ENVIRONMENTAL SCOPING DOCUMENT

Pilbara Iron Ore and Infrastructure Project:

Port and N-S Railway (Stage A)

EPA Assessment No. 1505

for

Fortescue Metals Group Limited

ENVIRON

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The Proposal

The Pilbara Iron Ore and Infrastructure Project (Port and N-S Railway) is located in the north of Western Australia, in the Pilbara region. Fortescue Metals Group Limited (FMG) is proposing to construct a port facility at Port Hedland and a connecting railway to its proposed iron ore mining operations some 345 km to the southeast in response to increasing global demand for steel. FMG intends to develop the Project in two stages:

Stage A - the proposed port and north-south rail infrastructure that is the subject of this document; and
Stage B - the development of the mining operations and connecting rail spurs.

The majority of the proposed railway will run parallel and in close proximity to the existing BHP Billiton Newman to Port Hedland Railway and the proposed Hope Downs alignment. FMG's proposed railway will be open to other users who also have undeveloped deposits in the Pilbara.

The proposed FMG Port facility will be located on the western side of the Port Hedland harbour and a conveyor system will transfer iron ore from the stockyard to a new wharf and shiploader that will be located at either Anderson Point or Harriet Point. The final location and configuration selected for the port and rail loop will depend on the outcome of environmental investigations (noise, dust, surface hydrology and mangrove studies), engineering constraints and land access issues.

Provided all Project approvals are in place, construction of the railroad and port facilities are expected to commence in the first quarter of 2005. FMG understands that should it gain approval for the Stage A Project that this in no way ensures that the Stage B Project will be approved and this represents a commercial risk that FMG understands and undertakes. Currently it is proposed that Stage A will utilise General Purpose Leases under the *Mining Act*, or a *Land Act* Sub-Lease from the Port Hedland Port Authority for port tenure for the Project. Under the *Mining Act*, FMG would be required to lodge unconditional performance bonds so that should the Project become unviable sufficient funds will be available for rehabilitation of any disturbance.

An application for project approval of the mining areas and connecting rail spurs will be submitted during the first quarter of 2004.

Key Project Characteristics

The following table identifies the key characteristics of the Project. These characteristics will be reviewed during the detailed feasibility study and environmental impact assessment. However, it is not expected that they will change significantly as a result of these studies.

Table E1. Key Port and Rail Project Characteristics

Element	Characteristics
General	
Construction period	20 months approximately
Project Life	20+ years
Export Tonnage	45 Mtpa
Railway	
Length	345 km approximately
Support Infrastructure	Sidings Administration Offices and Warehouses Trip Servicing facilities Service and Repair Workshop Turnaround "Y" Maintenance Facilities and Maintenance Track
Port	
Stockyard	2.5 Mt capacity
Materials handling	Car dumper Conveyors and Transfer Points Rescreening Plant 2 x Stackers (11,800 tph each) Reclaimer (11,800 tph)
Port Development	Piled Wharf 750 m long Ships up to 250,000 DWT Shiploader (10,000 tph) Dredging – 3.3 Mm^3 (construction, with minor ongoing maintenance dredging)
Buildings	Administration Office, Shift Office, Control Room and Amenities Wharf amenities Substations Workshop/warehouse
Infrastructure	
Power	17.5 MW from existing system
Water	2.5 GLpa from existing system
Fuel	50 MLpa for locomotives
Roads	General traffic, port access, rail service
Sewage	Construction – package treatment plant Operations – septic systems
Disturbance Areas	
Area of railway construction	3,500 ha (~345 km long x 0.1 km wide)
Area of operating railway	1,750 ha (~345 km long x 0.05 km wide)
Area of port facilities construction	160 ha
Area of operating port facilities	110 ha
Borrow and Spoil Areas	200 ha
Total area disturbed during construction	3,860 ha
Total operational areas	1,860 ha

Element	Characteristics
Workforce (approximate peak levels)	
Construction	Rail – 900 personnel
	Port – 400 personnel
Operations	Rail – 130 personnel
	Port – 70 personnel
Accommodation	Construction – single status in Port Hedland
	Camps for rail
	Permanent – new or existing residences in Port Hedland

Key:	m – metre
DWT - dead weight tonnes	Mm^3 - million cubic metres
GLpa - gigalitres per annum	Mtpa - million tonnes per annum
ha - hectare	Mt - million tonnes
km – kilometre	MW - megawatts

Existing Environment

The Pilbara region from Port Hedland south to the FMG mining tenements is classified as arid-tropical, with most rain falling during the hot summers and becoming more arid inland. The region is prone to cyclonic activity between January and March and much of the low-lying areas surrounding Port Hedland harbour, including parts of the proposed port location, are within the storm surge zone.

The proposed port facilities and railway corridor cross four major physiographic units within the section of the Fortescue District (Beard, 1975):

- Abydos Plain
- Chichester Plateau
- Fortescue Valley
- Hamersley Plateau

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) which is listed as a high priority for funding for land purchase under the National Reserves System Co-operative Program.

Certain listed rare fauna such as the Mulgara (*Dasycercus cristicauda*) are known to occur in the adjacent Hope Downs rail corridor and could potentially occur within the proposed FMG rail corridor and this will be assessed during the field surveys. The need for referral of the Project to the Federal Environment Minister is currently being discussed with the Federal Department of Environment and Heritage.

Community Consultation

A stakeholder consultation strategy will be implemented to ensure that the concerns and interests of stakeholders are taken into consideration in design and development of the Project. To date, consultation with local, State and Commonwealth government departments, the local Aboriginal communities, pastoralists and other interested parties has been undertaken to identify any issues associated with the Project's development. The consultation process has involved group consultation meetings with the community and government agencies.

The rail alignment passes through, or close to, the native title claims of six discrete native title claimant groups. Aboriginal heritage consultation will continue during the ethnographic and archaeological surveys and this will assist in determining the presence of any sites of Aboriginal heritage significance and/or areas to be avoided.

Scope of Work

The following list of Scope of Work identifies the studies that will be required to gain a thorough understanding of the receiving environment, the potential environmental impacts and develop appropriate management strategies. Further detail is provided in Table 2 and Sections 5 and 6 of this document. The proposed Scope of Work includes:

- Project sustainability assessment
- Flora and vegetation surveys
- Fauna studies
- Stygofauna study
- Coastal and marine study
- Mangrove study
- Surface hydrology study
- Water supply study
- Greenhouse gas emissions assessment
- Dust assessment
- Geotechnical assessment
- Noise and vibration assessment study
- Socio-economic study
- Aboriginal ethnographic study
- Aboriginal archaeological study

A PER document will be prepared by ENVIRON in conjunction with the Proponent and its sub-consultants involved in the various studies mentioned above. This document will be prepared in accordance with the EPA Guidelines for Preparing and Public Environmental Review/Environmental Review and Management Programme (EPA, 2002). The PER will describe the proposal and the

receiving environment in detail, outline the potential impacts of the proposal on factors of the environment, identify proposed management strategies to ensure those environmental factors are protected and demonstrate that the Project can be managed to minimise harm and in a way that is environmentally acceptable to the community.

Within the PER text broad management measures and strategies will be identified to mitigate and minimise environmental and social impacts. In addition to this a project Environmental Management Plan (EMP) will be prepared to outline in further detail how the key environmental issues and associated impacts of the Project will be managed during construction and operation. This will include specific management strategies and procedures that have been developed during project design, in consultation with the specialist consultants and DMAs.

An employee awareness training programme will form part of the EMP and will capture the essence of the Proponent's commitment to sustainable development and industry best practice environmental management. The awareness training programme will also include an overview of expected environmental management responsibilities and minimum performance requirements from all staff, contractors and visitors.

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ENVIRONMENTAL SCOPING DOCUMENT
Pilbara Iron Ore and Infrastructure Project: Port and N-S Railway (Stage A)
EPA Assessment No. 1505
for
Fortescue Metals Group Limited

1. INTRODUCTION

1.1 PURPOSE OF SCOPING DOCUMENT

Fortescue Metals Group Limited (FMG) is proposing to construct a port facility at Port Hedland and a connecting railway to its proposed mining operations some 345 km to the southeast (Figure 1). An Environmental Referral, which broadly described the Project, the regional environment, likely impacts and proposed management measures was submitted to the Western Australian Environmental Protection Authority (EPA) on 2 December 2003. The EPA advertised the level of assessment for the Project as a Public Environmental Review (PER) on 15 December 2003 subject to appeal.

This Environmental Scoping Document has been prepared as required for projects with a PER level of assessment, under Part IV Division 1 of the *Environmental Protection Act* 1986. The purpose of this document is to provide a basis of understanding with the EPA regarding the assessment of this proposal as well as providing an indicative timeline for the assessment. This document provides a summary of the potential environmental impacts, their significance and possible management responses; proposed Scope of Works; applicable legislation, guidelines and standards; stakeholder consultation programme; project and assessment schedule; study team and peer review mechanisms.

1.2 THE PROJECT

FMG intends to develop the Project in two stages:

A. the proposed port and north-south rail infrastructure that is the subject of this scoping document; and
B. the development of the mining operations and connecting rail spurs.

The Stage B Environmental Referral/Environmental Scoping Document will be lodged after further studies have been completed.

The proposal described in this Environmental Scoping Document is for the construction and operation of the Stage A of the Project and is known as the Pilbara Iron Ore and Infrastructure Project (Port and N-S Railway).

The Port facility and connecting railway will be used by FMG to transport iron ore from its proposed mining operations to the port, from where it will be shipped to market. FMG's railway will be open to other users for the transport of their ore to market at competitive commercial rates.

FMG understands that should it gain approval for the Stage A Project that this in no way ensures that the Stage B Project will be approved and this represents a commercial risk that FMG understands and undertakes. Currently it is proposed that Stage A will utilise General Purpose Leases under the *Mining Act*, or a *Land Act* Sub-Lease from the Port Hedland Port Authority for port tenure for the Project. Under the *Mining Act*, FMG would be required to lodge unconditional performance bonds so that should the Project become unviable sufficient funds will be available for rehabilitation of any disturbance.

1.3 PROPONENT

The Proponent and owner of the proposed port and rail facilities is Fortescue Metals Group Limited. The address is:

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1.4 PROJECT HISTORY

Historically, within the Pilbara, a network of four privately owned and operated rail systems, serving four separate port operations, was developed between the mid 1960s and early 1970s. As a result, the Pilbara has become established as a major centre for iron ore exports to the world market and many of

the regional towns and communities are predominantly mining-orientated. The number of mining operations and supporting rail network has been progressively expanded to serve the market demand and consequent global growth in iron ore output.

Consolidation of the iron ore industry in WA has seen the rail networks in the Pilbara being controlled by the two companies BHP Billiton (BHPB) and Hamersley Iron (Rio Tinto). Apart from the linkage between the two port facilities of Nelson Point and Finucane Island in Port Hedland, both now owned by BHPB, the BHPB and Hamersley Iron (HI) railway networks and their ports have, by deliberate corporate intent, remained independent from one another. This has led to a centralised attitude to the major commercial parameters of marketing and no third party access to infrastructure in the region.

The Central Pilbara region is now the focus of a new wave of major iron ore mining developments. Hamersley Iron opened its Yandicoogina mine in 1999, which included an extension of its rail line to Marandoo and provided a link to the Hamersley iron main line network to Dampier. BHPB's adjacent Yandicoogina's operation has been subject to capacity upgrades since its start up in 1992, and provides the rail spur linkage to BHPB's main line network to Port Hedland.

New projects now on line in this area include West Angelas (Rio Tinto) and Mining Area C (MAC) (BHPB). The Hope Downs (Hancock/Kumba) project is under review and in September 2002 received environmental approval to build its own railway and port facility. Hope Downs is continuing negotiations with BHPB in an attempt to gain access to BHPB's existing railway, under BHPB's "Rail Access Agreement", following a recent Supreme Court decision in Hope Down's favour. However, the access agreement does not include the MAC rail lines or the rail lines previously held by Goldsworthy Mining, which will be required to reach Harriet Point at Port Hedland.

If FMG were able to gain access to the existing BHPB railway and port facilities or the proposed Hope Downs railway and port facilities, at commercially competitive rates and scheduling time slots, it would not need to construct its own delivery infrastructure. However, to date no third party access agreement has been reached or appears imminent for any of the operating railways. Negotiations by parties with BHPB and Hamersley Iron have been unsuccessful for many years. Due to this uncertainty FMG must consider and control its own future by pursuing the development of its own independent port and railway infrastructure to enable the development and export of its stranded iron ore resources.

It is FMG's intention that the railway and port facilities it develops would be accessible to other parties, and function as a multi-user transport system from the outset of its use. Third party use would be based on a fee for use at commercially competitive rates.

The railway's formation and track will be designed and constructed so that it is capable, through the construction of additional sidings, of transporting 70 Mtpa. This will enable future expansions to increase rail capacity, beyond the 45Mtpa capacity currently being sought, for third party use without the need to duplicate the railway. If an increase in the capacity were required in the future then an application would be made to the EPA at that time by the relevant proponent.

2. PROJECT DESCRIPTION

2.1 PROJECT SUMMARY

The following table identifies the key characteristics of the Project. These characteristics will be reviewed during the detailed feasibility study and environmental impact assessment. However, it is not expected that they will change significantly as a result of these studies.

