Fortescue
The New Force in Iron Ore

Construction Dust Management Plan

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1. INTRODUCTION

1.1 BACKGROUND

The Fortescue Metals Group Limited (FMG) is proposing to develop the Pilbara Iron Ore and Infrastructure Project in the Pilbara region of Western Australia. The Project has been divided into stages for the purposes of the State environmental assessment process under the Western Australian *Environmental Protection Act 1986*.

- Stage A: Proposed port and north-south railway from Chichester Ranges to Port Hedland (ENVIRON 2004a).
- Stage B: The mining operations and east-west rail spur (ENVIRON 2005a).
- Cloud Break Iron Ore Project (ENVIRON 2005b).

This management plan relates only to dust management relevant to the **construction** phase of Stages A, B and Cloud Break (see Section 1.5). Operational dust management controls will be addressed in a separate plan, or in a subsequent revision to this plan. This plan incorporates construction of the following elements:

- A port facility at Anderson Point in Port Hedland;
- A 190 km North-South railway running between Port Hedland and the Chichester Ranges;
- A 111 km East-West railway running between the Chichester Ranges and Christmas Creek Mine.
- Christmas Creek, Cloud Break and Mindy Mindy Mines.

The locations of these facilities are presented on Figure 1 (railway and mine sites) and 2 (port facilities). Further detailed information about the project specifications can be found in the project Public Environmental Review Documentation (ENVIRON, 2004a, 2005a and 2005b).

This report is based on a draft report prepared by Environ (2005c). The draft report has been amended to take into account feedback from statutory authorities.

1.2 PORT FACILITY

The proposed port facility will consist of a rail loop, car dumper, stockyard and ore handling facilities (including two stackers and a single reclaimer) and rescreening facility located approximately 5 km north-west of the locality of Wedgefield. A product conveyer will carry ore a further 3 km to a wharf and shiploader at Anderson Point.

The land on which the port is to be constructed will be reclaimed using material dredged from the harbour, and supplemented with material collected from borrow pits if required. When the dredged material has drained and dried sufficiently, concrete hardstand areas will be laid to enable construction of the wharf, stockpile and handling areas.

During construction of the port facility, dust generation could be caused by the following:

- General construction activities related to land clearing, earthworks prior to dredging and vehicle generated dust;
- Windblown dust from cleared areas prior to covering with (wet) dredged material;
- Windblown dust from areas on which added dredged material has dried, prior to creation of hardstands; and
- General construction activities related to creation of hardstands and construction of port facilities.
- During operation of the port facility, dust generation could be caused by the following:
- Transfer of ore from rail cars into dumpers;
- Transport of ore along conveyors;
- Ore screening;
- Stacking and reclaiming of the ore in stockpile areas;
- Windblown dust from stockpiles;
- Ship loading; and
- Windblown dust from hardstand and cleared areas, and from transport activities on the site.

1.3 RAILWAY

The railway is to be constructed between the Port Anderson rail loop to the North to the Chichester Ranges 190 km to the South. An East-West extension of the rail, will link the Cloud Break and Christmas Creek Mines. The precise route for the rail line has not been determined, however where possible it will run parallel to the existing BHP Billiton Iron Ore (BHPBIO) rail line between Port Hedland and the Mt Whaleback mine site in Newman.

During construction of the railway, dust generation is likely to be restricted to general construction activities.

- During operation of the railway, dust generation could be caused by the following:
- Loading and unloading of rail cars (note that unloading has already been identified above as a port activity; and
- Windblown dust from open rail cars.

1.4 MINE SITES

Mine sites will be developed at Cloud Break and Christmas Creek, which are located in the Chichester Ranges and also Mindy Mindy which is located in the Hamersley Ranges. Mining will initially commence at Cloud Break where direct ship material will be extracted for the first few years. After this time low grade material from both operations will be mined in conjunction with direct ship material. Low grade material will be stockpiled until the beneficiation plant is constructed at Christmas Creek in Year 7. Mindy Mindy will be the last to be mined.

- During construction of the mine sites, dust generation could be caused by the following:
- General construction activities related to land clearing and earthworks prior to mining; and
- Transport activities.

During operation of the mine sites, dust generation could be caused by the following:

- General mining activities (blasting, vegetation removal, stockpiling etc);
- Crushing, screening and beneficiation;
- Windblown dust from stockpiles and open areas;
- Transport of ore along conveyors; and

- General transport activities on the site.

1.5 SCOPE OF DUST MANAGEMENT PLAN

This dust management plan is intended to cover the construction phases of Stage A, Stage B and Cloud Break of FMG's Pilbara Iron Ore and Infrastructure Project. The scope includes:

- Management and monitoring of dust during construction of the port, railway and mine site facilities; and
- Incorporation of dust control technology to enable subsequent operation of the facilities in a manner that minimises dust emissions.

This plan is not intended to cover ongoing operation of the facilities. FMG commits to revising this plan, or developing a subsequent new plan for managing dust emissions during operation.

Commitment 1
FMG commits to update this dust management plan, or to develop a new management plan, during construction phases. The revised (or new) plan will cover management of dust emissions during operation of the port, rail and mine site facilities.

2. CLIMATE OF THE REGION

The climate of the Pilbara region is dominated by the presence of tropical cyclonic weather between January and March. Both mean wind speeds and monthly rainfall levels are higher during these months than at other times of the year. These effects are more pronounced on the coast.

Annual rainfall in the region is low, averaging 313 mm and 310 mm at Port Hedland and Newman respectively. The majority of this rain falls during cyclonic events between January and March, with almost no rain falling between August and November. The rainfall events in the Pilbara are generally very concentrated, averaging more than 10 mm rainfall per rain day in Port Hedland, and slightly less than this figure in Newman.

A summary of the meteorological conditions present in Port Hedland and Newman are presented in Tables 1 and 2 respectively. The focus is on those parameters such as wind and rainfall data that are significant for dust generation and transport. Data relating to these towns are selected because they are representative of meteorological conditions relevant to the port facility (Port Hedland) and Christmas Creek and Cloud Break mines and the southern portion of the railway (Newman).

The data presented in Table 1 indicate that wind speeds are generally high in the Port Hedland area, averaging over 20 km/hr at some point in the day for most months. Winds are generally stronger in the morning between May and August, with afternoon winds stronger for the rest of the year. The strongest wind events occur during cyclonic events between December and March.

Winds are more moderate inland at Newman, with monthly wind speeds averaging 10 km/hr throughout the year. There is also far less diurnal variation in wind speeds at Newman.

Dust is most likely to be generated and transported when:

- Stockpiles and cleared areas are dry (i.e. during periods of low rainfall and high evaporation); and
- Wind speeds are sufficiently high to enable wind-blown dust to be generated from stockpiles and cleared areas.

At Port Hedland, the presence of strong winds throughout the year are conducive to dust generation and transport. Since rainfall is concentrated over a small number of days, even in the wettest months, and evaporation rates are high all year round, dust problems are likely to be present throughout the year. However, strong winds are generally from westerly or south-westerly directions, which would blow dust away from populated areas.

Wind speeds are generally lower inland than on the coast, with similar numbers of rainfall days occurring. Windblown dust is therefore likely to be less significant in inland areas.

Should suitable meteorological data be available, FMG will use this data to assist with ongoing dust management and subsequent air dispersion modelling at the site. In the event that suitable data is not readily available, FMG will construct a meteorological monitoring station at its port facility for this purpose.

Commitment 2
In the event that suitable meteorological data is not already available, FMG commits to installing a meteorological monitoring station at its port facility in accordance with AS 2923 prior to the commencement of operations.

