

Pilbara Iron Ore and Infrastructure Project: Port and North-South Railway (Stage A)

Fortescue Metals Group Limited

**Report and recommendations
of the Environmental Protection Authority**

**Environmental Protection Authority
Perth, Western Australia
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Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
03/12/2003	Proposal Referred to EPA	
03/03/2004	Level of Assessment Set (following appeals)	13
20/09/2004	Proponent Document Released for Public Comment	28
15/11/2004	Public Comment Period Closed	8
18/04/2005	Final Proponent Response to the Issues Raised	22
30/05/2005	EPA Report to the Minister for the Environment	6

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Summary and recommendations

Fortescue Metals Group Limited (hereafter referred to as FMG) proposes to develop the Pilbara Iron Ore and Infrastructure Project in the Pilbara region. This proposal comprises Stage A of the project and involves the construction of a port facility at Anderson Point in Port Hedland which includes shipping facilities, reclaimed areas for iron ore handling infrastructure, stockpiles and ancillary facilities and a connecting north-south railway (to be constructed in two parts), over a distance of 345 kilometres (km) to resources in the east Pilbara at Mindy Mindy.

This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for the Environment on the environmental factors relevant to the proposal.

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

The EPA is also required to have regard for the principles set out in section 4A of the *Environmental Protection Act 1986*.

Relevant environmental factors and principles

The EPA decided that the following environmental factors relevant to the proposal required detailed evaluation in the report:

- (a) terrestrial biodiversity;
- (b) benthic primary producer habitat- mangroves;
- (c) surface water hydrology;
- (d) dust;
- (e) noise; and
- (f) marine and sediment quality.

The following principles were considered by the EPA in relation to the proposal:

1. the precautionary principle;
2. the principle of intergenerational equity; and
3. the principle of the conservation of biological diversity and ecological integrity.

There were a number of other factors which were very relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

Conclusion

The EPA has considered the proposal by FMG to construct a port facility at Anderson Point in Port Hedland and a connecting north-south railway, over a distance of 345 km to resources in the east Pilbara at Mindy Mindy.

The EPA has previously considered and provided advice on a proposal by Hope Downs Management Services Pty Ltd (HDMS) to construct a rail line and port facility to support the development of an iron-ore mine, based on the Hope 1 Deposit (EPA, 2002). This proposal has yet to be implemented but has environmental approval. The FMG proposal, in part, overlays the HDMS proposal. Pursuant to the State Agreement between HDMS and the State of Western Australia, HDMS is required to make detailed proposals to the Minister responsible for the Agreement for consideration and approval. If HDMS submits a development proposal that is approved under the State Agreement, this will have implications for this proposal by FMG, and as such FMG will be required to revise and re-submit its proposal for further assessment under Part IV of the *Environmental Protection Act 1986*.

In relation to terrestrial biodiversity and surface water hydrology the EPA has concluded that:

- none of the habitat types present in the project area appear to be unique to the study corridor or regionally significant;
- although the impact on flora and fauna will increase if both HDMS and FMG's railways are constructed, it is unlikely that the conservation status of any Threatened flora, restricted vegetation types or Schedule fauna species will be affected at a regional or sub-regional scale;
- the range of management measures to be implemented as part of the design, construction and operation of the proposed rail line will effectively minimise or avoid any impacts on significant fauna habitats (including sand dune associations, cracking clay communities, mulga woodlands and rockpile associations) and fauna communities; and
- the integrity and function of the existing hydrological system will be maintained.

Recommended conditions relate to:

- limiting the disturbance of land to be cleared for the railway corridor to 3100 hectares (ha) (2385 ha for Part 1 and 715 ha for Part 2 in two parts);
- relocation of significant fauna prior to any disturbance;
- rehabilitation of all areas not required for ongoing operations;
- weed management during operations; and
- management of surface water.

With regard to benthic primary producer habitat (BPPH), two EPA Guidance Statements (GSs) are considered relevant to this assessment – GS No. 1 for the protection of tropical arid zone mangroves along the Pilbara coastline, and GS No. 29 that addresses cumulative loss of BPPH. In considering cumulative impact, the EPA agreed that the area identified in GS No. 1 as the “Port Hedland industrial area” would be the defined ‘management unit’ for the purpose of considering cumulative loss of mangrove habitat in the context of GS No. 29 for this proposal.