Table 1. Key Port and Rail Characteristics

Element	**Characteristics**
General	
Construction period Project Life Export Tonnage	20 months approximately 20+ years 45 Mtpa
Railway	
Length Support Infrastructure	345 km approximately Sidings Administration Offices and Warehouses Trip Servicing facilities Service and Repair Workshop Turnaround "Y" Maintenance Facilities and Maintenance Track
Port	
Stockyard Materials handling Port Development Buildings 	2.5 Mt capacity Car dumper Conveyors and Transfer Points Rescreening Plant 2 x Stackers (11,800 tph each) Reclaimer (11,800 tph) Piled Wharf 750 m long Ships up to 250,000 DWT Shiploader (10,000 tph) Dredging – 3.3 Mm^3 (construction, with minor ongoing maintenance dredging) Administration Office, Shift Office, Control Room and Amenities Wharf amenities Substations Workshop/warehouse
Infrastructure	
Power Water Fuel Roads Sewage	17.5 MW from existing system 2.5 GLpa from existing system 50 MLpa for locomotives General traffic, port access, rail service Construction – package treatment plant Operations – septic systems

Element	Characteristics
Disturbance Areas	
Area of railway construction	3,500 ha (~345 km long x 0.1 km wide)
Area of operating railway	1,750 ha (~345 km long x 0.05 km wide)
Area of port facilities construction	160 ha
Area of operating port facilities	110 ha
Borrow and Spoil Areas	200 ha
Total area disturbed during construction	3,860 ha
Total operational areas	1,860 ha
Workforce (approximate peak levels)	
Construction	Rail – 900 personnel Port – 400 personnel
Operations	Rail – 130 personnel Port – 70 personnel
Accommodation	Construction – single status in Port Hedland Camps for rail Permanent – new or existing residences in Port Hedland
Key: DWT - dead weight tonnes GLpa - gigalitres per annum ha - hectare km – kilometre	m – metre Mm^3 - million cubic metres Mtpa - million tonnes per annum Mt - million tonnes MW - megawatts

2.1.1 Port Facility

The proposed port facility will be developed on the western side of Port Hedland Harbour. There are two options for the port and load-out facility, and two options for the rail loop being considered for the Project. An example of these layouts is presented in Figure 2. The final location and configuration selected for these facilities will depend on the outcome of environmental investigations (noise, dust, surface hydrology and mangrove studies), engineering constraints and land access issues.

The port facilities will involve the construction of a rail loop, car dumper, stockyard and ore handling facilities (including two stackers and a single reclaimer), rescreening facility and product conveyor out to a wharf and shiploader at Anderson Point (or Harriet Point). The wharf will be approximately 750 m in length, with mooring dolphins at each end. The wharf will be capable of servicing ships up to 250,000 DWT.

If the rail loop or track crosses the South West Creek, carefully designed drainage works will ensure the free movement of surface water into the harbor. The product conveyor will be carried overland via an elevated truss to allow full tidal movement within the harbor and intertidal zone.

Dredging of the harbor will be required to accommodate the additional berths, at either Anderson Point or Harriet Point. A cutter suction-dredge will be used and the maximum quantity of dredge spoil (estimated at 3.3 million cubic meters) will be created if the Anderson Point option proceeds. Depending on the geotechnical and geochemical characteristics of the spoil, this material will be used either as bulk fill for preparation of the stockyard and surround facilities, or placed in voids created

from borrow pits. If the dredge spoil is unsuitable for use or disposal on land (e.g. due to fine particle structure, or oxidation of acid-generating sulphides), then dredge spoil might require disposal offshore. In this instance approvals will be applied for from the Commonwealth as required under the *Environment Protection (Sea Dumping) Act 1981*.

Within the Port Hedland Port, FMG will construct and operate a ship loading terminal with a capacity of 45 Mtpa. This will consist of a continuous train unloader, ore blending and ship loading facility.

The Port stockpile areas will be built to provide the necessary flexibility to ensure continuity of supply to steel mill customers, whilst ensuring that environmentally sensitive issues such as dust and noise are at the lowest practicable levels within the industry.

Dust suppression and water run-off will be closely monitored and controlled to ensure that all environmental and health related issues are managed.

2.1.2 Rail Infrastructure

The rail alignment will run close to, and parallel with, the Hope Downs and BHPBIO rail alignment from Port Hedland to its southern extent. The alignment will deviate from the proposed Hope Downs and BHPBIO rail alignments where significant engineering or environmental constraints are encountered, such as major river crossings. Due to the large capital expense it is highly unlikely that both Hope Downs and FMG will construct their own, independent railways. In an attempt to minimise duplication, cost and environmental impacts, discussions on the sharing of rail infrastructure, information and cost are at various stages of development between FMG and third parties.

The railway alignment commences at the proposed FMG Port facilities at Port Hedland and travels to the west of South Hedland (approximately 2.5 km away, Figure 2) and then south-southeast to the FMG iron ore resources (Figure 1). The railway transects a number of different landforms over its 345 km length. This length of rail is likely to vary slightly as the specific route and train loadout facilities at the mining operations are refined. Detailed studies, including environmental and engineering constraint analyses are currently being undertaken. Once these constraints and all baseline information has been obtained they will be utilised to optimise the railway design.

A series of culverts will support the rail track across major surface drainage features, such as creeks and floodways. Where major waterways, such as rivers, need to be crossed then elevated bridges will be constructed to support the rail track (see Figure 3).

A series of low profile borrow pits will be required to supply suitable transition and sub-ballast material for the railway embankment and formation. The location of borrow pits are constrained by the availability of suitable construction material. However, they will be located away from sensitive areas, such as significant vegetation, surface drainage and heritage sites. Wherever practicable,

material removed during the construction of rail cuts will be used in the rail formation where fill material is required.

It is anticipated that iron ore delivery will be controlled remotely from a train operations control centre. Depending on the ramp up and scheduling of mining operations, demand by customers and use by third parties, it is anticipated that the number of train movements along the railway will vary. For the transport of 45 Mtpa an average of 5.5 train consignments per day are expected.

Day-to-day operations of railway iron ore transport pose few direct environmental issues. Field operators will undertake regular route inspections and maintain ongoing liaison with the community, pastoralists, tenement holders and other stakeholders. They will respond to maintenance requirements such as track, ballast, and formation repairs; erosion, noise, dust and weed control.

Project commissioning is scheduled for the last quarter of 2005, resulting in the first throughput of iron ore in 2006.

2.2 ALTERNATIVES CONSIDERED

As part of FMG's business planning and project feasibility studies a number of alternatives for the transportation and export of iron ore have been considered. Some of these alternatives have been eliminated, while others are still being considered. Alternatives that have been eliminated include the transport of iron ore by road trains and overland conveyors due to cost and safety reasons. Rail is the only efficient means of transport over such long distances.

With the selection of railway as the preferred means of transport various options have, and are being evaluated. These options include the use of existing railway and port infrastructure (i.e. BHPB or HI's), the use of proposed railway and port infrastructure (i.e. Hope Downs) and/or the construction of FMG's own railway and port infrastructure. The first two options require that FMG reach an agreement with third parties, who are market place competitors, and with whom discussions and negotiations are likely to be protracted. Whilst these options have not been ruled out, FMG is proposing to build its own port and rail facilities to provide the Project with a secure infrastructure system. This third option requires evaluation of various possibilities to optimise both the railway and port infrastructure location and design.

One of the primary objectives in the selection of the FMG preferred corridor and its design is to optimise its proximity to the existing BHPB and Hope Downs rail corridor to minimise impact on the environment and the community, while simultaneously optimising operating benefits. Similarly, by paralleling Hope Downs' corridor for much of its length, which has recently been assessed by the EPA, there is abundant information available on the receiving environment that can be utilised by FMG to assist in placing its proposed Project into a regional context and supplement its own detailed surveys.

The "no project" option would result in the loss of opportunity to add value to Australia's raw materials, loss of employment opportunities particularly within local regional communities and loss of potential for future developments in downstream processing of raw materials. The World's increasing demand for iron ore would then be met through the development of other projects elsewhere with the loss of the associated benefits.

2.3 PROJECT JUSTIFICATION

The introduction of FMG brings another iron ore player into production, representing an attractive alternative in a competitive market, while enhancing competition by the provision of multi-user infrastructure. Of significance is the enormous expansion in world steel production, which is predominately driven by production growth in China. The resultant outcome is a demand for iron ore that exceeds supply; a situation which is forecast to continue. By 2007, accounting for current expansions planned by all major players and smaller prospective projects, it is conservatively estimated that there will be a shortfall in global seaborne trade in iron ore of at least 80 Mtpa. Australia, and in particular the Pilbara, is well positioned to meet significant amounts of this global supply shortfall if additional projects can be expediently brought on line.

The current restrictive use of infrastructure in the Pilbara is preventing the development of the Western Australian iron ore industry from its full potential. Construction of a port and railroad to the FMG mines is necessary for the operation of the Project. FMG will develop true multi-user rail and port infrastructure that will stimulate resource development across the Pilbara. In addition to ore from FMG's own mines, the infrastructure will enable ore from other isolated resources in the region to be carried to the port, thereby opening up the region's resources.

An outline of the potential benefits of the Project were presented in the Environmental Referral for Stage A of the Project (ENVIRON, 2003).

3. APPLICABLE LEGISLATION

In addition to obtaining approval from the State Minister for the Environment, FMG will have to comply with legislation and regulations administered by a number of State Government bodies. In additional to the State Government legislation there is also Commonwealth legislation that FMG must comply with.

3.1 STATE GOVERNMENT LEGISLATION

State legislation relevant to the Project includes the following:

- *Aboriginal Heritage Act 1972*
- *Agriculture and Related Resources Protection Act 1976*
- *Bush Fires Act 1954*
- *Conservation and Land Management Act 1984*
- *Environmental Protection Act 1986*
- *Explosives and Dangerous Goods Act 1961*
- *Dangerous Goods (Transport) Act 1998*
- *Land Administration (Amendments) Act 1997*
- *Local Government Act 1995*
- *Occupational Safety and Health Act 1984*
- *Private Railways (Level Crossings) Act 1966*
- *Rail Safety Act 1998*
- *Rail Freight System Act 2000*
- *Rights in Water and Irrigation Act 1914*
- *Soil and Land Conservation Act 1945*
- *Town Planning & Development Act 1928*
- *Western Australian Marine (Sea Dumping) Act 1981*
- *Wildlife Conservation Act 1950*

The *Environmental Protection Act 1986* is the principal statute relevant to environmental protection in Western Australia. The Act makes provision for the establishment of the Environmental Protection Authority (EPA), for the prevention, control and abatement of pollution and for the conservation, preservation, protection, enhancement and management of the environment.

This Act provides for the control and licensing of potentially polluting activities and is the Act under which the State environmental approvals process operates.

It has been determined by the EPA that the Pilbara Iron Ore and Infrastructure Project: Port and N-S Railway (Stage A) requires a formal level of environmental assessment as a Public Environmental Review (PER). The process for submission and assessment of a PER is outlined below:

1. The Proponent refers the proposal to the EPA to set the level of assessment (an Environmental Referral for this Project was submitted on 2 December 2003);
2. The EPA determines the level of assessment as a PER and advertises this decision and the length of the public review period, subject to appeal. (The EPA advertised a PER level of assessment for this Project on 15 December 2003 and set an 8 week public review period);
3. The Proponent prepares an Environmental Scoping Document (this document) outlining the scope of works for the PER assessment;
4. The EPA agrees to the Environmental Scoping Document as a basis for the PER;
5. The PER is prepared by the Proponent;
6. The PER is submitted as a final draft to the EPA for authorisation to release as a public document;
7. The PER is finalised based on the EPA's comments and released for public review;
8. The Proponent responds to any submissions made on the Project at the end of the public review period;
9. The EPA undertakes an assessment of the PER and the Proponent's response to any submissions and makes a recommendation to the Minister;
10. The Minister publishes the EPA Report;
11. The Minister determines any appeals, and consults with the key Decision Making Authorities to seek agreement on whether or not, and in what manner the proposal may be implemented.
12. The Minister issues a Statement.

The anticipated schedule for this process is outlined in Section 8 of this Scoping Document.

Once approval for a project is obtained under Part IV of the *Environmental Protection Act 1986*, licensing of construction and operations is required under Part V of the Act. This requires a Works Approval Application and Application for Licence to Operate to be submitted to the Department of Environment (DoE). Should FMG utilise mining related tenure to secure land access approvals from the Department of Industry and Resources (DoIR) through submission of a Notice of Intent will also be also required under the *Mining Act 1978*.

The *Environmental Protection Act* 1986 will be modified with the *Environmental Protection Amendment Bill 2002* once enacted. The changes will introduce the offence of environmental harm and new penalties and controls for illegal clearing, as well as aiming to promote better and more efficient environmental regulation.

3.2 COMMONWEALTH GOVERNMENT LEGISLATION

Under the *Environment Protection and Biodiversity Conservation Act 1999*, (EPBC Act) an action requires approval from the Federal Environment Minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance such as:

- World Heritage properties;
- Ramsar wetlands of international importance;
- listed threatened species and communities;
- migratory species protected under international agreements;
- nuclear actions; and
- the Commonwealth marine environment.

Certain listed rare fauna such as the Mulgara (*Dasycercus cristicauda*) are known to occur in the adjacent Hope Downs rail corridor and could potentially occur within the proposed FMG rail corridor. This will be assessed during the field surveys. The need for referral of the Project to the Federal Environment Minister is currently being discussed with the Federal Department of Environment and Heritage.

Commonwealth legislation likely to be relevant to the Project includes the following:

- *Environmental Protection and Biodiversity Conservation Act 1999*
- *National Native Title Act 1993*
- *Environmental Protection (Sea Dumping) Act 1981*

4. REGIONAL ENVIRONMENTAL SETTING

4.1 INTRODUCTION

The location of the proposed rail alignment and port facility are in close proximity to the areas recently surveyed by Hope Downs as part of its environmental impact assessment for its adjacent rail corridor and port. FMG's Project will look to use this and other available information for the region to supplement its own studies. Below is a summary of the existing environment on a regional scale. More detailed information on the existing environment was presented in the Environmental Referral (ENVIRON, 2003).