Table 1: Summary of Port Hedland Meteorology

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Mean 9am wind speed (km/hr)	14.0	14.1	14.7	16.8	19.4	20.3	20.5	19.7	18.0	17.5	15.4	14.7	17.1
Mean 3pm wind speed (km/hr)	24.9	23.1	21.1	19.3	17.9	17.4	18.2	19.5	21.8	24.9	26.0	26.3	21.7
Maximum wind gust(km/hr)	170.6	192.6	200.2	153.7	85.3	74.2	81.7	85.3	81.7	92.5	81.7	207.7	207.7
Mean rainfall (mm)	60.7	97.7	41.8	23.4	28.9	22.0	10.1	5.5	0.8	0.9	2.7	18.9	313.5
Mean no. of rain days	4.8	7.2	4.1	1.8	3.2	2.8	1.9	1.1	0.7	0.7	0.5	1.8	30.6
Mean daily evaporation (mm)	10.4	9.5	9.3	8.8	7.3	6.3	6.6	7.4	8.9	10.6	11.4	11.3	9.0

Note: Data sourced from Bureau of Meteorology, and relates to data collected at the Port Hedland Airport monitoring station from 1942-2005

Table 2: Summary of Newman Meteorology

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Mean 9am wind speed (km/hr)	10.5	10.4	9.1	7.7	6.8	6.9	7.5	8.2	10.4	11.2	10.5	10.5	9.1
Mean 3pm wind speed (km/hr)	10.1	10.7	8.8	7.7	7.9	8.3	9.3	9.2	10.2	11.0	10.2	9.6	9.4
Maximum wind gust(km/hr)	-	-	-	-	-	-	-	-	-	-	-	-	-
Mean rainfall (mm)	50.1	80.1	38.6	25.3	23.2	25.0	12.6	10.6	4.1	3.9	9.8	27.0	310.3
Mean no. of rain days	6.6	7.0	4.9	4.2	3.8	3.9	2.5	2.0	0.9	1.4	2.9	5.1	45.0
Mean daily evaporation (mm)	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: Data sourced from Bureau of Meteorology, and relates to data collected at the Newman monitoring station from 1965-2005

3. POTENTIAL IMPACTS OF DUST EMISSIONS

3.1 HEALTH IMPACTS

Health risks posed by inhaled dust particles are influenced by both the penetration and deposition of particles in the various regions of the respiratory tract and the biological responses to these deposited materials (DEH, 1998).

Particle size is the primary determinant of the depth to which particles can penetrate the human respiratory tract. Since smaller particles are able to penetrate further into the lungs than larger particles, they are generally of more concern from a health perspective. Exposure to small dust particles can lead to such respiratory conditions as asthma.

As a general rule, dust with an equivalent diameter less than 10µm is considered 'inhalable'. These particles may be inhaled through the nose and throat and be deposited in the trachea and bronchia sections of the lungs, and may therefore cause health impacts. Such dust is referred to by the nomenclature PM_{10}, or particulate matter with an equivalent diameter of less than 10µm.

The subset of PM_{10} is $PM_{2.5}$ which has an equivalent diameter less than 2.5µm and is considered 'respirable'. Due to their smaller size, $PM_{2.5}$ particles can travel further through the respiratory system. $PM_{2.5}$ may penetrate the lung's unciliated airways and become lodged in the alveolar region. The health implications of this are more pronounced than is the case for particles lodged higher in the respiratory tract.

Standards exist in Australia for both PM_{10} and $PM_{2.5}$, as discussed in Section 4.1.

Some dust particles can generate accelerated health impacts due to their shape or chemical nature. Examples of this are asbestos fibres (known carcinogens) and crystalline silica dust (which can form scar tissue on the lungs). Iron ore dust is generally not associated with any specific pathogen effects.

The Hamersley Ranges are noted for the presence of asbestiform minerals, the most common of which is crocodilite. However, during exploration drilling in FMG's proposed mining areas have to date failed to detect the presence of, or geochemistry indicative of, crocodolite or other asbestiform minerals. It is therefore unlikely that this will be an issue at FMG. However, FMG commits to undertake regular monitoring of ores received at the port facility for asbestos fibres, as per its Ministerial commitments.

Commitment 3
FMG commits to regularly monitor iron ore leaving the mine sites to confirm the absence of asbestos fibres. The frequency of asbestos monitoring will be finalised prior to any ore leaving the mine sites and included in an amendment to this dust management plan.

3.2 AMENITY IMPACTS

Aside from the potential health impacts described in Section 2.1, dust may also affect communities by interfering with amenity. Amenity impacts may include:

- Preventing members of the community from undertaking outdoor activities in comfort;
- Soiling clothing on washing lines;
- Dust build-up on buildings and vehicles requiring frequent washing; and
- Staining of surfaces.

Dust of any particle size can contribute to amenity impacts. The general term for dust of any size is Total Suspended Particulates (TSP).

Amenity impacts are often considered less important than health impacts. However, the effects of amenity reduction can be significant in terms of the social and economic welfare of a community. The stress associated with sustained amenity impacts may also lead to secondary health impacts. FMG is therefore committed to treat amenity impacts seriously, and to ensure that the potential for amenity impacts is minimised as far as reasonably practicable.

Commitment 4
FMG commits to treating amenity impacts seriously, and to ensure that the potential for amenity impacts is minimised as far as reasonably practicable.

3.3 VEGETATION IMPACTS

Where dust deposition is high over a sustained period, it can form a physical barrier on vegetation to restrict natural processes such as photosynthesis. Some species of plant are more sensitive to these effects than others.

Vegetation surveys of the Port, railway and mine sites have been carried out as part of the Environmental Impact Assessment process by Biota (2004a and 2004b) and Mattiske (2005). It was concluded that dust emissions during construction and operation of the port, railway and mine sites would have a minimal impact on

vegetation, and that normal dust suppression measures would provide adequate protection.

FMG considers that dust mitigation measures proposed for occupational health and public health and amenity protection will be sufficient to protect vegetation.

4. REGIONAL CONTEXT

4.1 REGIONAL PLANNING

Development in the Port Hedland area is centred upon three localities, Port Hedland, Wedgefield and South Hedland. Port Hedland contains mixed commercial / residential land uses and is nestled between two large BHPBIO operations at Finucane Island and Nelson Point. Wedgefield is located approximately 6 km to the south of Port Hedland, and is largely comprised of industrial land uses. South Hedland is a further 2 km to the south of Wedgefield, and comprises mixed commercial/residential land uses.

The Western Australian Government is currently undergoing an Enquiry by Design (planning review) of the Port Hedland area (MPI, 2004). An initial community survey and forum was conducted in October 2004, concluded that Wedgefield was best suited for industrial purposes and that residential components of Wedgefield should be relocated. Both Port Hedland and South Hedland were seen to be capable of sustaining both residential and commercial components. Assuming that the results of these forums will shape development of the region in the future, it is likely that:

- The small existing residential components of Wedgefield will be encouraged to relocate in the long-term, and that no new residential housing will be located in the area;
- Port Hedland will continue to sustain residential developments, although new developments will be focused upon Cooke Point to the east, which is further from the BHPBIO facilities at Nelson Point and Finucane Island; and
- South Hedland will continue to be the main focus of new residential development in the region (MPI 2004).

There is no significant residential development in the remainder of the proposal region, with the proposed FMG railway located adjacent to the existing BHPBIO railway for much of its length.

4.2 REGIONAL DUST LEVELS

Ambient dust concentrations in the Pilbara region can be naturally high due to:

- Low rainfall and high evaporation rates, which cause soils to be dry and subject to lift-off;
- Relatively sparse natural vegetation;
- Limited housing and industry development;
- Frequent high winds; and

- Frequent uncontrolled bush fires.

The cumulative effect of high ambient dust levels and emissions from mining and industrial activities has led to significant dust impacts. This is particularly the case in Port Hedland, which is a population centre in very close proximity to existing ore processing and transport facilities.

In response to increasing levels of development in the Pilbara Region, the DoE commenced a study of air quality in the area in 1998, and produced the Pilbara Air Quality Summary Report in 2004 (DoE, 2004). The study examined various aspects of air quality in the region, including dust levels in Port Hedland, and significant relevant outcomes of the study are presented below. With respect to Port Hedland, the report relied on data collected by BHPBIO at its monitoring stations. However, data regarding inland background dust levels are not readily available.

Prior to 2002, a monitoring station at Boodarie was used to collect background data. Following the construction of the BHPBIO Boodarie Direct Reduced Iron (DRI) project this site was deemed no longer suitable for collection of background data, and a new station was established at the Port Hedland Airport. Due to its location remote from major anthropogenic dust sources, the Port Hedland Airport monitoring station is considered to represent background dust levels. A summary of the Boodarie and Airport monitoring data is presented Table 3.

Table 3: Summary of Port Hedland Background Dust Levels

Monitoring Station	Year	No. of Times that 24-hr Average PM_{10} Concentration Exceeded the Specified Level in the Calendar Year	
		50 µg/m^3 (NEPM Standard)	150 µg/m^3
Boodarie	1996	0	0
Boodarie	1997	7	0
Boodarie	1998	6	1
Boodarie	1999	5	1
Boodarie	2000	20	0
Boodarie	2001	7	2
Airport	2003	15	-

Source: (DoE, 2004)

The data presented in Table 3 indicates that background dust levels in the Port Hedland area regularly exceed the PM_{10} NEPM standard, and are occasionally more than three times the standard. Most of these exceedences can be traced to dust storms and bushfires. For example, all except one of the 2000 NEPM exceedences have been verified to have occurred during these events.