The EPA concluded that FMG has taken all practicable measures to reduce mangrove disturbance and notes that the loss of core closed-canopy mangroves has been reduced from 22 ha to 14.8 ha during the course of the assessment. The EPA further notes that should all existing and approved developments proceed in the port area, that the cumulative loss of core canopy mangrove extent amounts to 12.8%. As a result of FMG's proposal, this cumulative loss will increase to 13.3%.

The EPA acknowledges that should the proposal proceed, there will be an unavoidable loss of mangroves. Accordingly, the EPA recommends that the proponent take measures to prevent the loss of, or serious damage to, any mangroves or their habitats other than in accordance with a Mangrove Protection Plan and to rehabilitate those areas not required for ongoing operations to BPPH.

With regard to dust, the EPA notes that Port Hedland townsite has been traditionally exposed to elevated dust levels through iron ore operations at Nelson Point and Finucane Island. Predictive modelling undertaken for the proposal indicates that there will be small increases in the maximum 24-hour and annual cumulative dust concentrations for total suspended particulates (TSP), PM₁₀ - particulate below 10µm in diameter, and PM_{2.5} -particulate below 2.5µm in the study area with existing operations still the predominant contributor to ambient dust concentrations in Port Hedland.

In addition, given the greater distance of the FMG proposal to the Port Hedland Townsite and the location of the proposal in relation to the prevailing winds, the FMG contribution to dust levels in the townsite is considered to be minor. As the ore will be conditioned at the mine to the optimum moisture content and transported to the port facility by rail it is not anticipated that loaded trains will generate significant dust during daily operations.

The EPA notes that preliminary information, from the Department of Industry and Resources' (DoIR's) cumulative modelling, suggests that BHP Billiton Iron Ore's (BHPBIO's) emissions are lower than used in the FMG Public Environmental review (PER) and as such the FMG PER results are most likely conservative.

The issue of dust is considered manageable and it is proposed that a condition be placed on the proponent to monitor and control dust.

In terms of noise emissions for the Port Hedland area, the EPA notes that this proposal highlights the fact that industrial noise emissions currently exceed the prescribed limits set by the Noise Regulations, for residential locations within the Port Hedland townsite.

Noise modelling undertaken by Lloyd (2004) shows that the predicted noise emissions from the proposed shiploading and associated operations at Anderson Point would comply with the *Environmental Protection (Noise) Regulations 1997* during daytime and evenings/Sundays, but would exceed the prescribed standard for night time by 4dB(A) under worst case conditions for sound propagation.

Noise emissions from FMG when taken in isolation will comply with the night time assigned level under the noise regulations, however, in the presence of BHPBIO's operations (that currently exceed the assigned level) FMG is unable to meet this lower level. Accordingly FMG will need to reduce the primary noise source (conveyors and shiploader) by 7dB(A) in order to reduce overall noise from FMG by 4dB(A).

The EPA's objective is to ensure that the FMG emission is at a level that is consistent with a future scenario where the BHPBIO noise emission has been substantially reduced to a level that is much closer to the assigned level. Accordingly, the EPA has

concluded that it is reasonable for FMG to work towards the fully compliant noise level over a period of time.

With regard to rail noise, the EPA notes that the existing L_{Aeq} level of 55dB(A) at *Abydos Station* is cause for concern and represents a significant noise issue requiring ameliorative measures. Accordingly, the EPA considers that a condition should be placed on the proponent to address noise emissions from port and rail operations in accordance with an operations Noise Management Plan.

In addition, it is recommended that given BHPBIO, FMG and HDMS will all contribute to resulting noise levels, that these companies be required to contribute to a joint noise amelioration programme, that could take the form of operational measures on the railway, construction of noise barriers, or noise insulation of the dwellings.

In terms of dredging and reclamation associated with the proposal, the EPA accepts the proponent's requirement for a 300 ha development footprint for construction, and , that 100 ha of that development footprint would be utilised for operations. However, the EPA considers that this needs to be managed appropriately, particularly as acid sulphate soils have been identified on site and because there is a risk of elevated turbidity levels (during a 12 month dredging campaign) impacting on the water quality and ecological processes within the Port Hedland harbour and environmental attributes in the adjacent nearshore marine environment (eg reef communities).