4.2 CLIMATE

The Pilbara region from Port Hedland south to the FMG mining tenements is classified as arid-tropical, with most rain falling during the hot summers and becoming more arid inland.

Peak rainfall tends to occur in the summer months between January and March with a smaller peak in May and June. Climatic conditions in the Pilbara are influenced by tropical cyclone systems predominantly between January and March. These cyclones normally develop over the ocean north of Australia and follow a southwesterly course parallel to the northwest coast. However, at some point, two thirds of these cyclones change direction and head southeast, crossing the coast and moving inland, bringing heavy rainfalls. Rainfall during May and June is generally a result of cold fronts moving across the south of the State, which occasionally extend into the Pilbara (Bureau of Meteorology; www.bom.gov.au).

Annual average rainfall for the Pilbara ranges from 180 mm to over 400 mm (Beard, 1975) with the Bureau of Meteorology data indicating a range from 312 mm at Newman (south of FMG's iron ore deposits) to 454 mm at Wittenoom. Average maximum summer temperatures are generally between 35°C and 40°C and winter maximum temperatures generally between 22°C and 30°C. In this climate, annual evaporation rates greatly exceed the mean annual rainfall. The local climate is influenced to some degree by the topography with rainfall highest around the Hamersley Ranges whose summits exceed 900 m above mean sea level (Beard, 1975).

Being inland, Newman experiences greater extremes of temperature than Port Hedland. Although average annual rainfall is similar for both meteorological stations, Newman's rainfall exceeds that of Port Hedland's between June and December, and Port Hedland receives more rainfall than Newman in summer between January and March.

Winds are predominantly east-southeasterly at both stations between May and August with stronger west-northwesterly winds between September and March. Port Hedland experiences stronger winds (annual average wind speed of 21.7 km/hr) in general than Newman (annual average wind speed of 9.4 km/hr).

4.3 MAJOR PHYSIOGRAPHIC UNITS

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). The Pilbara Bioregion is listed as a high priority for funding for land purchase under the National Reserves System Co-operative Program due to the limited representation of the area in conservation reserves.

A "Mulgalands Conservation Park", east of Karijini National Park, has been proposed to provide for reservation of species and floristic communities that are not present or are inadequately represented within the National Park (particularly Mulga (*Acacia aneura*) communities) (van Leeuwen and Bromilow, 2002). In addition, portions of numerous pastoral leases in the Pilbara have been nominated to be released to the conservation estate in 2015 or set aside for conservation management within the pastoral leases under conservation agreements.

Within the Pilbara bioregion, four subregions (based on the physiographic work of Beard, 1975) occur within the Project area (IBRA Revision 5.1; Environment Australia, 2000):

- **Roebourne Plains**

The Roebourne Plains subregion, which contains the port site and the northern-most portion of the rail corridor, is described as: *'Quaternary alluvial plains with a grass savanna of mixed bunch and hummock grasses, and dwarf shrub steppe of Acacia translucens over Triodia pungens. Samphire, Sporobolus and Mangal occur on marine alluvial flats. Arid tropical with summer rain.'*

- **Chichester Range**

South of the Roebourne Plains, the rail corridor traverses the Chichester Range subregion, which comprises: *'Archaean granite and basalt plains supporting shrub steppe characterised by Acacia pyrifolia over Triodia pungens hummock grasses. Snappy Gum tree steppes occur on ranges.'*

- **Fortescue Plains**

South of the Chichester Range, the rail corridor traverses the Fortescue Plains subregion, which comprises: *'Alluvial plains and river frontages. Salt marsh, mulga-bunch grass, and short grass communities on alluvial plains. River Gum woodlands fringe the drainage lines. This is the northern limit of Mulga (Acacia aneura).'*

- **Hamersley Range**

The Hamersley subregion is described as a *"A mountainous area of Proterozoic sedimentary ranges and plateaux with Mulga low woodland over bunch grasses on fine textured soils and Snappy Gum over Triodia brizoides on skeletal sandy soils of the ranges."*

The Hamersley Range subregion contains the southern-most part of the proposed rail corridor for Stage A of the Project, and the southern mining area (Mindy Mindy) proposed for Stage B.

4.4 REGIONAL VEGETATION AND FAUNA

Beard (1975) mapped the vegetation of the Pilbara at a scale of 1:1,000,000. The entire FMG port and rail development lie within the Fortescue Botanical District of the Eremaean Botanical Province as defined by Beard. The vegetation of this province is typically open, and frequently dominated by spinifex, wattles and occasional eucalypts.

The port and rail alignment include portions of 12 of Beard's mapping units[1]. From north to south, these are:

- Mangals on the coast at Port Hedland;
- Tidal mudflats at Port Hedland;
- *Acacia stellaticeps* dwarf shrubs over *Triodia epactia*[2] hummock grassland, mainly near the coast;
- Kanji *Acacia inaequilatera* shrubs over *Triodia epactia* hummock grassland on the broad granite plain south to the Chichester Range;
- Coolibah *Eucalyptus victrix* and River Red Gum *E. camaldulensis* var. *obtusa* woodland in the major drainage systems such as the Yule and Turner Rivers;
- *Acacia inaequilatera* shrubs over mixed *Triodia epactia* and *Triodia wiseana* hummock grassland on the Chichester Range;
- Patches of short grassland on the cracking clays of the Chichester Range;
- Snappy Gum *Eucalyptus leucophloia* scattered trees over *Triodia wiseana* hummock grassland, with Mulga *Acacia aneura*[3] low woodland in valleys, on the southern side of the Chichester Range;

[1] Species names have been updated with taxonomic changes since Beard (1975) was published.
[2] Note that '*Triodia epactia*' is a species complex rather than a single taxon.
[3] Note that '*Acacia aneura*' is also a species complex.

- Mulga groves on the plain surrounding the Fortescue Marsh and extending to the south;

- A narrow stretch of succulent steppe dominated by various halophytes; this is the westernmost extent of the Fortescue Marsh, and leads into an area of short tussock grassland further to the west;

- Twin-leaf Mallee *Eucalyptus gamophylla* scattered mallees over *Triodia basedowii* hummock grassland on the low footslopes of the Hamersley Range; and

- Further Snappy Gum *Eucalyptus leucophloia* over *Triodia wiseana* hummock grassland on hills of the Hamersley Range, dominating the mine area.

4.4.1 Significant Flora Species

A number of rare or restricted flora have either been recorded in adjacent proposed development areas, or are likely to occur (based on their occurrence in the region and presence of suitable habitat within the areas). Field surveys of likely habitats will be undertaken during the Pilbara flowering season to confirm any occurrence of rare or restricted flora within the Project Area.

4.4.1.1 Rail Corridor

No Declared Rare Flora (DRF) have been previously recorded in the areas adjacent to the FMG proposed rail corridor, however *Lepidium catapycnon* (DRF) could potentially occur. The following Priority flora have either been collected from the proposed FMG rail corridor, or have been recorded in the vicinity and may well occur:

- *Eriachne* sp. Hamersley Range Hilltops (Priority 1);
- *Swainsona* sp. Millstream (AA Mitchell PRP 798) (Priority 1)
- *Euphorbia clementii* (Priority 2)
- *Gonocarpus ephemerus* (Priority 2)
- *Indigofera ixocarpa* (Priority 2)
- *Ischaemum albovillosum* (Priority 2)
- *Olearia fluvialis* (Priority 2)
- *Stylidium weeliwolli* (Priority 2)
- *Abutilon trudgenii* (Priority 3)
- *Bulbostylis burbidgeae* (Priority 3)
- *Eriachne tenuiculmis* (Priority 3)
- *Goodenia nuda* (Priority 3)
- *Gymnanthera cunninghamii* (Priority 3)
- *Hibiscus brachysiphonius* (Priority 3)

- *Phyllanthus aridus* (Priority 3)
- *Themeda* sp. Hamersley Station (ME Trudgen 11431) (Priority 3)
- *Goodenia stellata* (Priority 4)

4.4.1.2 Port

No DRF have been collected from the general area encompassing the proposed port options. However, seven Priority flora species have been recorded nearby, based on records held by CALM. The proposed field surveys will confirm whether the following species or other threatened flora are present:

- *Ptilotus appendiculatus* var. *minor* (Priority 1)
- *Euphorbia clementii* (Priority 2)
- *Gomphrena pusilla* (Priority 2)
- *Gomphrena cucullata* (Priority 2)
- *Acacia glaucocaesia* (Priority 3)
- *Goodenia pascua* (Priority 3)
- *Gymnanthera cunninghamii* (Priority 3).

4.4.2 Threatened Fauna

Survey work conducted in the Hope Downs rail corridor provides a guide to the species of threatened fauna likely to occur along the FMG corridor and in the mine area. This work identified four species of Schedule fauna (listed under the Western Australian *Wildlife Conservation (Specially Protected Fauna) Notice 1999*), and seven Priority species (listed on CALM's Priority Fauna database), that are likely to occur in habitats affected by the proposed rail and port. One species, the Mulgara, is also listed as vulnerable under the Federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

4.4.2.1 Fauna Listed on the Federal *Environment Protection and Biodiversity Conservation Act 1999*

Mulgara, *Dasycercus cristicauda*
The Mulgara is listed as 'Vulnerable' under the Federal EPBC Act. Evidence of Mulgaras was recorded from along the northern section of the Hope Downs rail corridor and individuals were also captured. All records were from sandy substrates vegetated with *Triodia* spp. (spinifex) with a sparse overstorey of low shrubs. Consultation with the Federal Department of Environment and Heritage (DEH) indicated that the presence of the Mulgara in the Hope Downs Project Area was not a matter of 'national significance' requiring environmental assessment by the Commonwealth under the *EPBC Act*. FMG is currently assessing the potential for Mulgara to occur within FMG's corridor and are consulting with the DEH to determine whether the Project requires referral to the DEH.

4.4.2.2 Fauna Listed on the Western Australian *Wildlife Conservation (Specially Protected Fauna) Notice 1999*

Other threatened fauna species listed under the Western Australian *Wildlife Conservation (Specially Protected Fauna) Notice 1999* that may occur in the Project Area are:

- Mulgara, *Dasycercus cristicauda* (Schedule 1)
- Bilby, *Macrotis lagotis* (Schedule 1)
- Peregrine Falcon *Falco peregrinus* (Schedule 4)
- Woma *Aspidites ramsayi* (Schedule 4).

4.4.2.3 Fauna Listed on the Department of Conservation and Land Management's Priority Database

CALM also keep up to date, a priority fauna database, which lists species potentially under threat. Priority fauna that could potentially occur within the Project Area are:

- Black-lined Skink *Ctenotus nigrilineatus* (Priority 1)
- Little Northern Freetail-bat *Mormopterus loriae* (Priority 1)
- Ghost Bat *Macroderma gigas* (Priority 4)
- Short-tailed Mouse *Leggadina lakedownensis* (Priority 4)
- Western Pebble-mound Mouse *Pseudomys chapmani* (Priority 4)
- Australian Bustard *Ardeotis australis* (Priority 4)
- Bush Stonecurlew *Burhinus grallarius* (Priority 4)
- Eastern Curlew *Numenius madagascariensis* (Priority 4)

4.5 EXISTING LAND USE

4.5.1 Pastoral Activities

The pastoral industry in the whole of the Pilbara is increasingly geared to overseas exports of live cattle, mainly through Port Hedland, with fewer animals being sent to the Midland (Perth) market. The cattle industry currently contributes about $15 million per annum to the Pilbara economy. Sheep numbers in the Pilbara are steadily declining and the annual value of wool and meat production in 2000 was estimated to be around $2 million per annum (Dames and Moore, 2000).

Pastoral leases in the area are generally considered to be of poor grazing quality, with large areas required for grazing and some areas that were never alienated for pastoral operations or were abandoned in the 1940's (Dames and Moore, 2000).

Mining companies hold many of the pastoral leases in the Project Area and throughout the East Pilbara to ensure security of access to land adjacent to mines and infrastructure.

4.5.2 Mining

The central Pilbara generates approximately 87% of Western Australia's iron ore production, estimated at 125Mtpa and with a value of over $3,000 million per year (Dames and Moore, 2000). Development of the iron ore rich deposits was accelerated in the 1960s after the Commonwealth lifted the export embargo on iron ore.

Development of the iron ore industry in the region has historically focused on the exploitation of high grade (65-66% Fe) Brockman ores. More recently exploitation has moved to pisolitic Channel Iron Deposits and Marra Mamba ore. Iron ore mining operations in the Pilbara are currently restricted to BHP Billiton and Hamersley Iron (Rio Tinto).

Port Hedland's existing port operations primarily focus on the export of iron ore. Being in close proximity to the town of Port Hedland, iron ore transport, stockpiling and loading operations present an ongoing noise and dust management issue.

4.5.3 Tourism

Besides mining and pastoral activities, tourism provides the only other significant economic driver in the central Pilbara. In 1994, tourism was worth $75 million to the Pilbara with annual growth projected at around 6% (Dames and Moore, 2000). The Karijini National Park is the primary tourism focus in the Central Pilbara.

4.6 ABORIGINAL HERITAGE

The rail alignment passes through, or close to, the native title claims of six discrete native title claimant groups:

- Nyjiaparli;
- Martu Idja Banyjima;
- Palyku;
- Njamal;
- Karriyarra; and
- Karriyarra Yinjbarndi.

FMG has met with the Working Groups established by three of the main claimant groups (Nyjiaparli, Martu Idja Banyjima and Palyku), which cover the southern rail alignment and resources areas, to discuss its intention to seek approval to construct and operate its proposed Pilbara Iron Ore and Infrastructure Project.

