmas Creek would produce approximately 450,000t of CO_2 per year once it is at operating at full capacity.

Table 2: CO_2 emissions for the project

Activity	Stage	Assumptions	tCO_2e/yr
Mobile equipment	Stage A	5 ML of automotive diesel oil.	13,500
	Stage B	Not operational during first five years.	-
	Cloud Break	40.7 ML per year automotive diesel oil.	109,944
Power consumption	Stage A	12.5 MW	50,130
	Stage B	Not operational during first five years.	-
	Cloud Break	45 MW power station.	90,495
Locomotive fuel	Stage A	40 ML Industrial diesel fuel.	112,000
	Stage B	Included under Stage A.	-
	Cloud Break	Included under Stage A.	-
Vegetation clearing	Stage A	1,600 ha – no burning.	16,259
	Stage B	Not operational during first five years.	-

Activity	Stage	Assumptions	tCO_2e/yr
	Cloud Break	Clearing 5,500 ha over 12 years 27 t carbon per ha above-ground biomass 70 t carbon per ha in soil No revegetation offsets calculated	72,786
Total	Stage A		191,889
	Stage B	Not operational during first five years.	-
	Cloud Break		273,224
	Total		**465,113**

Greenhouse gas emissions for the Pilbara Iron Ore Infrastructure Project were estimated according to Australian Greenhouse Office Factors and Methods Workbook August 2004 (AGO 2005).

Greenhouse gas emission efficiency for the project is similar to other iron ore projects in the region (Table 3).

Table 3: Greenhouse Emissions for Recent Iron Ore Proposals

Project	Reported energy use (kgCO2e/t of ore shipped)
Robe River West Angelas Project[a]	10-13
BHP Mining Area C Project[b]	12
Hamersley Iron Nammuldi Silvergrass Iron Ore Project[c]	9-12
Hope Downs Iron Ore Project[d]	13.6
Fortescue Metals (during first five years based on production from Cloud Break only)	10.3

[a] Robe River, 1998

[b] BHPBIO, 1997

[c] Hamersley Iron, 1999

[d] Hope Downs, 2002

3. APPLICABLE LEGISLATION

Whilst there is no specific legislative requirement to manage Greenhouse gas impacts in Western Australia, Fortescue recognises the importance of addressing this globally important environmental issue for its rail and mine operations. Further, the development of a Greenhouse Gas Management Plan is a requirement of Ministerial Statements 707 and 721 and this Plan is developed to meet compliance with the Statements.

Fortescue, its employees and contractors will comply with all Commonwealth and State legislation that applies to the development and operation of the Project.

4. ROLES AND RESPONSIBILITY

Table 4 provides provisional roles and responsibilities of the personnel responsible for the Greenhouse Gas Management Plan. Contractor responsibilities will be outlined within contract documents.

Table 4: Roles and Responsibilities

Position	Responsibility
Manager - Environment	To formulate and implement greenhouse gas management strategies. To provide the tools required to meet Fortescue's objectives to site staff.
Site Environmental Officers	To collect information necessary to calculate greenhouse gas emissions. To provide technical support and advice to site staff.
Construction / Operational Managers	To ensure that Fortescue's conditions, commitments, and policies are followed on-site. To provide necessary information to the Site Environmental Officer.
All Fortescue personnel, contractors and visitors	Minimise the generation of greenhouse gases from the construction and operation of the project through minimising the use of energy and resources.

5. ENVIRONMENTAL MANAGEMENT

The general approach to management of greenhouse gases has been detailed according to the following structure:

Item	Content
Objective	What is aimed to be achieved.
Target	Intended outcomes to achieve the objective.
Performance Indicators	Qualitative or quantitative measurement to gauge the performance of the actions undertaken.

Management Actions	Timing	Responsibility
Tasks that will be undertaken to ensure the Objective is met. Include list of the relevant procedures.	When action is to be undertaken	Nomination of responsibilities for overseeing management action

Item	Content
Monitoring	Details of measurement of performance indicators, including the nature, timing and responsibility of monitoring
Reporting	Reporting requirement for each issue.
Corrective Action	Action to be taken if monitoring indicates objective is not being met.