The average PM_{10} concentration at Boodarie between 1996 and 2001 was approximately 19 µg/m^3, which is 38% of the NEPM standard.

$PM_{2.5}$ has been monitored at the Boodarie station between 1998 and 2002 and at the Airport station since 2003. The average $PM_{2.5}$ concentration at Boodarie between 1998 and 2000 was approximately 8 µg/m^3. The 24-hour $PM_{2.5}$ NEPM Advisory Reporting Standard of 25 µg/m^3 was exceeded on 3 occasions in 2003 at the Airport station.

Monitoring data collected at the BHPBIO monitoring stations during 2002 are summarised in Table 4.

Table 4: Monitored Dust Concentrations 2002/03

Monitoring Station	Daily Average TSP ($\mu g/m^3$)	Daily Average PM_{10} ($\mu g/m^3$)	Daily Average $PM_{2.5}$ ($\mu g/m^3$)	% Days Where Daily Average PM_{10} Exceeded 50 $\mu g/m^3$	% Days Where Daily Average $PM_{2.5}$ Exceeded 25 $\mu g/m^3$
Town	112	47	30	43	49
Hospital	91	40	-	22	-
Airport	36	22	12	5	5

The results presented in Table 4 indicate that the NEPM standards are exceeded approximately 40-50% of the time at the eastern edge of the Port Hedland town site (Town monitoring station), approximately 20% of the time closer to the centre of the town site (Hospital monitoring station), and approximately 5% of the time at the more remote Airport site. Given the location of the monitoring sites, this appears to be consistent with impacts from the BHPBIO operations at Finucane Island and Nelson Point.

4.3 REGIONAL DUST MANAGEMENT STRATEGY

Given that ambient dust levels in the Port Hedland region are relatively high, effective management of anthropogenic dust sources in the area is essential to minimising potential dust impacts in the area. The BHPBIO Port Hedland Dust Management Strategy is therefore a critical document, as outlines the manner in which current operations will be managed to minimise emissions in the present and also in the future. In this regard, the strategy has been endorsed by the DoE as a reasonable response to the problem.

However, with the introduction of further dust generating activities in the area, such as construction and operation of the proposed FMG port facility, the value of a coordinated approach to dust management becomes apparent. Such a strategy may involve such actions as the transfer of information regarding new dust management and control technologies, and the development of a coordinated and collaborative ambient dust monitoring program. The DoE has indicated that such a collaborative strategy would be supported and encouraged *(Pers. Comm. P. Raitt, 21 April 2005)*. Accordingly, FMG will commit to any such agreed approach.

Commitment 5
FMG commits to actively participate with other stakeholders in the development of a coordinated dust strategy for the Port Hedland region.

Commitment 6

FMG commits to implement the outcomes of any agreed coordinated management strategy, which may involve, but not be limited to,

- **transfer of information regarding new dust management and control technologies; and**
- **the development of a coordinated and collaborative ambient dust monitoring program.**

5. DUST STANDARDS, TARGETS & OBJECTIVES

5.1 NATIONAL ENVIRONMENTAL POLLUTANT MEASURES

The National Environmental Protection Council (NEPC) has developed a range of National Environmental Protection Measures (NEPM) for protecting various aspects of the environment. These included the *National Environmental Protection Council (Ambient Air Quality) Measure*, which sets National standards for various air pollutants, including PM_{10}. In addition, the Air Quality NEPM sets an advisory reporting standard for $PM_{2.5}$. A summary is presented in Table 5.

Table 5: Summary of Ambient Air Quality NEPM Dust Standards

Particle Size Fraction	Status	Maximum Concentration ($\mu g/m^3$)	Averaging Period	Specified Goal
PM_{10}	Standard	50	1 day	No more than 5 days per year exceeding standard by 2008
$PM_{2.5}$	Advisory Reporting Standard	25	1 day	Gather data to facilitate a review of the Advisory Reporting Standard
		8	1 year	

The Ambient Air Quality NEPM has been developed for the protection of human health, and the PM_{10} standard and $PM_{2.5}$ advisory reporting standard reflect the NEPC conservative opinion of ambient air quality levels that would not be injurious to human health. Whilst excursions of these levels may not lead to unacceptable health outcomes (as reflected in the PM_{10} standard itself, which allows for 5 exceedences per year), it is appropriate that the NEPM standards be used as a platform for developing regulatory limits and management targets.

5.2 REGIONAL DUST TARGETS

It is known from existing ambient monitoring programs that dust levels in the Pilbara region naturally exceed NEPM ambient dust level criteria from time to time (DoE, 2004). In the Port Hedland region specifically, the NEPM criteria are exceeded more often due to the anthropogenic dust generated through the ore processing activities undertaken there. The DoE therefore has an expectation that existing and future dust producers will minimise emissions as far as reasonably practicable, and actively work towards reducing emissions.

Whilst no regional dust targets have been set, it is likely that the DoE will consider developing and implementing an Environmental Protection Policy relevant to dust in the Port Hedland area in the future. Such a Policy would be likely to set targets for the region which take into account the specific environmental values and natural

background levels of the area. FMG commits to supporting the development of such a Policy.

Commitment 7
FMG commits to support the Department of Environment in the development of any future Environmental Protection Policy relevant to dust levels in the Port Hedland area.

5.3 REGULATORY REQUIREMENTS

Draft Ministerial Conditions for the project do not contain specific regulatory requirements with respect to dust, apart from a requirement to develop and implement a Dust Management Plan which sets out measures for:

- defining an effective tool for measuring the effectiveness of dust management strategies (for example monitoring for benchmarking and performance evaluation)
- controlling the generation of dust during construction and operations;
- researching and justifying the application of best practice dust mitigation and management during construction and operations;
- establishing and implementing a comprehensive ambient air quality monitoring programme including validation of source emissions estimates;
- participating in a consolidated monitoring programme involving major industry in the Port area;
- continually improving and reducing emissions;
- a complaints process; and
- reporting of monitoring results.

Works approval and licence conditions for the project are likely to contain specific conditions relating to dust. It should be noted that the current licences for the Port Hedland facilities specify PM_{10} targets of 50 µg/m^3 differential between downstream and background dust levels (as monitored at agreed locations). There is an expectation that a similar target would be placed on the FMG operating licence.

5.4 PROJECT OBJECTIVES & TARGETS

FMG sets the following internal objectives specifically for this project:

(i) That dust emissions resulting from implementation of the project do not adversely affect the health or amenity of nearby residents.

(ii) That dust emissions resulting from implementation of the project do not adversely impact on ecological values in the project area.

(iii) That dust emissions be minimised as far as reasonably practicable.

(iv) That the project be implemented in manner that is considered as best practice for the industry with respect to dust control.

As measures to determine whether these objectives are being met, FMG sets the following targets against which the project will be internally audited. FMG will adopt strategies for monitoring and review to ensure maintenance of industry best practice and to ensure that construction and operations are undertaken in a manner that approaches these ideals as closely as possible:

(v) That implementation of the project does not lead to community complaints regarding dust emissions or their impacts.

(vi) That FMG operations do not cause NEPM standards be exceeded in the project area.

(vii) That any additional regional ambient dust targets set by the DoE will be met in the vicinity of the project.

Given the nature of the project, and the naturally high background dust levels in the area, it is unrealistic to expect that these targets will be met at all times. However, FMG commits to monitoring and reporting its performance against these targets, and to periodically review its dust management strategies based on complaints and advances in mitigation technologies.

Commitment 8
FMG commits to monitoring and reporting against its dust targets, and to periodic review of its dust management strategies until they are achieved. Its dust targets are:

- **No community complaints received regarding dust emissions;**
- **NEPM standards are not exceeded due to FMG operations; and**
- **Any additional regional targets set by the DoE to be met.**

6. DUST MONITORING EQUIPMENT

A number of types of dust monitoring equipment are available. Equipment suitable for the purposes of this project include dust deposition gauges, high volume samplers and continuous particle monitors. These are explained in the sections below.