Protocols have been agreed with these three claimant groups, and with their representative body, the Pilbara Native Title Services (PNTS). The PNTS is a service division of the Yamatji Land and Sea Council, the authorised Native Title representative body for the Pilbara. The agreed protocols identify

the manner in which Aboriginal heritage surveys and other Aboriginal matters and interests will be managed and conducted between FMG, the Native Title claimant parties, their representative body and the Aboriginal communities within the area.

Further details on the archaeological and ethnographic values of the Project Area were presented in the Environmental Referral (ENVIRON, 2003).

4.7 EUROPEAN HERITAGE

No sites of European Heritage significance are known to occur within or near the proposed railway corridor and port area.

5. ENVIRONMENTAL ISSUES AND MANAGEMENT

A summary of the potential environmental issues and management measures was presented in the Environmental Referral for the Stage A Project. Table 2 presents the key environmental factors and issues that are considered to be significant in the assessment of the environmental impacts of the Project. These are:

- Significant flora and fauna and the impact of land clearing;
- Stygofauna and the impacts of water abstraction;
- Surface hydrology management, particularly at river crossings, the Fortescue Marsh and on the mudflats near Port Hedland;
- Water supply for the Project;
- Disturbance of the coastal ecosystem by the port development and potential impact on mangrove communities;
- Dredging and disposal of dredge material;
- Air quality management, in particular management of dust from stockpiling and handling of iron ore at Port Hedland;
- The impact of the Project on surface, ground and marine water quality;
- Management of noise from rail and port activities and the associated impact on residential amenity at Port Hedland;
- Economic and social issues;
- Greenhouse gas emissions; and
- Aboriginal heritage sites.

The table also includes reference to the EPA's objectives in relation to the issues, the potential impacts, additional investigations required, potential management strategies and applicable standards and guidelines. This information will be further developed in the PER.

Table 2: Key Environmental Factors for Assessment of the Project

Environmental Factor	Relevant Area	EPA/Project Environmental Objective	Potential Impacts	Additional Investigations	Potential management	Applicable standards, guidance and policies
INTEGRATION						
Biodiversity	Within the following major physiographic units in the Pilbara bioregion: • Abydos Plain; • Chichester Range; • Chichester Plateau; • Fortescue Valley; and • Hamersley Plateau.	To avoid adverse impacts on biological diversity, comprising the different plants and animals and the ecosystem they form, at the levels of genetic, species and ecosystem diversity.	Significant species or communities could potentially occur within the Project Area and may be affected by land clearing or construction or operational impacts.	Undertake detailed biological surveys commencing in March 2004.	• Significant habitats and significant flora and fauna species will be avoided where practicable and/or management measures implemented to ensure that the conservation status of these species or communities is not affected.	• EPA Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection.
Sustainability	The Project Area and adjacent areas potentially affected by the Project (e.g. town of Port Hedland).	To ensure, as far as practicable, that the proposal meets or is consistent with the sustainability principles in the *National Strategy for Ecologically Sustainable Development (Cmwlth 1992).*	Poor design and management of a development such FMG's proposal could result in unacceptable economic, environmental and social impacts. Conversely, protection of the environment and social values needs to take into consideration economic constraints.	A Sustainability Assessment for the Project will be undertaken.	• Project design and management will be developed along the sustainability principles outlined in the National Strategy for Ecologically Sustainable Development.	• National Strategy for Ecologically Sustainable Development (Govt. of Australia 1992). • Hope for the future: The Western Australian State Sustainability Strategy (Govt. WA, 2003). • EPA Guidance Statement No. 55. Implementing Best Practice in proposals submitted to the Environmental Impact Assessment process.
BIOPHYSICAL						
Terrestrial Flora – Vegetation Communities	Within the following major physiographic units in the Pilbara bioregion: • Abydos Plain; • Chichester Range; • Chichester Plateau; • Fortescue Valley; and • Hamersley Plateau.	Maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities.	• Land clearing of a 345 km corridor, 100 m wide will be required for the construction of the north-south railway, and approximately 160 ha required for construction of the port facility (total 3,860 ha). Approximately 2.000 ha of this will be rehabilitated. • Other impacts may include off-road vehicle impacts, erosion, smothering of vegetation with dust and increased risk of fire.	Undertake detailed studies to identify existing flora species and vegetation communities (including riparian and mangrove communities) present in the proposal areas, commencing March 2004.	• Minimise vegetation clearing. • Manage dust emissions as outlined below. • Implement a weed management programme. • Implement an environmental awareness training programme. • Stockpile topsoil in low windrows for use in rehabilitation. • Rehabilitate areas not required for operations, on completion of construction.	• EPA Position Statement No. 2: Environmental Protection of Native Vegetation in Western Australia. • EPA Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection. • EPA Draft Guidance Statement No. 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia.

Environmental Factor	Relevant Area	EPA/Project Environmental Objective	Potential Impacts	Additional Investigations	Potential management	Applicable standards, guidance and policies
Terrestrial Flora – Declared Rare and Priority Flora; flora of conservation significance	Within the following major physiographic units in the Pilbara bioregion: • Abydos Plain; • Chichester Range; • Chichester Plateau; • Fortescue Valley; and • Hamersley Plateau.	• Protect Declared Rare and Priority Flora, consistent with the provisions of the *Wildlife Conservation Act* 1950. • Protect other flora species of conservation significance.	Significant flora species or vegetation communities could potentially occur within the Project Area.	Undertake baseline studies to identify any Declared Rare Flora, Priority Flora or other species of conservation significance.	• Avoid disturbance of Declared Rare and Priority Flora and other significant flora in the design and construction of the Project or implement mitigation measures where disturbance unavoidable. • Implement an environmental awareness training programme.	• EPA Position Statement No. 2: Environmental Protection of Native Vegetation in Western Australia. • EPA Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection. • EPA Draft Guidance Statement No. 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia.
Terrestrial Fauna	Within the following major physiographic units in the Pilbara bioregion: • Abydos Plain; • Chichester Range; • Chichester Plateau; • Fortescue Valley; and • Hamersley Plateau.	Maintain the abundance, species diversity and geographical distribution of terrestrial fauna.	Land clearing will disturb some fauna habitats. Terrestrial fauna may be affected by earthworks, noise and blasting vibration.	Undertake baseline studies to identify existing terrestrial fauna throughout the areas to be affected by the proposal.	• The Project will be designed to avoid significant fauna habitats or implement mitigation measures where disturbance is unavoidable. • Construction of the railway and conveyors will be undertaken in a way that allows small animal movement within their natural ranges. • -Implement an Environmental Awareness training programme.	• EPA Draft Guidance Statement No. 56: Terrestrial fauna surveys for Environmental Impact Assessment in Western Australia.
Terrestrial Fauna - Specially Protected (Threatened) Fauna	Within the following major physiographic units in the Pilbara bioregion: • Abydos Plain; • Chichester Range; • Chichester Plateau; • Fortescue Valley; and • Hamersley Plateau.	Protect Specially Protected (Threatened) Fauna, consistent with the provisions of the *Wildlife Conservation Act* 1950.	Land clearing may impact significant species if these are present within the Project Area.	Undertake baseline studies to identify Specially Protected (Threatened) Fauna, which may be found within the areas to be affected by the proposal.	• The Project will be designed to avoid adverse impacts on threatened fauna species. If disturbance is unavoidable, mitigation measures will be implemented so that the conservation status of the species is not adversely affected.	• EPA Draft Guidance Statement No. 56: Terrestrial fauna surveys for Environmental Impact Assessment in Western Australia.
Stygofauna	Within groundwater supply areas, in particular for the proposed port facilities.	Maintain the abundance, diversity and geographical distribution of subterranean fauna	Abstraction of groundwater for the Project's water supply may impact on the habitat of subterranean fauna.	• Identify any potential stygofauna habitat sites. • Undertake stygofauna sampling in conjunction with drilling for groundwater resources	• Monitor groundwater drawdown and recharge in the groundwater supply areas.	• EPA Guidance Statement No. 54: Consideration of subterranean fauna in groundwater and caves during environmental impact assessment in Western Australia.

Environmental Factor	Relevant Area	EPA/Project Environmental Objective	Potential Impacts	Additional Investigations	Potential management	Applicable standards, guidance and policies
Marine biota and associated habitat (mangroves, benthic and other marine floral and faunal communities)	Intertidal mudflats, mangroves and subtidal zone at the proposed port and loadout facilities at Port Hedland.	Maintain the ecological function, abundance, species diversity and geographic distribution of marine biota and habitat in order to protect ecosystem health, in accordance with the principles identified in *Perth Coastal Waters Environmental Values and Objectives* (EPA 2000).	• Construction of the port facilities will disturb intertidal, mangrove and subtidal habitats. • Marine biota may be directly affected by dredging and construction activities or hydrodynamic changes at the port site, and in the harbour.	• Map and describe the benthic marine biota and habitat (including mangroves) likely to be impacted by dredging, land reclamation, construction and operational activities. • Undertake a hydrodynamic investigation of the coastal mudflats and the influence of fresh-water inflows into mangrove communities.	• The port facility will be designed to minimise disturbance to the natural coastal processes and hydrodynamic forces. • Sensitive marine communities will be avoided during dredging and/or measures implemented to mitigate the impacts. • Disturbance to mangroves will be minimised and the port facilities constructed to ensure littoral process on which the mangroves depend, are maintained.	• EPA Guidance Statement No. 1: Protection of Tropical Arid Zone Mangroves along the Pilbara Coastline. • EPA draft Guidance Statement No. 29: Benthic Primary Producer Habitat Protection for Western Australia's Marine Environment. • Perth Coastal Waters Environmental Values and Objectives (EPA 2000).
Coastal Processes	The coastal zone in and around the proposed port and loadout facilities at Port Hedland.	Ensure the development does not significantly impact on existing coastal processes.	• Approximately 160 ha will require clearing for construction of the port and loadout facilities, with dredging of up to 3.3 Mm^3 of spoil. • The port facility may alter the hydrodynamics and the natural erosion and deposition processes around the proposed port and loadout facilities.	Undertake a study to assess and describe the potential impacts resulting from dredging and port development on the hydrodynamic processes (including flushing dynamics and storm surge) of the area.	• The port facility will be designed and constructed to minimise disturbance to the natural hydrodynamics of the area. • The Project will be designed to withstand storm surge. • Disturbance to mangroves will be minimised and the port facilities constructed to ensure littoral process on which the mangroves depend, are maintained.	• Perth Coastal Waters Environmental Values and Objectives (EPA 2000).
Water courses	Water courses within the Project Area.	Maintain the integrity, functions and environmental values of watercourses and sheet flow.	• The rail corridor crosses a number of major rivers and tributaries and the port facility will be constructed near a major creek in an area prone to inundation. • Incorrect management of surface water flows within the Project Area can result in increased erosion and siltation, particularly along water courses.	• Undertake baseline surface hydrology studies to identify watercourses, and types of surface water flow including sheetflow throughout the areas to be affected by the proposal. • Assess the potential impacts on surface water flow rates, drainage patterns, sediment transport, riparian vegetation, pools and dependent vegetation, as a result of development activities. • Undertake a study to investigate topography, catchment areas, predicted surface water runoff volumes.	• Rail crossings will be designed to minimise impacts to the water course flow, and reduce the risk of erosion and siltation. • Surface water management around the port will be designed to minimise erosion and siltation and maintain freshwater flows into mangrove areas.	• EPA Draft Guidance Statement No. 26 Management of Surface Run-off from Industrial and Commercial Sites.

Environmental Factor	Relevant Area	EPA/Project Environmental Objective	Potential Impacts	Additional Investigations	Potential management	Applicable standards, guidance and policies
Water supply	Water supply areas, in particular for the propose port facilities.	Maintain (sufficient) quantity of groundwater so that existing and potential uses, including ecosystem maintenance, are protected.	• Water supply for construction of the port and rail will be from locally available surface, groundwater or municipal sources. The main water requirement for the Project will be for dust suppression during operations, although alternative dust suppression mechanisms and water cycling options will be investigated. Approximately 2.5 GLpa will be required during operation of the port and rail. • Impacts could occur where the quantity of water is being abstracted from a source is unsustainable.	• A water supply study will be undertaken to investigate sources of water for the Project, and the sustainability of these sources under proposed abstraction rates. • A review of water demand will be undertaken to identify the volume of water required during the different stages of project development. • A study will detail the hydrogeological systems of the Project Area, existing beneficial uses of groundwater (including ecosystem maintenance) and any proposed groundwater extraction operations.	• Implement strict water conservation measures for the Project. • Monitor groundwater drawdown and recharge in the groundwater supply areas.	• Water and Rivers Commission (2000). Environmental Water Provisions Policy for Western Australia: Statewide Policy No. 5
POLLUTION MANAGEMENT						
Air – Greenhouse Gases	The Project as a whole.	Minimise greenhouse gas emissions for the Project and reduce emissions per unit product to as low as reasonably practicable, and mitigate greenhouse gas emissions in accordance with the *Framework Convention on Climate Change 1992*, and with established Commonwealth and State policies.	Greenhouse gas emissions from the Project Area are not expected to be a significant impact.	Undertake a greenhouse gas emissions estimation study.	• The Project will incorporate Best Practice technology and energy saving mechanisms to ensure greenhouse gases are minimised.	• EPA Guidance Statement No. 12 for Minimising Greenhouse Gas Emissions.
Air – Particulate dust emissions during construction	The Project as a whole.	Protect the surrounding land users such that dust and particulate emissions will not adversely impact upon their welfare and amenity or cause health problems in accordance with EPA Guidance Statement No. 18 *Prevention of Air Quality Impacts from Land Development Sites*.	Dust from earthworks during construction may generate a nuisance.	Undertake a dust impact study to assess the potential impacts of dust on the air quality of the town of Port Hedland.	• Implementation of dust avoidance and suppression measures (e.g. water sprays and other dust suppression mechanisms). • Progressive rehabilitation of cleared areas not required for operations.	• EPA Guidance Statement No. 18 Prevention of Air Quality Impacts from Land Development Sites.
Air – Particulate dust emissions during operations	• At the ore loading facilities and stockpiles at Port Hedland. • Unsealed areas within the Project Area.	Ensure that particulate/dust emissions, both individually and cumulatively, meet appropriate criteria and do not cause an environmental or human health problems.	• Ore loading and off-loading, conveying and stockpiling of iron ore, has the potential to create a dust nuisance around Port Hedland. • Unsealed areas within the Project Area may generate dust, smothering vegetation. • Dust emissions from FMG's proposed port facility may exacerbate existing dust problems around Port Hedland.	• Identify sources of particulates/dust and estimates of project-wide emissions. • Undertake modelling to predict the cumulative impacts of the Project on Port Hedland's air quality. • Analyse the significance of these emissions with regard to human health and environmental impacts, in particular, impacts on vegetation.	• The Project will comply with the NEPM Ambient Air Quality guidelines. • Maintain optimum moisture content of the ore. • Stockpiles will be sited and aligned to take account of the prevailing wind direction and proximity to residences, within the constraints of the site. • Other dust avoidance/suppression measures will be investigated during the Dust Impact study and engineering design.	• NEPC (1998) Ambient Air Quality National Environment Protection Measure.