5.1 MANAGEMENT

5.1.1 Objectives And Indicators

Objective	To quantify greenhouse gas emissions and efficiencies. To minimise greenhouse gas emissions for the project. To reduce greenhouse gas emissions per unit product to as low as reasonably practicable. To manage greenhouse gas emissions in accordance with the Framework Convention on Climate Change 1992 and with established Commonwealth and State policies.
Target	Use of lowest emission equipment as far as practicable during construction and operation. Completion of investigations into reducing greenhouse gas emissions over the life of the project. Report to community and regulators on greenhouse gas management performance annually during operations
Performance Indicators	Improvements in greenhouse gas efficiency over the life of the project. Comparison of Fortescues greenhouse gas total emissions and efficiencies with other similar operations.

5.1.2 Management Actions

Management Actions	Timing	Responsibility
Quantify project greenhouse gas emissions	During construction and operations	Manager - Environment
Undertake clearing incrementally and as close to time of mining as practicable.	During construction and operations	Manager - Environment
Progressively rehabilitate disturbed areas as soon as practicable.	During construction and operations	Manager - Environment
Do not burn cleared vegetation.	During construction and operations	Manager - Environment
Design operational layout to reduce vehicle movements.	During construction and operations	Manager - Environment

Management Actions	Timing	Responsibility
Consider greenhouse gas efficiencies in the purchase of equipment.	During construction and operations	Manager - Environment
Energy substitution for lower greenhouse intensity sources where practicable.	During construction and operations	Manager - Environment
Prepare a greenhouse gas policy.	During construction and operations	Manager - Environment
Investigate other options for reductions in greenhouse gas emissions, including: • Use of renewable energy sources (e.g. solar panels for power in remote areas). • Fuel substitution, such as converting the diesel-fired power station to natural gas and converting the mobile fleet to LPG; and • The development of greenhouse gas efficient technologies.	During construction and operations	Manager - Environment

Fortescue has committed to undertaking management practices to ensure that greenhouse gas emissions are minimised as far as practicable. During construction and subsequent operation of the Project, Fortescue will minimise both the land area and total amount of biomass cleared. Cleared vegetation will be stockpiled for use in rehabilitation, to provide mulch and a seed source to assist revegetation and will not be burnt. Clearing of the proposed 17,107 ha will be over the life of the Project (20 or more years) and will be progressively rehabilitated as mining progresses. This will offset greenhouse gas emissions to some extent.

The rail construction schedule and mining construction and operations will be designed to be undertaken in the most efficient manner, to minimise vehicle movements, and duplication of activities and use of natural resources.

In designing the Project, Fortescue has, where practicable, selected the most energy efficient technology available. Once operational, Fortescue will monitor greenhouse gas emissions and continue to look for ways to improve energy efficiency and reduce greenhouse gas emissions, as part of continual improvement.

5.1.3 Monitoring

Monitoring of greenhouse gas efficiency performance will consist of the annual collection of the data necessary for calculating and reporting greenhouse gas emissions. Data to be collected will include:

- Fuel usage by vehicles;
- Fuel usage in power generation;
- Fuel used by mobile equipment;
- Areas cleared; and
- Areas rehabilitated.

5.1.4 Contingencies

If greenhouse gas efficiency trends are found to be decreasing, investigations will be conducted to determine the causes of the decrease. The investigation will also determine actions to be taken to ensure that greenhouse gas efficiencies are increased.

5.1.5 Reporting

Fortescue will report annual greenhouse emissions and improvement measures as part of its Annual Environmental Report. The Western Australian Greenhouse Strategy has recently been established to provide a mechanism for reporting of greenhouse gases within WA. According to the strategy the reporting of greenhouse by emitters will be required according to the following timetable:

- 2004-05 – more than 500,000 tonnes CO_2-e year
- 2005-06 – more than 250,000 tonnes CO_2-e year
- 2006-07 – more than 100,000 tonnes CO_2-e year

Currently reporting is optional, but it is expected to become mandatory in the near future. Once the strategy is finalised Fortescue intends to participate in the inventory as required.

Reporters to the Inventory are to provide forecasts for the following year by amount and intensity, as well as strategies to minimise anticipated emissions. The strategy also provides for audits of operators reporting to the Inventory every three years.

Fortescue will also consider becoming a signatory to the Greenhouse Challenge, a voluntary program between the Federal Government and industry to abate and report greenhouse gas emissions. The Challenge requires that emissions of greenhouse gases are calculated and reported each year of a company's operation together with Greenhouse reduction measures.