6.1 DUST DEPOSITION GAUGES

A dust deposition gauge is a gravimetric instrument to quantify deposited particulate matter. It relies on the passive deposition and capture of dust within a funnel and bottle arrangement. It can be deployed in remote areas, is cheap to construct and operate, does not require power, and can be left in the field for long periods of time. The deposition gauge provides basic data on dust deposition rates (usually as g/m^2/month) and the relative 'dustiness' of sampling locations.

The following limitations apply to dust deposition gauges:

- Measurement gives levels of dust deposition, rather than dust concentration therefore they are more appropriate for assessing vegetation and amenity impacts rather than health impacts.
- Results are averaged over long periods (usually 30 days), and specific short-term dust events may therefore not be identified;
- Conversely, single non-representative high dust events may artificially inflate results;
- The gauges provide an indication of total dust deposition, and do not differentiate between sources of dust, whether they be natural or anthropogenic; and
- Due to the nature of the equipment, there is a fairly large error associated with the measurements.

6.2 DUSTTRAK MONITORS

Dusttrak monitors are portable, battery operated laser photometers that monitor real time dust concentrations in mg/m^3. They are useful for obtaining instantaneous information about ambient dust concentrations. Selective size inlets can be fitted to the monitors to enable measurement of PM_{10} or $PM_{2.5}$.

The main disadvantage of Dusttrak monitors is that they are not included in standard monitoring methodologies, and are therefore not recommended for compliance monitoring and reporting. However, results are appropriate for internal management purposes.

6.3 HIGH VOLUME SAMPLERS

A typical high volume sampler collects particles by drawing a constant flow rate of ambient air through a filter medium. A determination of the net weight of the filter and knowledge of the total air flow through the filter provides an average concentration of TSP in $\mu g/m^3$. Selective size inlets can be added to a high volume sampler to restrict the size of particle entering the unit. A high volume sampler fitted with a selective size inlet can be used to measure PM_{10} or $PM_{2.5}$.

The following limitations apply to high volume samplers:

- Results are averaged over a period of time (e.g. 24 hours), and there is no measure of variability over this time period; and
- Since results are obtained by manually weighing the mass of particles deposited, results are labour intensive and not instantaneous.

6.4 CONTINUOUS PARTICLE MONITORS (TEOM, BAM)

Continuous particle monitors enable the continuous measurement of ambient dust levels. Two examples of continuous particle monitors are the Tapered Element Oscillating Microbalance (TEOM) and the Beta Attenuation Mass Monitor (BAM).

The TEOM is fitted with an oscillating tapered tube with a filter on one end. When particles enter the unit they collect on the filter, which affects oscillation of the tube according to total particle mass. The BAM uses a radioactive source and detector to determine the attenuation caused by particles deposited on a filter. Both units can be fitted with various cyclone heads to enable the continuous analysis of TSP, PM_{10} and $PM_{2.5}$.

The main advantages of continuous particle monitors is that they enable real time analysis of dust, and that results can be obtained directly without the need for filters to be weighed. The units can therefore be hooked up directly to a computer to enable on-line data collection.

Both TEOM and BAM monitors have been demonstrated to be suitable for dust monitoring, with each type of unit having particular advantages over the other. The main advantages of BAM monitors are that they are cheaper to establish, and require less ongoing maintenance than TEOM monitors.

6.5 PERSONAL EXPOSURE MONITORS

Personal dust monitors are small dust monitoring units that can be mounted onto clothing to monitor dust exposure in the work environment. Personal exposure monitors are commonly miniature laser photometers, and function in a similar manner to Dusttraks. They are worn for a specified period (generally 8 hours to verify compliance with occupational health guideline values). The units can be

fitted with size selective inlets to measure PM_{10} or $PM_{2.5}$ (i.e. inhalable or respirable dust respectively).

Personal exposure monitors are routinely employed for occupational health and safety monitoring on mine sites because they provide a better indication of personal exposure than the static monitors used for environmental monitoring.

6.6 DUST MONITORING STANDARDS

Various standards have been developed in relation to dust monitoring, including the following Australian Standards:

- AS 2922: Ambient Air – Guide for Siting of Sampling Units (relevant to all types of dust monitoring);
- AS 2.24.3: Determination of Total Suspended Particulates (dust deposition gauges);
- AS 3580.10.1: Deposited Matter – Gravimetric Method (relevant to dust deposition gauge and high volume sampler monitoring);
- AS 3580.9.6: PM_{10} High Volume Sampler with Size Selective Inlet – Gravimetric Method (high volume samplers);
- AS 3580.9.8: PM_{10} Continuous Direct Mass Method Using a Tapered Oscillating Microbalance Analyser (TEOM monitors);
- AS 2923: Ambient Air – Guide for Measurement of Horizontal Wind for Air Quality Applications (meteorological monitoring for dust impact analysis);
- AS 2985: Workplace Atmospheres – Methods of Sampling Respirable Dust; and
- AS 3640Workplace Atmospheres – Methods of Sampling Inspirable Dust.

FMG will conduct all monitoring in accordance with the above Standards.

Commitment 9
FMG commits to conducting dust monitoring in accordance with relevant Australian Standards.

7. DUST MONITORING PROGRAM

Dust monitoring is required to:

- Determine background dust levels;
- Monitor the impact of construction activities on ambient dust concentrations; and
- Monitor the impact of ongoing operation of the project on ambient dust concentrations.

7.1 BACKGROUND DUST MONITORING

BHPBIO currently operates a background dust monitoring station at Port Hedland Airport. The site has been agreed by the DoE as being suitable for the purposes of background monitoring in the area. Predictive air dispersion modelling indicates that the FMG operations will lead to increases in dust concentrations at the Airport (ENVIRON, 2004b).

FMG's preferred option is to rely on the existing BHPBIO monitoring station to provide background monitoring data for the area. However, FMG is amenable to negotiating with DoE and will commit to either:

Sharing responsibility for operation and maintenance of the Airport monitoring station with BHPBIO; or

Establishment of a second ambient monitoring station to be operated independently by FMG.

Commitment 10
FMG commits to monitor background dust levels in negotiation with DoE by either:

- **Sharing responsibility for operation and maintenance of the existing BHPBIO Airport monitoring station; or**
- **Establishment of a second ambient monitoring station to be operated independently by FMG.**

7.2 MONITORING DURING CONSTRUCTION

Construction activities have the potential to impact on the following environmental values:

Ambient air quality of the Port Hedland air shed; and

Health of vegetation along the railway corridor and around the mine sites, which may be affected by dust deposition.

7.2.1 Port Hedland Air Shed

Dust generation during construction of the port facilities will occur in three phases:

- Dust generated as a result of general clearing and earthworks activities. Dust generated during this period is likely to be of a similar particle size distribution as natural dust storm events in the area (i.e. relatively course particles with a low $PM_{2.5}/PM_{10}$ ratio).
- Dust generation is likely to be minimal immediately after the cleared area is backfilled with dredged material due to its high moisture content, however as the material dries sufficiently to enable further construction, dust emissions will increase. The nature of dusts generated in this period is unknown, with a higher ratio of smaller sized particles possible.
- Dust generated during construction of the facilities themselves is likely to be similar in magnitude and nature to those generated at construction sites elsewhere.

During initial clearing and earthworks activities, there will be a need to monitor TSP and PM_{10} levels at strategic locations. Since dust is likely to be similar to that monitored at background locations, $PM_{2.5}$ monitoring should not be necessary during this phase as it can be conservatively estimated by multiplying PM_{10} by a factor of 0.4.

FMG proposes to install an automated continuous particle (BAM) monitor at a location between the port facility and the locality of Wedgefield. The reasons for a installing such a monitor in this location are:

- Whilst Wedgefield is planned to be an industrial area, it is the nearest locality to the FMG port site;
- Wedgefield is situated between the FMG port site and the locality of South Hedland, and monitoring at this location should therefore provide a conservative estimate of impacts in the South Hedland residential area;
- The significance of dust emissions when prevailing winds are in this direction is likely to be an ongoing issue during both construction and operation of the port facility, and a comprehensive monitoring station is therefore warranted.

Installation of the continuous particle monitor will occur prior to backfilling of the cleared areas with dredged material.

Commitment 11
FMG commits to installing a continuous particle monitor (BAM) at a location between the port facility and the locality of Wedgefield prior to backfilling of cleared areas with dredged material.

FMG proposes to install dust deposition gauges at a minimum of five locations around the earthworks and one background location and to conduct monthly monitoring of dust deposition. FMG also proposes the use of Dusttrak monitors to undertake real-time TSP and PM10 measurements for internal management purposes. FMG will also install up to two continuous particle monitors at locations to be negotiated with the DoE, prior to the commencement of site clearing and earthworks.