Environmental Factor	Relevant Area	EPA/Project Environmental Objective	Potential Impacts	Additional Investigations	Potential management	Applicable standards, guidance and policies
Water Quality -Surface water	Proposed port development area and near waterbodies within the Project Area.	Maintain or improve the quality of surface water to ensure that existing and potential uses, including ecosystem maintenance are protected, consistent with the *Australian and New Zealand Water Quality Guidelines (ANZECC 2000).*	Surface water runoff or discharge of waste water from the Project Area could contaminate, or increase sediments flowing into, nearby waterbodies.	Detail site drainage, modifications to drainage and potential for contamination.	• Any waste water or surface runoff that is potentially contaminated will be treated before discharge to the environment. • Potentially sulphide-rich dredge spoil will be disposed of in a manner which prevents release of acidic runoff or seepage into surface waters.	• ANZECC/ARMCANZ 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. • EPA Draft Guidance for the Assessment of Environmental Factors No. 26, Management of Surface Run-off from Industrial and Commercial Sites
Water Quality -Groundwater	Groundwater underlying the Project Area and within groundwater supply areas.	Maintain or improve the quality of groundwater to ensure that existing and potential uses, including ecosystem maintenance are protected, consistent with the *Australian and New Zealand Water Quality Guidelines (ANZECC 2000).*	• There is potential for spills or contaminated runoff from the Project Area, to seep into the underlying groundwater. • Excessive abstraction of groundwater near the coast could cause saline water to enter the freshwater aquifer if the coastal aquifer is hydraulically linked to the sea.	• Detail the existing water quality of groundwater aquifers. • Identify potential sources of contamination associated with the proposal.	• Any waste water or surface runoff that is potentially contaminated (e.g. around the ore stockpiles at the port) will be treated before discharge to the environment. • The Project will have spill prevention and clean-up procedures during construction and operations. • Groundwater drawdown and recharge in the water supply areas will be monitored.	• ANZECC/ARMCANZ 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality.
Water Quality -Marine water and sediment quality	Proposed port development area.	Maintain or improve marine water and sediment quality to protect Environmental Values (EVs) and Environmental Quality Objectives (EQO's) defined in *Perth Coastal Waters Environmental Values and Objectives* (EPA 2000) and the sediment and water quality guidelines documented in *Australian and New Zealand Water Quality Guidelines (ANZECC 2000).*	Surface water runoff, discharge of waste water or spills during shipping and loading activities could potentially contaminate waters in the harbour, or marine sediments.	• Assess and describe the potential impacts within the port area resulting from sediment disturbance, disposal of discharge water during dredging, reclamation and other construction operations. • Investigate the impact of increased turbidity on dredging on marine water quality;	• Any waste water or surface runoff that is potentially contaminated (e.g. around the ore stockpiles at the port) will be treated before discharge to the environment. • Shipping and loading operations will have spill prevention and clean-up procedures.	• ANZECC/ARMCANZ 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. • Perth Coastal Waters Environmental Values and Objectives (EPA 2000)
Contamination - Acid Sulphate Soils	Proposed port development and harbour.	Minimise the risk to the environment resulting from Acid Sulphate Soils.	Sediments excavated for the port development site could contain acid sulphate soils that may cause acid drainage problems if oxidised.	Investigate the potential for acid sulphate soils.	• If acid sulphate soils are present, these will be disposed in a manner that prevents the generation of acidic drainage (e.g. by preventing oxidation and/or leaching).	
Contamination - Oil Spills	Proposed port development and harbour.	Minimise the impacts of fuel or oil spillage during ship movements and refuelling (if applicable).	Spills during shipping or loading activities could potentially contaminate soils, or surface waters including the harbour.	Describe the oil spill contingency measures in place.	• A spill prevention and clean-up strategy will be developed for construction and operations, and will be regularly reviewed within the EMS to take into account any increase in risk or change in operation.	

Environmental Factor	Relevant Area	EPA/Project Environmental Objective	Potential Impacts	Additional Investigations	Potential management	Applicable standards, guidance and policies
Contamination - Dredge spoil	Proposed port development and harbour.	Contaminated material should be treated and/or disposed of in a manner that minimises the risk of long-term contamination to the environment.	Dredge spoil will be saline and may contain acid sulphate soils. There may also be traces of TBT or heavy metals in the sediments. This material has the potential to contaminate soils, groundwater and surface water if incorrectly disposed.	• Assess and describe the nature and extent of any contamination (including TBT and heavy metals) within proposed dredge spoil with reference to accepted Department of Environment (DoE) criteria. • Undertake a geotechnical investigation and discuss the risk and suitability of dredge spoil for use as landfill or reclamation material.	• Management and disposal of dredge spoil will be determined by the characteristics of the sediments. If onshore disposal is unsuitable, dredge spoil will be disposed of off-shore.	
Introduction of exotic organisms	Within the Port Hedland harbour.	Minimise the risk of introduction of unwanted marine organisms consistent with the Australian Quarantine Inspection Services (AQIS) guidelines for ballast water management and ANZECC Code of Practice for Anti-fouling and In-Water Hull Cleaning and Maintenance.	Ships travelling from foreign waters may bring exotic marine organisms into coastal waters in discharge of ballast water, or during cleaning of the ship hulls.	Review strategies for the management of potential exotic organism introduction associated with ballast water and in-water hull cleaning and demonstrate how these are consistent with the AQIS guidelines for ballast water management and ANZECC Code of Practice for Antifouling and In-water Hull Cleaning and Maintenance.	• Shipping companies operating within Australian waters are required to comply with marine quarantine laws, which include prohibition of the disposal of 'high risk' ballast water from foreign ports and coastal waters. Ships using FMG's port will be required to comply with these laws.	• AQIS guidelines for ballast water management. • ANZECC Code of Practice for Antifouling and In-water Hull Cleaning and Maintenance.
Noise – Construction	Within the vicinity of the town of Port Hedland.	Ensure noise impacts emanating from proposed railway construction, dredging, reclamation and other construction activities comply with statutory requirements and acceptable (and appropriate) standards.	Construction noise has the potential to disturb residents within the vicinity of Port Hedland if incorrectly managed.	• Ensure construction activities comply with the *Environmental Protection (Noise) Regulations 1997*, and instructions as provided in *Draft EPA Guidance No. 8 – Environmental Noise.* If likely to exceed accepted criteria, undertake modelling and outline a noise management plan under noise regulation 13, addressing management options such as selection of construction method, buffer zones and/or hours of operation as appropriate. • Where construction works involve significant trucking operations, assess noise impacts on nearest noise premises, having regard to appropriate noise criteria for road traffic noise assessment, including *Preliminary draft Guidance for EIA No. 14 – Road and Rail Transportation Noise (Version 3),* and develop appropriate management options.	• Implement a noise management plan under noise regulation 13, addressing management options such as selection of construction method, buffer zones and/or hours of operation as appropriate. • Noise modelling will take into account existing railway and port operations in Port Hedland.	• EPA Draft Guidance Statement No. 8: Environmental Noise. • Environmental Protection (Noise) Regulations 1997. • Preliminary draft Guidance for EIA No. 14 – Road and Rail Transportation Noise (Version 3), and develop appropriate management options.

Environmental Factor	Relevant Area	EPA/Project Environmental Objective	Potential Impacts	Additional Investigations	Potential management	Applicable standards, guidance and policies
Noise – Port	Within the vicinity of the town of Port Hedland.	Ensure noise impacts emanating from any increase in port operations comply with statutory requirements and acceptable (and appropriate) standards.	Noise from existing port operations in Port Hedland is already an issue. If incorrectly managed, there is the potential that noise emissions from the Project that will exacerbate the noise problem.	• For increased port operations undertake noise studies in accordance with *EPA Draft Guidance No.8 – Environmental Noise* including assessment of new and existing sources (cumulative impacts). • Demonstrate that the requirements of the *Environmental Protection (Noise) Regulations* 1997 can be met at the nearest relevant premises. If likely to exceed acceptable criteria, undertake noise modelling as required for all plant and equipment to be operated within the port under likely worst-case weather conditions.	• Implement a noise management plan, addressing management options such as engineering noise controls, buffer zones and/or hours of operation as appropriate. • Noise modelling will taken into account existing railway and port operations at Port Hedland.	• EPA Draft Guidance Statement No. 8: Environmental Noise. • Environmental Protection (Noise) Regulations 1997.
Noise – Railway	Within the vicinity of the town of Port Hedland.	Minimise the impact to noise sensitive premises from increased train movement.	If incorrectly managed, noise emissions from the railway may exacerbate the noise problem in Port Hedland.	• Identify noise sensitive premises that may be affected by train movements during the construction and operational phase. • Predict noise level increases where relevant and detail measures to be taken to ensure that train noise will not impact unduly on nearby residences, having regard to appropriate noise criteria for train noise assessment, including *Preliminary draft Guidance for EIA No. 14 – Road and Rail Transportation Noise (Version 3).*	• Implement a noise management plan, addressing management options such as engineering noise controls, buffer zones and/or hours of operation as appropriate. • Potential noise impacts on nearby residents have been taken into account in the location of the railway turning loop.	• Preliminary draft Guidance for EIA No. 14 – Road and Rail Transportation Noise (Version 3).
SOCIAL SURROUNDS						
Recreational Activity	Coastal areas, rivers.	Ensure that the environmental value of recreational activities is maintained.	Access to some coastal areas used for recreation may be restricted by construction and operation of the port.	Assess and describe potential impacts to existing recreational use including access to rivers, beaches, creeks and other recreational areas.	• Where access to recreational areas may be restricted by the Project, FMG will consult with the community to develop appropriate management measures or suitable alternative recreational sites.	

Environmental Factor	Relevant Area	EPA/Project Environmental Objective	Potential Impacts	Additional Investigations	Potential management	Applicable standards, guidance and policies
Visual Amenity	The Project as a whole.	Ensure visual amenity of the area is not unduly affected by the proposal.	• The port development may be visible from parts of South Hedland and Wedgefield. • Sections of the railway may be visible along the Port Hedland to Wittenoom road, and the Munjina to Roy Hill road.	Assess landscape values of the Project Area and describe how these will be affected by the proposal	• Reduction of visual impact of the port will be included in the design and siting of the Project (e.g. such as the height and alignment of the conveyors) and may use measures such as vegetative screening where visual impacts are unavoidable. • No special management is likely to be required for the railway, as this is expected to be sufficiently remote to not adversely affect the visual amenity of the area.	
Heritage – Aboriginal culture and heritage	The proposed rail corridor and port area within the region covered by the Yamatji Land and Sea Council.	• Ensure that the proposal complies with the requirements of the *Aboriginal Heritage Act* 1972. • Ensure that changes to the biological and physical environment resulting from the Project do not adversely affect cultural associations with the area.	Sites of Aboriginal Heritage significance could potentially occur within the Project Area.	Identify Aboriginal cultural and heritage sites of significance through archaeological and ethnographic surveys of the Project Area and through consultation with local Aboriginal groups and the Department of Indigenous Affairs.	• The final alignment will take into consideration the location of Aboriginal heritage sites. • Management of any Aboriginal heritage sites potentially impacted by the Project will involve discussions with the appropriate Aboriginal people, implementation of agreed management measures, and where necessary, clearance obtained under the *Aboriginal Heritage Act 1972*.	• EPA Draft Guidance Statement No. 41: Assessment of Aboriginal Heritage
Heritage – European heritage	The Project as a whole.	Comply with statutory requirements in relation to areas of cultural or historical significance.	It is not expected that any sites of European heritage significance will be affected by the Project.	Identify any places listed on the Register of the National Estate (or the Interim List of the Register) that may be adversely impacted by the proposal.	• The final alignment will take into consideration the location of European heritage sites.	
Economic and Social Impacts	Within the Shires of Port Hedland and East Pilbara.	To ensure a net benefit to the local community potentially affected by the Project.	• The Project could place additional pressure on local services and resources, but will also provide benefits such as employment opportunities and support of local businesses. • There may be some opposition from the local community with particular views on the Project.	Undertake an assessment of the social and economic impacts of the Project.	• Implementation of the Stakeholder Consultation Programme. • FMG will investigate opportunities for the Project to contribute to the local community.	• Department of Environment, Interim Industry Guide to Community Involvement, December 2003

An Environmental Management Plan (EMP) will be developed and implemented for the construction and operation stages of the Project. The objective of the EMP is to provide a working manual that will include specific procedures to eliminate or minimise the impact on the environment. The EMP will identify the following:

- issues of concern;
- environmental objectives;
- proposed management techniques;
- proposed monitoring programmes;
- completion criteria; and
- reporting requirements.