6. REVIEW

This management plan will be reviewed every five years or at such time as the project scope changes. Upon review, the document will be revised where appropriate and the revision status will be recorded as directed by the Fortescue Document Control Procedure.

The review will seek to incorporate any new investigations, information, new techniques, and advice from regulatory bodies.

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Figures

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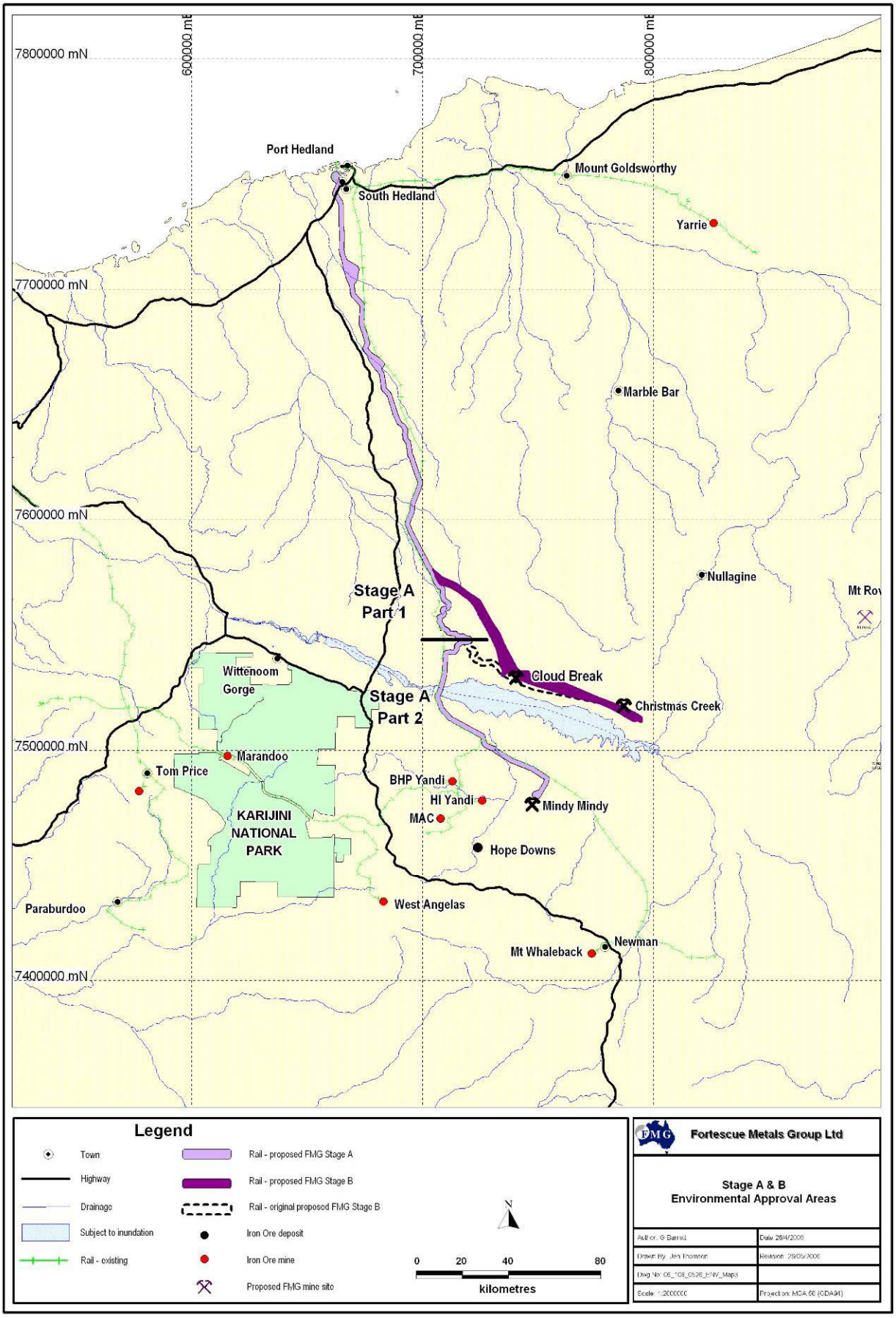

Figure 1: Site Locations.