Such monitoring will be relevant during all phases of construction and operation of the port facility, and will therefore be ongoing.

Commitment 12
FMG commits to installing a minimum of 5 dust deposition gauges around the port earthworks area, and a minimum of 1 dust deposition gauge at a background location, and to record monthly average deposition at each of these locations during construction and subsequent operation.

Commitment 13
FMG commits to the use of Dusttrak monitors to undertake real-time TSP and PM_{10} measurements around the Port for internal management purposes.

The network of Dusttraks will function as 'early warning' devices to aid the detection of dust issues by the BAM (continuous particle monitor). Their locations are shown in Figure 3. The trigger level has initially been set as 50 ug/m^3. The BAM has been set up to send SMS alarms if the wind direction is between 210 and 300 degrees and dust levels at Wedgefield:

- Reach 90ug/m^3 over a 10 minute average;
- Reach 70ug/m^3 over a 1hr average;
- Reach 60ug/m^3 over a 6 hr average;
- Goes over 50ug/m^3 10 times in a 24h period.

Trigger levels on the Dusttraks will be set based on the levels recorded by the BAM with the Intent that the Dusttrak monitors indicate (by flashing lights) that a dust event may be imminent.

Since the nature of dust that may be generated following backfill of cleared areas with dredged material is unknown, the preliminary dust monitoring undertaken during earthworks will need to be supplemented.

FMG commits to installing up to two continuous particle monitors at locations to be negotiated with the DoE. The value of such monitors will be assessed on the basis

that BHPBIO already operate seven BAM monitors in the locality of Port Hedland (at the 'Town' 'Hospital' and 'Airport' locations).

Commitment 14
FMG commits to installing up to 2 continuous particle monitors in the project area at locations to be negotiated the DoE.

FMG considers that the monitoring programs specified for the first two phases of construction will provide sufficient monitoring data for the third phase of construction, and no additional monitoring is proposed.

7.2.2 Railway

There are no significant public health and amenity issues relevant to construction of the railway, however there is a potential for dust deposition to impact vegetation. The value of dust deposition gauges, which are generally suitable for determining vegetation impacts, is questionable due to the transient nature of construction activities. FMG therefore does not propose monitoring of dust emissions generated from railway construction.

7.2.3 Mine Sites

High dust emissions during the construction of the mine sites has the potential to create amenity, health and safety risks for workers on site as well as the potential for dust deposition to impact vegetation. Dust impacts should therefore be minimised to as low as possible.

Commitment 15
FMG commits to implementing dust suppression measures as required to minimise the potential for dust deposition on vegetation.

Commitment 16
FMG commits to installing a minimum of 5 dust deposition gauges around the mines sites, and a minimum of 1 dust deposition gauge at a background location, and to record monthly average deposition at each of these locations during construction and subsequent operation.

Commitment 17
FMG commits to undertaking personal dust monitoring for respirable and inspirable dust.

7.2.4 Summary of Monitoring Program

The monitoring program to be undertaken during construction is summarised in Table 6.

7.3 DUST MONITORING DURING OPERATION

Dust monitoring undertaken during construction of the proposal is likely to be relevant to subsequent operation. FMG commits to reassessing its monitoring program prior to operation of the port and railway facilities and to amending it as required.

Commitment 18
FMG commits to reassessing its monitoring program prior to operation of the port and railway facilities and to amending it as required.

Table 6. Dust Monitoring Program – Construction

Phase	Equipment	Location	Monitoring Frequency
Clearing and Earthworks (Port)	Deposition Gauges	Minimum of 5 (1 background) to be located as per AS 2922 at locations to be negotiated with DoE.	Monthly
	Dusttrak	See Figure 3.	Complaint verification, and otherwise in accordance with internal management requirements
	Continuous Particle Monitor (BAM)	Wedgefield (see Figure 3).	To be negotiated
Drying of Dredged Material (Port), and Construction of Port Facilities	Deposition Gauges	Minimum of 6 (1 background) to be located as per AS 2922 in locations to be negotiated with DoE	Monthly
	Dusttrak	As required	Complaint verification, and otherwise in accordance with internal management requirements
	Continuous Particle Monitor	As per AS 2922 in a location between the site and the locality of Wedgefield, and in up to 2 further locations to be negotiated with the DoE	Continuous, with electronic data capture
Construction of Railway	No additional monitoring proposed (although monitoring of dust generated during construction of the port will also be relevant to construction of the northern portion of the railway near populated areas, and negotiated port monitoring locations may therefore be relevant to railway construction)		
Construction of Mine sites	Deposition Gauges	Minimum of 5 (1 background) to be located as per AS 2922 in locations to decided in consultation with DoE	Monthly
	Personal Exposure Samplers (i.e.- CONTAM)	Number will depend on workforce size. Measures respirable and inspirable.	To be determined

8. DUST MANAGEMENT – CONSTRUCTION PHASE

8.1 PORT

8.1.1 Vegetation Clearing & Earthworks

In order to minimise the amount of dust generated during vegetation clearing and earthworks, the following measures will be undertaken:

- Clearing will not be undertaken during high wind speed events leading to the exceedences of dust trigger levels, as defined below;
- Where surface soil moisture is low, water carts will be employed to reduce the potential for dust lift-off (taking water efficiency into account as per Section 10);
- Vegetation clearing will be undertaken in stages, with denuded areas subjected to surface treatments where practicable to prevent lift-off;
- Dusttrak monitors will be used to monitor dust levels downwind of the project area on a daily basis, and water carts employed to increase soil moisture content when ambient TSP levels in the project area exceed 260 µg/m^3 or ambient PM_{10} levels in the project area exceed 50 µg/m^3; and
- Generation of dust through vehicle movements will be minimised through the introduction of speed limits in cleared areas, covering of truck loads and driver education programs.

Commitment 19
FMG commits to cease clearing during high wind speed events if it leads to the exceedences of dust trigger levels.

Commitment 20
FMG commits to employing the use of water carts at the Port when surface soil moisture is low.

Commitment 21
FMG commits to undertaking vegetation clearing at the Port facilities in stages, with denuded areas subjected to surface treatments where practicable to prevent lift-off.

Commitment 22
FMG commits to using Dusttrak monitors to record ambient dust levels at least daily, and to using water carts for dust suppression when ambient TSP and PM_{10} levels within the Port project area exceed 260 µg/m^3 and 50 µg/m^3 respectively.

Commitment 23
FMG commits to minimising the generation of dust from vehicle movements at the Port by:

- **Introduction of speed limits in cleared areas;**
- **Covering of truck loads; and**
- **Driver education programs.**

8.1.2 Dredging

Since dredged material will initially be moist, dust generation is not likely to be a significant issue during this stage. However, as the material dries, dust generation may become more significant.

The principle method for managing dust over cleared areas is to ensure adequate moisture cover, however in this instance FMG needs the material to dry as quickly as possible to enable creation of hardstands to commence, and surface wetting would therefore be counter-productive. FMG commits to:

- Monitoring ambient dust levels during this phase of construction, including installation and operation of a continuous particle monitor between the site and the locality of Wedgefield;
- Use of water carts to wet the surface of backfilled material if ambient PM_{10} or $PM_{2.5}$ concentrations recorded at the Wedgefield monitoring station exceed 50 µg/m^3 or 25 µg/m^3 (above background) for 2 or more consecutive days, or if more than two valid complaints are received in any 24 hour period (as assessed by FMG); and
- Commencing construction activities, including sealing of backfilled material, as soon as practicable.

Commitment 24
FMG commits to operating a continuous particle monitor located between the project area and the locality of Wedgefield, and other agreed monitoring equipment, during the construction phase following backfill of cleared land with dredged material.

Commitment 25
FMG commits to using water carts to wet the surface of backfilled material if PM_{10} or $PM_{2.5}$ concentrations recorded at the Wedgefield monitoring station exceed 50 µg/m^3 or 25 µg/m^3 for 2 consecutive days, or if more than two valid dust complaints are received in any 24 hour period.

Commitment 26
FMG commits to commencing construction of port facilities, including sealing of backfilled dredge material, as soon as practicable.

8.1.3 Port Facilities

Dust management during this phase of construction will consist of managing dust generated during construction itself, and constructing the facility in such a manner that effective and efficient dust management can be achieved during subsequent operation of the facilities.