6. SCOPE OF WORKS FOR PUBLIC ENVIRONMENTAL REVIEW

The following Scope of Works identifies the purpose and scope of the key factors likely to influence the proposed Project. The Proponent is forming a team of specialist consulting firms and individuals to assist it in undertake the identified work and optimising the Project. The consultants chosen have been selected for their specialist abilities, knowledge and experience of the Project Area and/or issues.

FMG has a policy for open, transparent and interactive consultation with the State's Decision Making Authorities (DMAs) and invites their representatives to be actively involved (e.g. as observers of field surveys). The results of the environmental surveys will be made publicly available and shared with Government DMAs and the wider community. A copy of the biological survey reports shall be provided to the Department of Conservation and Land Management (CALM; Contact S. Van Leeuwen) as the custodian of the Pilbara Biological Database.

6.1 PROJECT SUSTAINABILITY ASSESSMENT

6.1.1 Purpose

An assessment of the sustainability of the Project against the broad principles outlined in the National Strategy for Ecologically Sustainable Development will be conducted.

6.1.2 Scope

FMG's team of specialist engineers and consultants will assess the economic, environmental and social implications of the proposed Project using the principles outlined in the Western Australian State Sustainability Strategy. The EPA Guidance Statement No. 55 for implementing Best Practice in proposals submitted to the environmental assessment process will also be referred to. Similarly, representatives from the key DMAs will be consulted during this process to help guide and participate in this assessment and its outcomes.

6.2 FLORA AND VEGETATION SURVEYS

6.2.1 Purpose

To identify existing flora species and vegetation communities present in the Project Area, the location of any Declared Rare (DRF) or Priority Flora (PF), or other significant species or vegetation communities. This will enable an assessment of conservation significance with the aim of minimising impacts on significant flora and vegetation communities during both construction and operation.

6.2.2 Scope

Biota Environmental Sciences, who completed the biological surveys of the adjacent rail corridor for the Hope Downs Project, will undertake the flora and vegetation surveys in accordance with the

EPA's Draft Guidance Statement No. 51 for the assessment of environmental factors for terrestrial flora and vegetation. Key representatives from CALM will be consulted prior to, and throughout the surveys to ensure sufficient information is acquired to enable their assessment of the Project.

Due to the extent of the survey area, and the availability of information on the adjacent Hope Downs corridor, the survey of the rail corridor will adopt an approach of focussing systematic sampling efforts on portions of the FMG rail corridor which:

a) are substantially removed from the previously surveyed Hope Downs rail corridor (principally through the Chichester Range and in the Mindy Mindy Creek area); and
b) were not thoroughly ground-truthed during previous surveys.

In these areas standard 50 m x 50 m flora sampling quadrats will be established. This systematic sampling will be supplemented by targeted searches for Threatened Flora taxa and mapping of vegetation types from aerial photography. Other parts of the rail corridor more closely adjoining or overlapping the Hope Downs rail corridor will be subject to less systematic survey effort. In these areas, vegetation mapping will be completed, with ground-truthing to identify any new or significant vegetation types. Targeted searches for threatened flora would again be completed in these areas.

The outcomes of these field surveys will enable FMG to:

a) verify the accuracy of desktop information;
b) delineate and characterise the flora and range of vegetation types present in the Project Area; and
c) identify the potential impacts of the Project on these features.

Dependent on the adequacy of the survey in respect of rainfall and seasonal timing, additional seasonal sampling will be conducted to supplement flora collections completed during the primary survey.

6.3 FAUNA STUDIES

6.3.1 Purpose

To undertake baseline studies to identify existing terrestrial fauna, including any Specially Protected (Threatened) Fauna, or significant fauna habitats present within the Project Area. Having determined the status of fauna in the areas of impact, to then formulate best-practice procedures to ensure impacts are minimised.

6.3.2 Scope

Biota will undertake this work, which will be based on its experience with the Hope Downs Project, targeting areas most likely to support threatened species. The approach to the work will be similar to

that adopted for the flora and vegetation surveys. This will involve systematic sampling work (including pitfall traps, Elliott traps, funnel traps and bird transects) in the sections of the FMG rail where the corridor is removed from previously surveyed areas. The balance of the rail corridor will be sampled on an opportunistic and non-systematic basis, with effort targeted at area that may support Threatened fauna.

Priority will be given to searching for evidence of the Mulgara (which is listed as Schedule 1 under the *Wildlife Conservation Act 1950* and 'Vulnerable' under the *EPBC Act 1999*), and other Schedule and Priority listed species previously recorded in the vicinity of the Project Area.

The final scope and methodology for fauna surveys will be developed with input from CALM and DoE representatives.

6.4 STYGOFAUNA STUDY

6.4.1 Purpose

To determine whether stygofauna are present within the groundwater supply areas proposed for the Project, and if the conservation status of these populations will be affected by abstraction of groundwater.

6.4.2 Scope

Stygofauna sampling will be conducted in conjunction with drilling for groundwater resources to identify any potential stygofauna habitat sites, in accordance with the principles outlined in the EPA Guidance Statement No. 54 on sampling of subterranean fauna and in consultation with representatives from CALM and WA Museum. This work will be undertaken by Biota, with detailed taxonomic and genetic work to be completed in liaison with the WA Museum, University of Western Australia and other specialist taxonomists. This work will be based on accepted techniques of plankton haul net sampling and will be geared to the level of risk associated with Project hydrological changes.

6.5 COASTAL AND MARINE STUDY

6.5.1 Purpose

To map and describe the benthic marine biota and habitat likely to be impacted by the Project, and to investigate the hydrodynamics of the coastal mudflats and the influence of freshwater inflows into mangrove communities. To assess the potential impacts resulting from dredging and port development on the hydrodynamic processes (including flushing dynamics and storm surge) of the area.

6.5.2 Scope

This study will investigate the benthic and shore environments, as well as the intertidal mudflats within the Project Area, and assess the potential impacts of the proposed port development.

The study will investigate:

- the impacts of the Project on water circulation, sediment movement and benthic communities' susceptibility to on-shore disturbance;
- changes in surface drainage;
- increased turbidity and the effects on water quality, as a result of dredging operations;
- the impacts of disposal of discharge water during dredging, reclamation and other construction operations;
- levels of contamination in dredge spoil (e.g. TBT);
- the presence of acid-sulphate sediments and the potential for pollution on disposal;
- the risk of oil spills and spill contingency measures;
- the potential for introduction of exotic marine organisms; and
- the cumulative impacts of port operation.

It is currently proposed to dispose of dredge spoil on-shore, for use as fill during construction of the port. However, should geotechnical studies indicate that the spoil is unsuitable for use as fill, an alternative deposition option will need to be investigated. The coastal and marine study, will also tie in with the regional biological studies, which will include an assessment of the local mangrove species and community.

The investigative work will be conducted by DALSE and will be undertaken in accordance with the principles outlined in the EPA Draft Guidance Statement No. 29 for the protection of benthic primary producer habitats in Western Australia's marine environment and in consultation with the DoE, PHPA and other relevant DMAs. In the event that offshore disposal is required then FMG will initiate discussions with the DEH to obtain approval to dispose of spoil offshore. The results of this study and application will also be copied to the DoE.

6.6 MANGROVE STUDY

6.6.1 Purpose

To map and describe the mangrove assemblages present at the location of the proposed port development, and identify the potential impacts on these mangroves as a result of the Project.

6.6.2 Scope

The mangrove survey and development of management measures will be undertaken in accordance with the EPA Guidance Statement No. 1 for the protection of arid zone mangroves along the Pilbara coastline under Guideline 4 for 'all other mangrove areas that occur inside areas that have been designated as industrial areas associated with ports or other developments'.

The survey will be undertaken by Biota, which has surveyed the mangrove areas for the Hope Downs Project. This study will be closely linked to the Coastal/Marine study and also the surface hydrology study and undertaken with guidance from CALM and the DoE. The assessment of mangrove communities will identify and evaluate the potential impacts presented by the proposal and discuss design and management measures to address these.

6.7 GEOTECHNICAL ASSESSMENT

6.7.1 Purpose

To determine the substrate characteristics within the Project Area and its suitability for foundations, use as fill and/or means of disposal and rehabilitation.

6.7.2 Scope

Geotechnical investigations of the rail corridor and port area, including areas to be dredged will be conducted. Investigative works will include evaluation of the underlying strata and geology of the rail corridor and port facilities to identify preferred locations for infrastructure, ancillary facilities, their configuration, engineering work required to overcome any problematic issues and also locate/identify suitable foundation (borrow) and ballast material required for construction.

Dredged spoil will be saline and some of it may contain a large volume of particles that are too small to provide sufficient strength for use in foundations, which may necessitate the need for on land or off-shore disposal. Dredged sediments may also be anoxic, containing pyrite and sulphides caused by bacterial reduction, which may result in acid generation when oxidised. The geotechnical consultant will investigate the geotechnical characteristics of the dredged material, and the possible need for offshore dredge spoil disposal.

6.8 SURFACE HYDROLOGY STUDY

6.8.1 Purpose

To examine the natural surface water drainage patterns of the proposed port facilities and rail corridor to assist in appropriate design of infrastructure and of surface water control measures.

6.8.2 Scope

The study will:

- Identify watercourses and types of surface water flow including sheetflow;
- Undertake a study to investigate topography, catchment areas and predicted surface water runoff volumes;
- Assess the potential impacts on surface water flow rates, drainage patterns, sediment transport, riparian vegetation, pools and dependent vegetation as a result of development activities; and
- Provide advice to the engineering team with regards to location and design of drainage structures and creek and river crossings.

Surface drainage diversion or catchment structures will be designed to ensure that potentially polluted runoff does not enter natural waterbodies, and is contained (and treated if necessary) before being released to the environment, in accordance with the principles outlined in the EPA Draft Guidance Statement No. 26 for the management of surface run-off from industrial and commercial sites. The assessment criteria for the water quality of runoff will be the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2000).

The study will also identify areas of high erosion risk within the Project Area that require site-specific management during construction, operation and rehabilitation. The study will include detailed investigation into the hydrodynamics of the coastal river systems and the influence of fresh-water inflows into mangrove communities and how the Project may affect these attributes. This work will be undertaken in consultation with the relevant DMAs and will be closely linked to the biological and coastal geomorphology studies.

6.9 WATER SUPPLY STUDY

6.9.1 Purpose

To determine the project demand and availability of water for project construction and operation, the sustainability of this identified resource for the proposed use, and means through which water use can be minimised. To detail the existing water quality of groundwater aquifers within the Project Area.

6.9.2 Scope

A review of water demand will be undertaken to identify the volume of water required during the different stages of project development. A study will then be undertaken to detail the hydrogeological systems of the Project Area, existing beneficial uses of groundwater, including ecosystem maintenance, and any proposed groundwater abstraction operations. This information will be used to

identify likely available water sources and assess the sustainability of these resources and potential impacts of abstraction.

Studies will be conducted in consultation with the Water and Rivers Commission, Local Government authority, pastoralists and other water users in the area. Drilling and pump testing will be required to confirm available water sources, and the water quality of groundwater aquifers. Water supply for the Project in the vicinity of Port Hedland will be investigated in conjunction with the Water Corporation.

This work will be conducted in accordance with the principles of the Water and Rivers Commission (now Department of Environment) Statewide Policy No. 5 (Environmental Water Provisions for Western Australia).

In design of the Project, FMG will investigate ways to minimise water use, including water recycling, and use of alternative dust suppression measures to water sprays, such as organic non-water spray on suppressants.

Potential sources of groundwater contamination associated with the Project will also be investigated.

6.10 GREENHOUSE GAS EMISSIONS ASSESSMENT

6.10.1 Purpose

To estimate the Project's greenhouse gas emissions and determine appropriate measures of minimising these emissions.

6.10.2 Scope

In consultation with the engineering design team, ENVIRON will review the consumption of fossil fuels and CO_2 generation from the Project's operations including clearing. The findings will be utilised to calculate the expected greenhouse gas emissions for the Project during operations, and compare predicted emissions with other similar infrastructure projects in Australia. The Project will incorporate energy saving strategies to ensure that greenhouse gas emissions are minimised.

This study will be undertaken in accordance with the EPA Guidance Statement No. 12 on minimising greenhouse gases and in consultation with the Australian Greenhouse Office.

6.11 ASSESSMENT OF DUST

6.11.1 Purpose

To assess the potential impacts of dust on the air quality of the town of Port Hedland from construction and operational (transport, loading and stockpiling) activities at the proposed port facility.

6.11.2 Scope

The Proponent's design team and specialists from ENVIRON will examine the proposed construction and operational activities, their potential to generate dust at the proposed port and along the rail corridor and the potential for the dust emissions to impact on the air quality of the Port Hedland area.

The assessment of dust impacts by the Proponent will therefore include an analysis of adverse climatic conditions to be used as input for determining the preferred stockpile location and orientation in order to minimise dust impacts, and a review of effective dust mitigation measures to be incorporated into the facilities design and operating strategies. The significance of dust emissions from the Project with regards to human health and environmental impacts will be assessed.