With respect to managing dust generation during construction activities, FMG commits to:

Ensure that heavily trafficked areas are sealed with bitumen or an alternative surface where practicable prior to commencement of construction; and

Undertake daily good housekeeping practices to ensure that accumulated dust is removed from surfaces such as roads and foundations.

With respect to ensuring that the facility is constructed in such a manner that will enable effective dust management during subsequent operation, FMG commits to:

- Installing water sprays in all stockpile areas;
- Ensuring that there is a suitable laboratory facility in the Port Hedland area to enable effective maintenance and operation of dust monitoring equipment (e.g. weighing of deposition gauges and sampler filters) and ore moisture measurements; and
- Where practicable, enclosing all ore transfer equipment, including covers on conveyors and installing skirts on transfer points.

Commitment 27
FMG commits to sealing all trafficked areas with bitumen where practicable or an alternative surface material prior to the commencement construction.

Commitment 28
FMG commits to undertaking daily good housekeeping practices to ensure that accumulated dust is removed from roads and foundations.

Commitment 29
FMG commits to installing water sprays in all stockpile areas.

Commitment 30
FMG commits to ensuring that suitable laboratory facilities are available in the Port Hedland area to enable measurements relevant to ongoing dust management.

Commitment 31
FMG commits to, where practicable, enclosing all ore transfer equipment, including the covering of conveyors and installation of skirts at all transfer points.

8.2 RAILWAY

The main environmental issue associated dust generation during construction of the railway is protection of vegetation along the rail route. However, dust deposition will be confined to small areas, and is likely to be no more significant than natural dust storm events. FMG will undertake weekly inspections of vegetation to determine the extent of localised deposition but will not take action to remove dust unless deposition is considered significant. Areas cleared in order to enable railway construction will be progressively revegetated as soon as practicable.

Commitment 32
FMG commits to undertaking weekly inspections of vegetation along railway construction areas to qualitatively determine the level of dust deposition, and to take action to remove dust if deposition is considered significant.

Commitment 33
FMG commits to progressively revegetating cleared areas along the rail route as soon as practicable.

8.3 MINE SITES

The main environmental issue associated dust generation during construction of the mine sites is protection of vegetation around the sites particularly around high trafficked areas. FMG will undertake monthly inspections of vegetation to determine the extent of localised deposition and will assess the requirement for additional dust suppression measures.

Commitment 34
FMG commits to the use of dust suppression measures on high traffic areas such as access and haul roads and laydown areas around the mines (e.g. water carts and/or non-water soil stabilisers).

Commitment 35
FMG will minimise vegetation clearing at its mine sites and will ensure that any areas not required are progressively rehabilitated.

Commitment 36
FMG will carry out weekly visual inspections or construction areas to ensure dust control measures are implemented and are effective.

Commitment 37
FMG will carry out monthly assessments of vegetation condition to assess the impacts of dust deposition.

9. WATER MANAGEMENT IN DUST CONTROL

9.1 WATER CONSERVATION

One of the main dust control techniques available during construction of large infrastructure projects is the use of water to keep surfaces moist. However, this needs to be undertaken with consideration of water resource conservation. To this end:

- Alternative methods of dust control should be considered. Two such methods are the sealing of cleared areas, which FMG will undertake where appropriate (Commitment 27) and the employment of good housekeeping practices (Commitment 28).
- Soil disturbance during unfavourable meteorological conditions such as high wind speed events should be avoided (Commitment 19).
- The need to control dust should be evaluated at all stages, and a lower standard of dust control adopted where appropriate. Since dust in the Port Hedland airshed is a significant issue, water usage will be required in this area. However, since environmental risks of dust are less along the railway route, water will only be used where deposition is considered significant.
- Water should be sourced appropriately. Groundwater abstraction for the purpose of dust control should be avoided where possible. In this instance, the use of seawater and grey water has been considered during construction of the port facilities. However, there are a number of reasons for rejecting the use of saline water. Firstly, it has the secondary impact of rendering the topsoil saline, and inhibiting the effectiveness of revegetation activities. Secondly, prior to sealing of roads and foundations, the added seawater would be filtered directly down to groundwater and increase its salinity levels. Seawater may be appropriate for controlling dust emissions during subsequent operation of the port facilities, and FMG commits to investigating this option during the construction phase. FMG in collaboration with the Water Corporation are also investigating the use of grey water for use in dust suppression.

Commitment 38
During construction of the port, FMG commits to investigating the use of seawater and grey water for dust suppression during its subsequent operation.

9.2 MANAGEMENT OF OVERFLOW WATER

Where water is used for dust suppression, controls need to be in place to ensure that the dust contaminated water is not discharged directly into surface waters in such a manner that increases turbidity and sedimentation to unacceptable levels. This will not be an issue prior to sealing of roads and foundations because water will drain vertically through the soil profile. However, drainage to surface waters will be an issue once these areas have been sealed. Therefore FMG commits to constructing the port facility such that:

- Drainage of sealed areas is designed to flow to dedicated collection sumps and settling ponds prior to discharge off the site.

Commitment 39
FMG commits to designing drainage systems on sealed areas such that water is drained to collection sumps and settling ponds prior to discharge offsite.

10. COMPLAINT PROCESS

Receipt of complaints will be an integral trigger for selected dust monitoring and management procedures. FMG therefore commits to having robust complaints logging and investigation procedures that include:

- Establishment of a dedicated telephone number for the receipt of complaints, with a minimum agreed response time (Commitment 40);
- Advertisement of the complaint telephone number throughout the Port Hedland community (Commitment 40);
- Logging of all complaints in an electronic database, with hard copies of complaints produced on a weekly basis and filed in a central area (Commitment 41);
- Complaint verification procedures including validation against wind direction and recorded ambient data, and physical investigation of complaints where practicable (Commitment 42);
- Routine internal meetings to discuss complaints and review dust management procedures. The frequency of such meetings would be dependent upon the number of complaints received and upon recorded ambient dust concentrations (Commitment 43);
- Monthly internal reporting of dust complaints and corrective actions (Commitment 44);
- Annual summary reports of dust complaints and corrective actions to be submitted to the DoE for information (Commitment 44).

Commitment 40
FMG commits to establishing a dedicated complaints line with a minimum agreed response time, and to advertising this number throughout the Port Hedland community.

Commitment 41
FMG commits to logging all complaints electronically, and to producing a hard copy of all complaints on a weekly basis to be filed in a central location.

Commitment 42
FMG commits to undertaking verification procedures for all complaints, which will include validation against wind direction and ambient monitoring data, and physical investigation where practicable.

Commitment 43
FMG commits to holding regular internal meetings to discuss complaints received and review dust management procedures, at a frequency dependent upon number of complaints received and dust monitoring results

Commitment 44
FMG commits to monthly internal reporting of dust complaints and corrective actions undertaken, and to summarize this information into an annual report to be submitted to the DoE.

11. REPORTING

Dust monitoring results will be reported to the DoE in accordance with works approval and licence requirements. A short summary of results will be provided in the Annual Environmental Report.

12. REVIEW PROCEDURES

The commitments made in this management plan, and work instructions arising from it, will be reviewed internally at least annually, and or amended if appropriate whenever a judgment is made that management controls and commitments made in this document are not providing adequate levels of dust control. This judgment will be based upon ambient monitoring data and complaints received.

Commitment 45
FMG commits to reviewing this document, and amending it if necessary, whenever a judgment is made that the management controls and commitments made in this document are not providing adequate levels of dust control.

In addition, the document will be revised or replaced prior to operation of the port and railway facilities to incorporate operational dust management commitments.

13. REFERENCES

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Figures

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Figure 1.

General Location of FMG Operations

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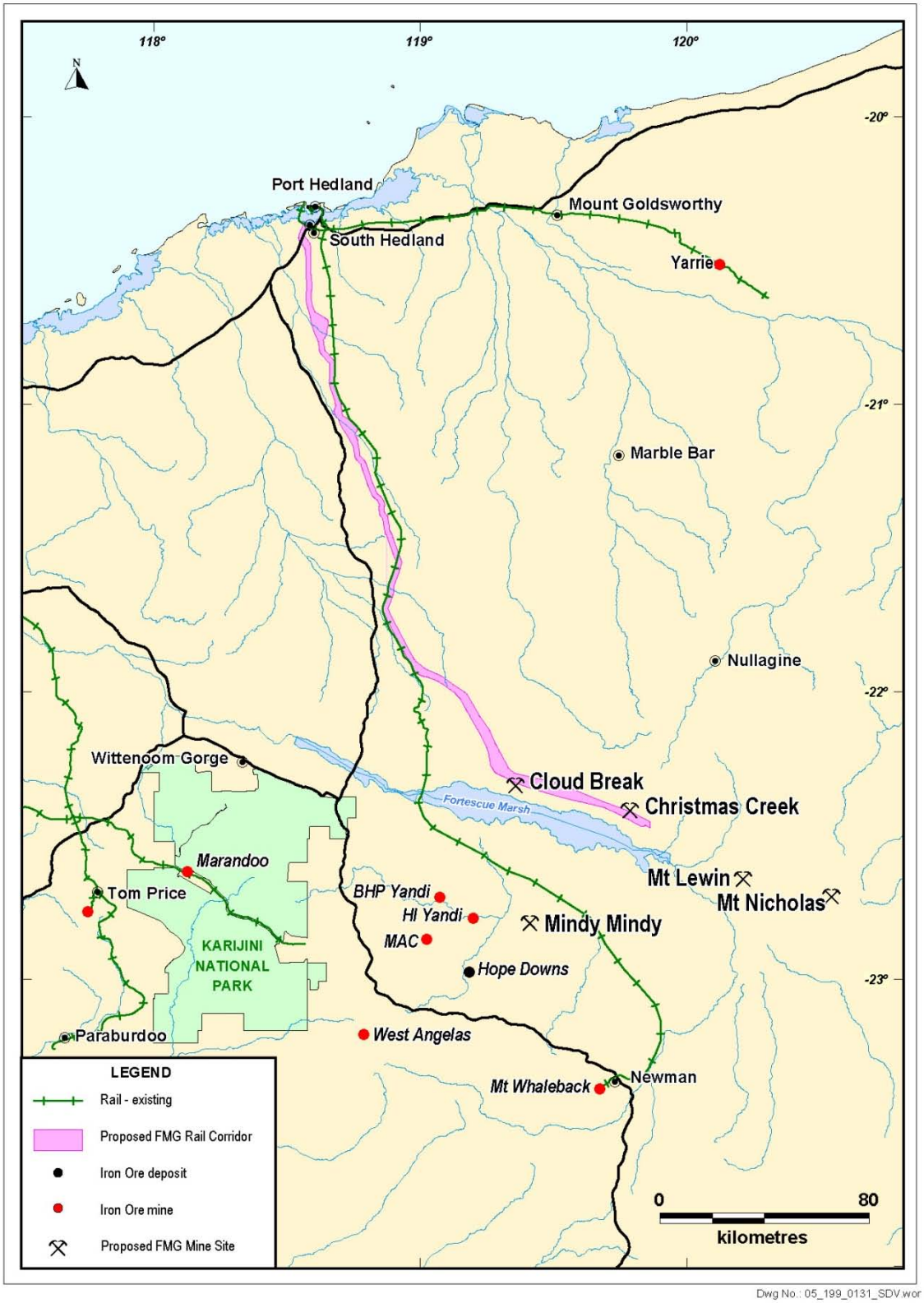

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Figure 2.

Port Facilities and Alternative Rail Loop

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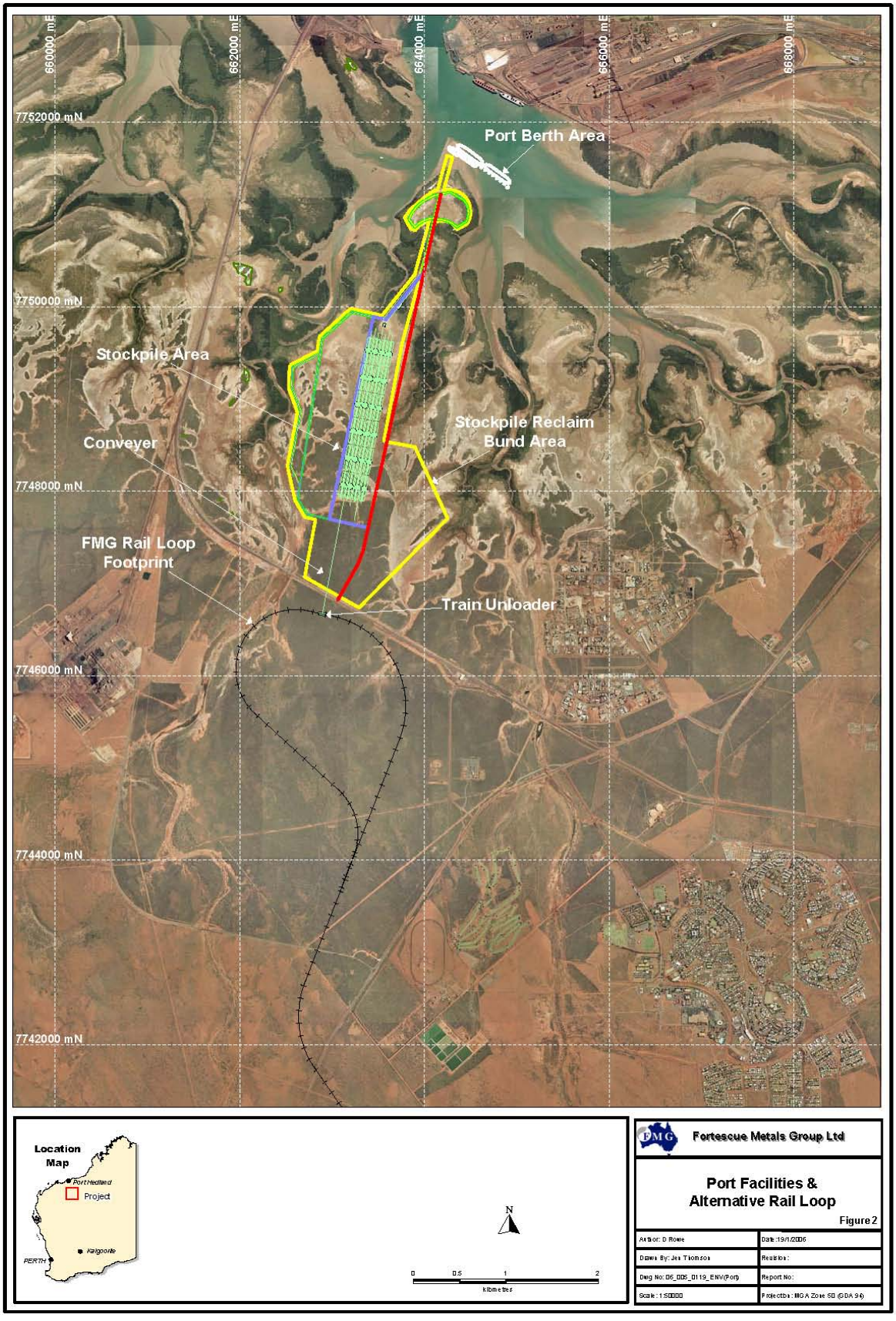
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662000 mE
664000 mE
666000 mE
668000 mE
7752000 mN
7750000 mN
7748000 mN
7746000 mN
7744000 mN
7742000 mN
Port Berth Area
Stockpile Area
Conveyer
Stockpile Reclaim Bund Area
FMG Rail Loop Footprint
Train Unloader
Location Map
Port Hedland
Project
Kalgoorlie
PERTH
N
0
0.5
1
2
kilometres
Fortescue Metals Group Ltd
Port Facilities & Alternative Rail Loop
Figure 2
Author: D Rowe
Date: 19/1/2006
Drawn By: Jen Thomson
Revision:
Dwg No: 05_005_0119_ENV(Port)
Report No:
Scale: 1:50000
Projection: MGA Zone 50 (GDA 94)

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Figure 3.

Locations of BAM and Dusttrak near Wedgefield

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Prevailing Wind
Dirtection N/W
FMG Reclaim Area
South Hedland
Town
FMG Proposed
Rail Loop
WEDGEFIELD
Location
Map
Port Hedland
Project
Perth
Kalgoorlie
LEGEND
Location of Dusttracks
Location of BAM (Beta Attenuation Monitor)
0
N
0 125 250 500
metres
Fortescue Metals Group Ltd
FMG PROPOSED PORT IN
PROXIMITY TO WEDGEFIELD
Author: D ROWE
Date: 23/1/2006
Drawn By: G Matthews
Revision:
Dwg No: 06_026_0123_ENV
Report No:
Scale: 1:10000
Projection: MGA 50 (GDA94)

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Appendices

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Appendix A.