Within the context of the environmental impact assessment for the Hamersley Iron Dampier Port Upgrade, the EPA determined that air dispersion modelling predictions should not be heavily relied upon in its decision-making due to the large uncertainties associated with the modelling of dust impacts (EPA, 2003a).

Notwithstanding this, based on advice from the DoE's Air Quality Branch, air dispersion modelling of dust emissions from the FMG Stage A Project in isolation, and in combination with the dust emissions from BHPB's existing Port Hedland operations and the dust emissions from the approved Hope Downs project, will be conducted to assess the potential for cumulative dust impacts in residential areas.

Input from those with local knowledge of historic dust issues in Port Hedland such as the PHPA and local Shire Council will also be sought.

6.12 NOISE AND VIBRATION ASSESSMENT STUDY

6.12.1 Purpose

To assess the Project's potential impact on noise sensitive premises in Port Hedland.

6.12.2 Scope

Lloyd Acoustics will identify noise sensitive premises and assess the existing background noise levels, influencing climatic and geophysical parameters and evaluate the predicted noise characteristics of equipment and vehicles used by the rail and port operations. This information will be used to undertake noise modelling under worst-case and average-case environmental conditions for the Project on an individual basis, and combined with noise levels from existing industries at Port Hedland (cumulative impacts). The results of this modelling will give an indication of noise emissions from the Project and the potential to exacerbate existing noise levels received by the surrounding occupants and at any noise sensitive premises. Should noise modelling indicate that the Project is unable to meet the *Environmental Protection (Noise) Regulations* 1997 on an individual basis, then it is intended to seek authorisation to exceed the assigned levels. A noise management plan will be developed to address management options such as selection of construction methods, buffer zones and/or hours of operation as appropriate.

Where construction works involve significant trucking operations, the noise impacts on the nearest premises will be assessed against the criteria for road traffic noise assessment including the EPA Preliminary Draft Guidance No. 14 for road and rail transportation, and develop appropriate management options. These draft guidelines will also be used for the assessment of railway noise during operations.

An assessment of vibration emissions and its effects during construction (i.e. blasting and earth moving) and from the operation of the railway and port facilities on local residents and other facilities will be made.

The study will be undertaken in accordance with the EPA Draft Guidance Statement No. 8 on environmental noise, and results will be compared with the *Environmental Protection (Noise) Regulations 1997*, whilst taking into account existing background noise levels that currently do not comply with the regulations. Noise assessment and modelling will be undertaken in consultation with the DoE.

6.13 SOCIO-ECONOMIC STUDY

6.13.1 Purpose

To assess the benefits and any potentially adverse social and economic impacts of the Project.

6.13.2 Scope

A review of the Project's socio-economic effects will be undertaken by a suitably qualified consultant. The review will include a study of both direct and indirect benefits and possible disruptions to employment, job and wealth creation, regional/state/national economic benefits, effect on local

communities and existing land uses/users, demands placed on local services and resources, land and housing availability in the region and alignment with State policy.

The study will assess the impacts on recreational use of the port area and visual amenity and landscape values. European heritage values will also be considered and a search of the Register of National Estate will be conducted.

The study will investigate opportunities for the Proponent to contribute to the local communities affected by the Project. This study will be closely linked to the Project Sustainability Assessment and stakeholder consultation.

6.14 ABORIGINAL ETHNOGRAPHIC STUDY

6.14.1 Purpose

To determine if the Project will potentially affect any sites of cultural significance to Aboriginal people.

6.14.2 Scope

The scope of the study will be defined in consultation between the PNTS and Native Title claimant groups as part of regular working group meetings. The study will be conducted in accordance with the principles in the EPA Draft Guidance Statement No. 41 for the assessment of Aboriginal Heritage and the requirements of the DIA.

Aboriginal people who are acknowledged by their community as ones who can 'speak for the land' will be consulted by a suitably qualified and experienced Anthropologist as to the location and cultural significance of ethnographic sites in and around the Project Area. This will include the Anthropologist accompanying the local Aboriginal people in the field to discuss the proposed Project and ensure complete understanding and coverage of areas likely to be disturbed.

6.15 ABORIGINAL ARCHAEOLOGICAL STUDY

6.15.1 Purpose

An archaeological survey will be conducted to determine if the Project will impact any archaeological sites that are of significance to the local Aboriginal people, or the understanding of their culture.

6.15.2 Scope

The Pilbara Native Title Service (PNTS) has been commissioned by the Proponent to undertake archaeological studies of the Project Area. The PNTS and its archaeologist will also be supported

during the field surveys by local Aboriginal representatives that are familiar with the area. Due to the extent of the Project Area, aerial mapping and the results of surveys undertaken by Hope Downs, and an in-field engineering constraints survey will be used to target areas where more engineering flexibility is required (e.g. around rocky outcrops, drainage channels and river systems) or significant archaeological finds are most likely to be located such as:

- Rock shelters;
- Short, steep valleys and gullies;
- Rivers and creek lines;
- Foot slopes of rock outcrops;
- Gorges with permanent water sources; and
- Coastal areas.

Archaeological surveys will be undertaken in consultation with the local Aboriginal communities and Native Title claimant groups as part of regular working group meetings and also the Department of Indigenous Affairs (DIA).

6.16 PREPARATION OF PER

A PER document will be prepared by ENVIRON in conjunction with the Proponent and its sub-consultants involved in the various studies mentioned above. This document will be prepared in accordance with the EPA Guidelines for Preparing and Public Environmental Review/Environmental Review and Management Programme (EPA, 2002). The PER will describe the proposal and the receiving environment in detail, outline the potential impacts of the proposal on factors of the environment, identify proposed management strategies to ensure those environmental factors are protected, and demonstrate that the Project can be managed to minimise harm in a way that is environmentally acceptable to the community.

6.17 ENVIRONMENTAL MANAGEMENT PLANS

Within the PER text broad management measures and strategies will be identified to mitigate and minimise environmental and social disruption/harm. In addition to this a Project Environmental Management Plan (EMP) will be prepared to outline in further detail how the key environmental issues and associated impacts of the Project will be managed during construction. This will include specific management strategies and procedures that have been developed during project design, in consultation with the specialist consultants and DMAs.

An employee awareness training programme will form part of the EMP and will capture the essence of the Proponent's commitment to sustainable development and industry best practice environmental management. The awareness training programme will also include an overview of expected environmental management responsibilities and minimum performance requirements from all staff, contractors and visitors.

A copy of this EMP will be submitted as an appendix in the PER.

7. STAKEHOLDER CONSULTATION

7.1 CONSULTATION TO DATE

To date, consultation with local, State and Commonwealth government departments, the local Aboriginal communities, pastoralists and other interested parties has been undertaken for the Project to identify any issues associated with the its development. The consultation process has involved group consultation meetings with the community and government agencies. As part of the consultation process the Proponent is acquiring contact details of interested parties and stakeholders, who will be kept informed of project developments through the circulation of the FMG Newsletter and by other means.

The Proponent is in the process of notifying all stakeholders by registered mail where the Project Area intersects land in which the stakeholders hold a registered interest. A stakeholder consultation strategy will be implemented to ensure that the concerns and interests of stakeholders are taken into consideration in design and development of the Project.

Table 3 outlines the community consultation undertaken by the Proponent to date.

Table 3. Consultation with Stakeholders

Consultation	Date
Various meetings and open consultation with the Port Hedland Port Authority, members of the Shire Council and local Chamber of Commerce and Industry representatives.	Since August 2003
Various presentations to, and consultations with, State Government agencies (i.e. DoE, DoIR, CALM, WRC), both regionally and in Perth.	Since August 2003
Presentations to, and consultations with, various State Government Ministers, their advisors and independent WA Senators.	Since August 2003
Open communication with other key iron ore producers, infrastructure owners and proposed projects (e.g. BHPB, HI and Hope Downs) in relation to the sharing on information and use (at agreed terms and conditions) of existing/proposed rail and port infrastructure.	Since August 2003
Presentation to and marketing negotiations with local and foreign consumers of iron ore, which has included the securing of Letter of Intent from a number of steel manufactures for the supply of 25 Mtpa.	Since August 2003
Presentation to, and consultation with, the Nyjiaparli and Martu Idja Banyjima Native Title claimant groups during working group meetings in Tom Price.	23 September 2003
Presentation to and consultation with the Port Hedland Shire Council	29 September 2003 and 22 October 2003
Presentation to, and consultation with, the Newman Shire Council, approximately 120 community members, and various pastoralists.	28-30 September 2003
Consultation with the PNTS and the Aboriginal Native Title claimant groups covering the Project Areas at various Working Group Meetings and the wider Aboriginal community.	10, 12, 26 and 27 November and, 08 December 2003,
Public advertisements via the local radio station notifying the Port Hedland	15 November 2003 to 17 November

Consultation	Date
community of FMG's presentation on the proposed EPIO Project.	2003
Presentation to and consultation with Federal Government agencies (e.g. Invest Australia and DIFAT).	November 2003
Consultation with pastoralists within or near the Project Area.	November 2003
Aboriginal heritage consultation with local elders and representatives from the Nyjiaparli, Palyku and Martu Idja Banyjima Native Title claimant groups in the field.	8 – 14 December 2003
Presentation to DoIR, CALM and DoE Karratha regional offices to present an overview of the Project and discuss proposed flora and fauna survey methodology.	6 February 2004
Working Group meeting with the Karriyara People.	16 March 2004

Further consultation with pastoralists, Shires and the wider public was planned for March 2004, but was logistically prevented by the passage of two cyclones across the region in quick succession. This will now take place in April 2004.

Various letters and verbal communications have been received that express stakeholder interest and support for the Project. There was a single appeal, during the advertised level of environmental assessment period, that the Project be assessed as an Environmental Review and Management Program (ERMP) and not a PER, and this was dismissed by the Minister for the Environment on 3 March 2004.

7.2 PROPOSED CONSULTATION

The Proponent is currently determining the most appropriate manner in which to undertake community consultation such that all relevant stakeholders have the opportunity to become involved and be kept informed. The Proponent has enlisted the services of ERM, who have facilitated many community consultation and stakeholder engagement programs, to assist in the preparation and delivery of information to stakeholders.

The consultation program is expected to consist of an ongoing 'open-door' approach, whereby any member of the community can contact the Proponent and be advised of the Project and possible effects that it may have on them. Consultation and information dissemination will be undertaken in a variety of forms. This includes specific verbal and/or written correspondence where the Project will have a direct effect on the stakeholder (i.e. the rail corridor intersecting a pastoral lease or Native Title claim), or whereby interested stakeholders, not directly effected, can be kept informed through the circulation of Company newsletters, advertisements and community presentations.

The Local, State and Commonwealth Decision Making Authorities and other involved/non-government agencies will be consulted and kept informed on an ongoing basis. This will enable them to provided input into the environmental assessment and recommended management measures for the Project. Non Government Organisations (NGOs) such as conservation groups and local community groups will be included in the consultation process.

8. PROJECT AND ASSESSMENT SCHEDULE

The following schedule is proposed for the assessment of environmental impacts of the Project. This timetable is contingent on key information being available for each stage of the study, and smooth development of other aspects of the Project, such as engineering design and land access.

Table 4. Proposed Project and Assessment Schedule

Task	Commencement	Completion	Approximate Duration
Preparation of Environmental Referral	17 Nov 03	2 Dec 03	12 days
EPA sets level of assessment	2 Dec 03	15 Dec 03	10 days
Appeal period	16 Dec 03	24 Dec 03	8 days
Resolution of appeals	5 Jan 04	3 Mar 04	8 weeks
Environmental Surveys and Investigations	6 Nov 03	31 May 04	7 months
Stakeholder Consultation	21 Nov 03	17 May 04	6 months
PER preparation	5 Jan 04	31 May 04	5 months
Peer Review	30 Apr 04	31 May 04	1 month
Submission of Stage A PER to EPA Service Unit	-	31 May 04	(Milestone)
Public Review of Stage A PER*	21 Jun 04	13 Aug 04	8 weeks
Summary of Submissions and Proponent Response*	16 Aug 04	10 Sep 04	4 weeks
Preparation of the EPA Report & Recommendations by EPA Service Unit*	20 Sep 04	29 Oct 04	6 weeks
EPA Report to Minister*	-	16 Nov 04	(Milestone)
Appeal Period on EPA Report*	1 Nov 04	15 Nov 04	2 weeks
Ministerial Approval*	16 Nov 04	17 Dec 04	4 weeks
Preparation of Notices of Intent/Works Approval Applications (NOIs/WAAs)	2 Aug 04	16 Nov 04	3 months
Commencement of Construction	-	1 Jan 05*	(Milestone)

Notes: *Anticipated timing.

9. STUDY TEAM AND PEER REVIEW

9.1 STUDY TEAM

The environmental impact assessment of the Pilbara Iron Ore and Infrastructure Project (Port and N-S Railway) will be undertaken by an experienced team of specialist consultants and FMG personnel. The Proponent is specifically selecting specialised consultants that have extensive experience in their respective study areas, have Pilbara knowledge and are recognised for their professionalism.

The management of the study team is one of overall strategic understanding by all team members and integration between members and their respective areas of study. This will help to ensure an optimal Project with the best possible environmental, engineering and economic outcomes is achieved. The Proponent's final decisions on project design and management commitments will recognise and rely on the specialist advice it receives from its consultants. The Proponent is actively involved throughout the environmental assessment process to ensure 'ownership' and ultimate responsibility and accountability is retained by the company and its management.

The Proponent has enlisted the services of ENVIRON, an international technical and scientific consultancy, to provide the Project with strategic environmental advice, co-ordinate baseline environmental studies, undertake the assessment of dust impacts, greenhouse gas emissions and the Project sustainability assessment, liaise with the key Decision Making Authorities (DMAs) and prepare environmental documentation required for the State EIA process including the PER.