Summary of Management Plan Commitments

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Commitment Type	Commitment Number	Commitment	Location	Timing
General	4	FMG commits to treating amenity impacts seriously, and to ensure that the potential for amenity impacts is minimised as far as reasonably practicable.	All Areas	Project duration
	5	FMG commits to actively participate with other stakeholders in the development of a coordinated dust strategy for the Port Hedland region.	Port	Project duration
	6	FMG commits to implement the outcomes of any agreed coordinated management strategy, which may involve, but not be limited to: Transfer of information regarding new dust management and control technologies; and The development of a coordinated and collaborative ambient dust monitoring program.	Port	Project duration
	7	FMG commits to support the Department of Environment in the development of any future Environmental Protection Policy relevant to dust levels in the Port Hedland area.	Port	Project duration
	8	FMG commits to monitoring and reporting against its dust targets, and to periodic review of its dust management strategies until they are achieved. Its dust targets are: No community complaints received regarding dust emissions; NEPM standards are not exceeded due to FMG operations; and Any additional regional targets set by the DoE to be met.	Port	Project duration
Monitoring	2	In the event that suitable meteorological data is not already available, FMG commits to installing a meteorological monitoring station at its port facility in accordance with AS 2923 prior to the commencement of operations.	Port	Prior to commencement of operations.
	3	FMG commits to regularly monitor iron ore leaving the mine sites to confirm the absence of asbestos fibres. The frequency of asbestos monitoring will be finalised prior to any ore leaving the mine sites and included in an amendment to this dust management plan.	Mine	Prior to Ore Leaving the mine sites

Commitment Type	Commitment Number	Commitment	Location	Timing
	9	FMG commits to conducting dust monitoring in accordance with relevant Australian Standards.	All Areas	Project duration
	10	FMG commits to monitor background dust levels in negotiation with DoE by either: Sharing responsibility for operation and maintenance of the existing BHPBIO Airport monitoring station; or Establishment of a second ambient monitoring station to be operated independently by FMG.	Port	Project duration
	11	FMG commits to installing a continuous particle monitor (either TEOM or BAM) at a location between the port facility and the locality of Wedgefield prior to backfilling of cleared areas with dredged material.	Port	Installation prior to earthworks, operation for project duration
Monitoring (cont)	12	FMG commits to installing a minimum of 5 dust deposition gauges around the port earthworks area, and a minimum of 1 dust deposition gauge at a background location, and to record monthly average deposition at each of these locations during construction and subsequent operation.	Port	Project duration
	13	FMG commits to the use of Dusttrak monitors to undertake real-time TSP and PM_{10} measurements around the Port for complaint verification and internal management purposes.	Port	Project Duration
	14	FMG commits to installing up to 2 continuous particle monitors in the project area at locations to be negotiated the DoE.	Port	Prior to backfilling with dredged material
	15	FMG commits to implementing dust suppression measures as required to minimise the potential for dust deposition on vegetation.	Mines	Duration of Project

Commitment Type	Commitment Number	Commitment	Location	Timing
	16	FMG commits to installing a minimum of 5 dust deposition gauges around the mines sites, and a minimum of 1 dust deposition gauge at a background location, and to record monthly average deposition at each of these locations during construction and subsequent operation.	Mines	Duration of Project
	17	FMG commits to undertaking personal dust monitoring for respirable and inspirable dust at the mine sites.	Mines	Duration of Project
Management Practices to Minimise Dust Emissions	19	FMG commits to cease clearing during high wind speed events if it leads to the exceedences of dust trigger levels.	Port	During earthworks
	20	FMG commits to employing the use of water carts at the Port facilities when surface soil moisture is low.	Port	During earthworks
	21	FMG commits to undertaking vegetation clearing at the Port facilities in stages, with denuded areas subjected to surface treatments where practicable to present lift-off.	Port	During earthworks
	22	FMG commits to using Dusttrak monitors to record ambient dust levels at least daily, and to using water carts for dust suppression when ambient TSP and PM_{10} levels within the Port project area exceed 260 µg/m^3 and 50 µg/m^3 respectively.		During earthworks
	23	FMG commits to minimising the generation of dust from vehicle movements at the Port by: Introduction of speed limits in cleared areas; Covering of truck loads; and Driver education programs.	Port	Project duration
	24	FMG commits to operating a continuous particle monitor located between the project area and the locality of Wedgefield, and other agreed monitoring equipment, during the construction phase following backfill of cleared land with dredged material.	Port	During Dredging Operations

Commitment Type	Commitment Number	Commitment	Location	Timing
	25	FMG commits to using water carts to wet the surface of backfilled material if PM_{10} or $PM_{2.5}$ concentrations recorded at the Wedgefield monitoring station exceed 50 µg/m^3 or 25 µg/m^3 for 2 consecutive days, or if more than two valid dust complaints are received in any 24 hour period.	Port	During Dredging Operations
	26	FMG commits to commencing construction of port facilities, including sealing of backfilled dredge material, as soon as practicable.	Port	Prior to Port Construction
	27	FMG commits to sealing all trafficked areas at the Port with bitumen where practicable, or an alternative surface material prior to the commencement construction.	Port	Prior to commencement of construction
	28	FMG commits to undertaking daily good housekeeping practices to ensure that accumulated dust at the Port is removed from roads and foundations.	Port	
	29	FMG commits to installing water sprays in all stockpile areas at the Port.	Port	During Construction
	30	FMG commits to ensuring that suitable laboratory facilities are available in the Port Hedland Area to enable measurements relevant to ongoing dust management.	Port	During construction
	31	FMG commits to, where practicable, enclosing all ore transfer equipment at the Port, including the covering of conveyors and installation of skirts at all transfer points.	Port	During construction
	32	FMG commits to undertaking weekly inspections of vegetation along railway construction areas to qualitatively determine the level of dust deposition, and to take action to remove dust if deposition is considered significant.	Railway	During construction
	33	FMG commits to progressively revegetating cleared areas along the rail route as soon as practicable.	Railway	During construction

Commitment Type	Commitment Number	Commitment	Location	Timing
	34	FMG commits to the use of dust suppression measures on high traffic areas such as access and haul roads and laydown areas around the mines (e.g. water carts and/or non-water soil stabilisers).	Mines	Project Duration
	35	FMG will minimise vegetation clearing at its mine sites and will ensure that any areas not required are progressively rehabilitated.	Mines	Project Duration
	36	FMG will carry out weekly visual inspections or construction areas to ensure dust control measures are implemented and are effective.	Mines	Project Duration
	37	FMG will carry out monthly assessments of vegetation condition at mine sites to assess the impacts of dust deposition.	Mines	During construction
Water Management	38	During construction of the port, FMG commits to investigating the use of seawater and grey water for dust suppression during its subsequent operation.	Port	During construction
	39	FMG commits to designing drainage systems on sealed areas such that water is drained to collection sumps and settling ponds prior to discharge offsite.	Port	During construction
Complaint Procedures	40	FMG commits to establishing a dedicated complaints line with a minimum agreed response time, and to advertising this number throughout the Port Hedland community.	Port	Project duration
	41	FMG commits to logging all complaints electronically, and to producing a hard copy of all complaints on a weekly basis to be filed in a central location.	All Areas	Project duration
	42	FMG commits to undertaking verification procedures for all complaints, which will include validation against wind direction and ambient monitoring data, and physical investigation where practicable.	All Areas	Project duration
	43	FMG commits to holding regular internal meetings to discuss complaints received and review dust management procedures, at a frequency dependent upon number of complaints received and dust monitoring results.	All Areas	Project duration

Commitment Type	Commitment Number	Commitment	Location	Timing
	44	FMG commits to monthly internal reporting of dust complaints and corrective actions undertaken, and to summarize this information into an annual report to be submitted to the DoE.	All Areas	Project duration
Review Procedures	1	FMG commits to update this dust management plan, or to develop a new management plan, during construction phases. The revised (or new) plan will cover management of dust emissions during operation of the port, rail and mine site facilities.	All Areas	Prior to operation
	18	FMG commits to reassessing its monitoring program prior to operation of the port and railway facilities and to amending it as required.	All Areas	Prior to operation
	45	FMG commits to reviewing this document, and amending it if necessary, whenever a judgment is made that the management controls and commitments made in this document are not providing adequate levels of dust control.	All Areas	Project duration