For the biological survey work and investigations the Proponent has commissioned Biota Environmental Sciences Pty Ltd to undertake the work. Biota undertook the majority of the flora and vegetation surveys (including mangrove assessments) and fauna surveys for the Hope Downs Project and will use this experience in the assessment of the FMG Project.

The services of other suitably experienced consultants are currently being scoped and/or commissioned.

9.2 PEER REVIEW

In consultation with the DoE and other relevant DMA representatives the need for peer review of key technical studies will be discussed including the identification of a suitable peer reviewer.

10. EXISTING STUDIES AND OTHER REFERENCES

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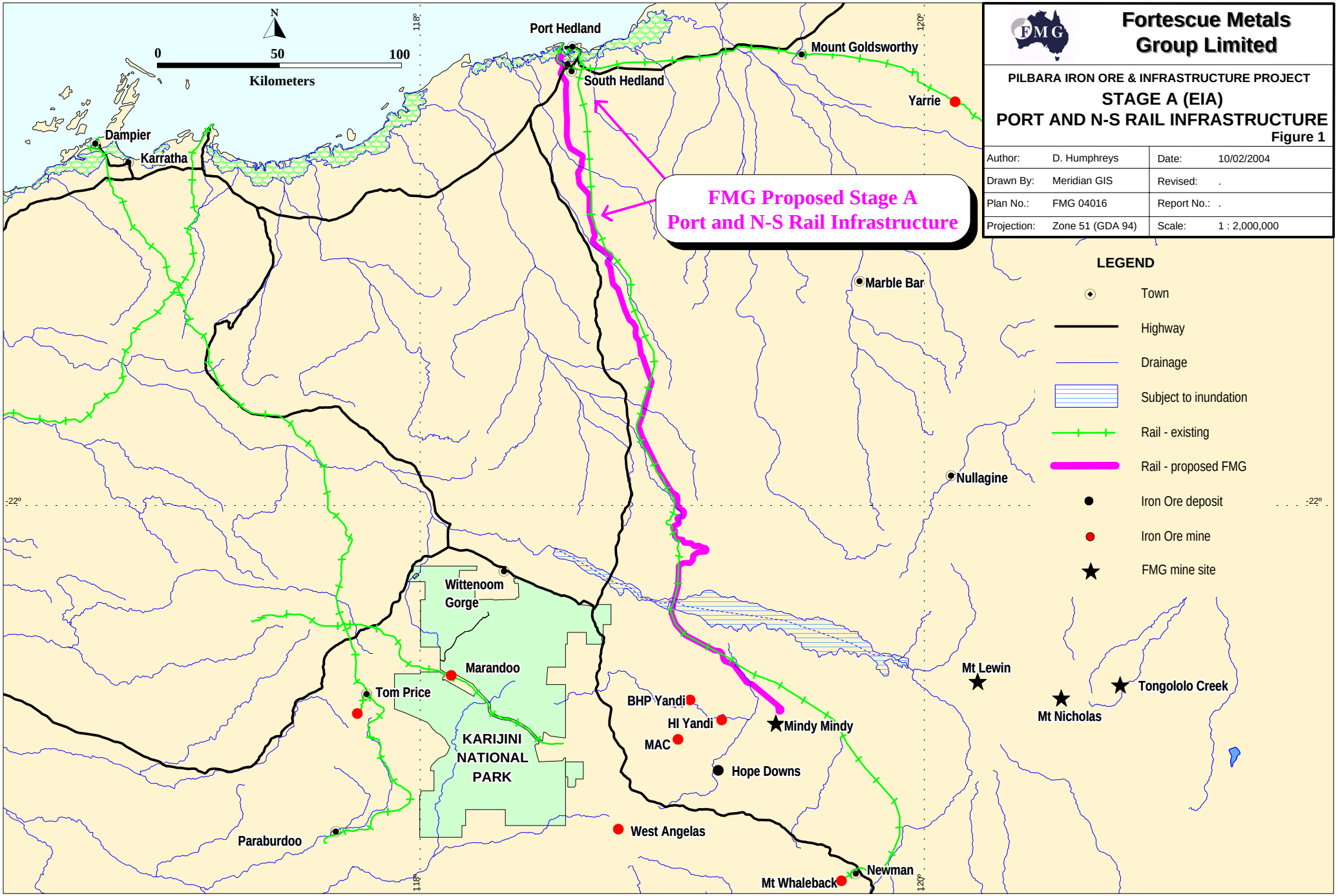


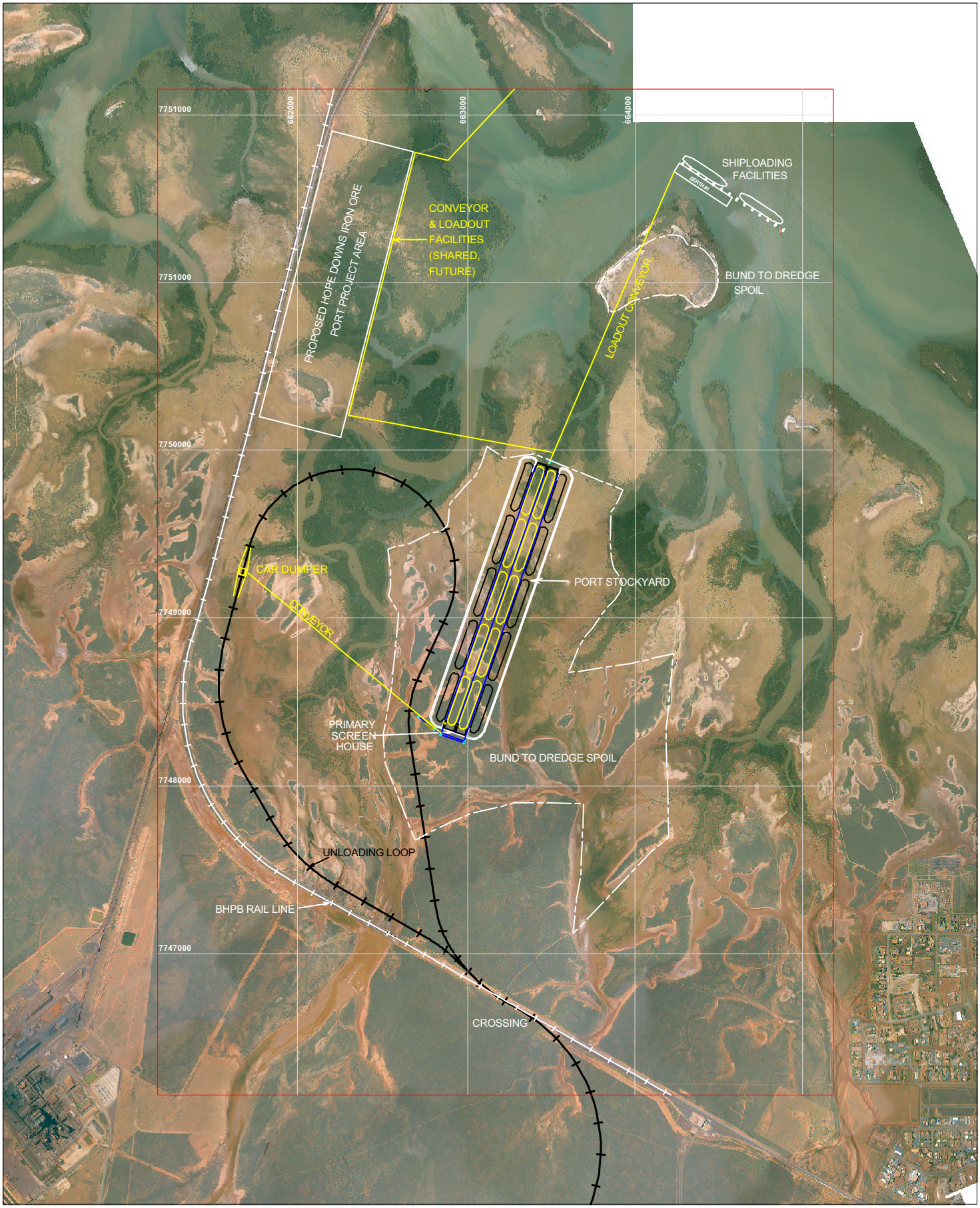
Fortescue Metals Group Limited

PILBARA IRON ORE & INFRASTRUCTURE PROJECT

STAGE A (EIA)
PORT AND N-S RAIL INFRASTRUCTURE

Figure 1

Author:	D. Humphreys	Date:	10/02/2004
Drawn By:	Meridian GIS	Revised:	.
Plan No.:	FMG 04016	Report No.:	.
Projection:	Zone 51 (GDA 94)	Scale:	1 : 2,000,000



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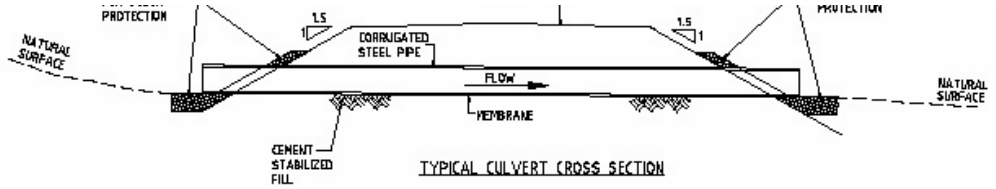
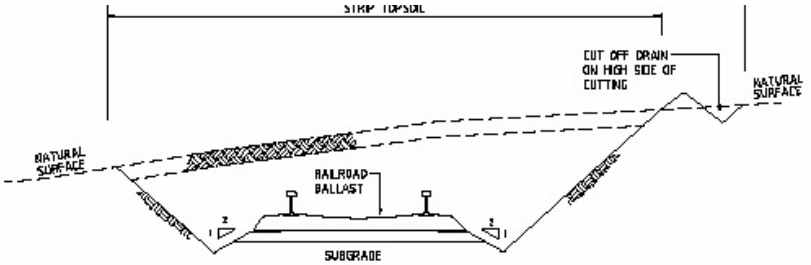
Fortescue Metals Group Limited

Figure 2.
Indicative Port Layout

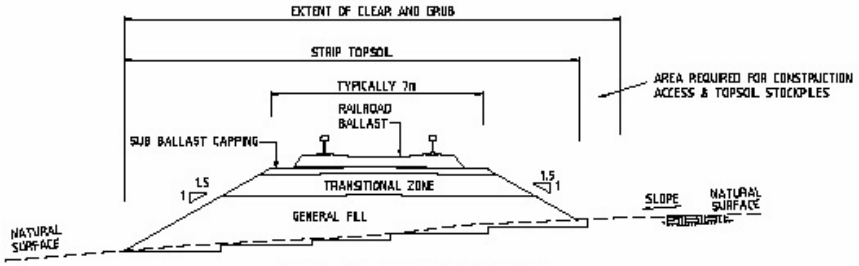
Author: FMG	Date: 6th April 2004
Drawn: P Sawers	Revised:
Dwg No.:	Report No.:
Projection GDA 94 Zone 50	Scale: 1:15 000



TYPICAL CULVERT CROSS SECTION



TYPICAL RAIL IN CUT CROSS SECTION



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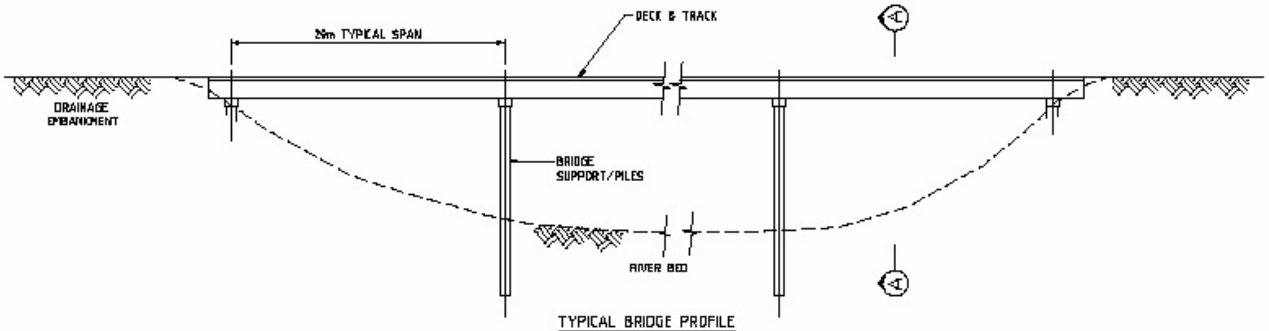
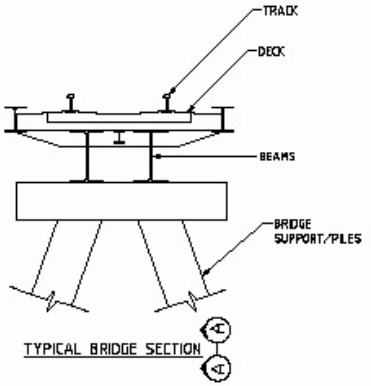


TYPICAL BRIDGE PROFILE



TYPICAL BRIDGE SECTION

PRELIMINARY- C
NOT FOR CONSTRUCTION

Fortescue Metals Group Limited

PILBARA IRON ORE & INFRASTRUCTURE PROJECT
E-W Railway and Mine Sites (Stage B)

INDICATIVE RAIL FORMATION CROSS SECTION

Figure 3

Author:	D. Humphreys	Date:	10/02/2004
Drawn By:	Meridian GIS	Revised:	.
Plan No.:	FMG 03030	Report No.:	EPBC Referral
Projection:	Zone 51 (GDA 94)	Scale:	