Conditions to be placed on the proponent relate to monitoring and controlling water quality changes associated with dredging; managing the disturbance of ASS, and ensuring dredging equipment utilised does not present a risk to the ecosystem integrity of the marine waters of Port Hedland.

With regard to rail duplication, the EPA in its assessment of the HDMS port and rail facility EPA, 2002) noted that it would be preferable for HDMS to share existing railway infrastructure, rather than to duplicate an existing railway line. The EPA maintains this view and considers it would be preferable for FMG, HDMS and BHPBIO to share existing railway infrastructure to minimise the cumulative impact of rail infrastructure and transport.

In terms of future development of the port, the PPHA intends to seek comment from the EPA under Section 16e of the *Environmental Protection Act 1986*. The PPHA's draft Ultimate Development Plan identifies proposed service corridors required to link all newly developed areas of the port with appropriate berths, support areas and the major access routes into Port Hedland. The FMG development has integrated its layout into this draft plan.

The EPA, however, is aware that the DoIR is trying to resolve how the HDMS and FMG railways are to cross BHPBIO's Finucane line and acknowledges that the solution to this complex issue is likely to impact on the alignment of the PPHA's services corridor.

The EPA has therefore concluded that it is unlikely that the EPA's environmental objectives would be compromised provided there is satisfactory implementation by

the proponent of the proponent's commitments and the recommended conditions set out in Appendix 5 and summarised in Section 4.

Recommendations

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister notes that the proposal being assessed is for construction of a port facility at Anderson Point in Port Hedland which includes shipping facilities, reclaimed areas for iron ore handling infrastructure, stockpiles and ancillary facilities and a connecting north-south railway (to be constructed in two parts), over a distance of 345km to resources in the east Pilbara at Mindy Mindy;
2. That the Minister considers the report on the relevant environmental factors and principles, as set out in Section 3;
3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarised in Section 4, including the proponent's commitments;
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report;
5. That in accordance with previous EPA advice where rail facilities in the Pilbara have been assessed, it would be preferable for FMG to share existing railway infrastructure rather than to duplicate an existing railway line; and
6. That Government, in conjunction with industry, develop a strategy to resolve the cumulative noise issue in Port Hedland with the aim towards achieving real noise reductions in Port Hedland over time.

Conditions

Having considered the proponent's commitments and information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by FMG to construct a port facility at Anderson Point in Port Hedland and a connecting north-south railway (to be constructed in two parts), approximately 345km to the south southeast is approved for implementation. These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

1. that the proponent shall fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 4;
2. disturbance of land within the railway corridor and limiting the total area to be disturbed to 3100 ha (2385 ha for Part 1 and 715 ha for Part 2);
3. relocation of significant fauna;
4. surface water management;

5. rehabilitation of all areas disturbed during construction of the rail corridor, not required for ongoing operations;
6. weed management during construction;
7. protection of subterranean fauna;
8. mangrove protection and limiting the total area of core closed canopy mangroves to be disturbed to 14.8 ha;
9. rehabilitation of the port area;
10. dredging and reclamation;
11. introduced marine species and ballast water for dredging equipment;
12. acid sulphate soil management;
13. dust management during construction and operations; and
14. noise management during port and rail operations.

It should be noted that other regulatory mechanisms relevant to the proposal are:

- Works approval/ Licensing under Part V of the *Environmental Protection Act 1986*;
- Permits and licenses under the provisions of the *Rights in Water and Irrigation Act 1914*; and
- preparation and implementation of a Construction Noise Management Plan in accordance with Regulation 13 of the *Environmental Protection (Noise) Regulations 1997*, to the requirements of the Town of Port Hedland.

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3. Summary of Identification of Relevant Environmental Factors and Principles
4. Recommended Environmental Conditions and Proponent's Commitments
5. Summary of Submissions, Proponent's Response to Submissions and Additional Studies

1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment on the environmental factors relevant to the proposal by Fortescue Metals Group Limited (FMG) to construct a port facility at Anderson Point in Port Hedland and a connecting north-south railway (to be constructed in two parts) stretching approximately 345 kilometres (km) south south-east to resources at Mindy Mindy (see Figure 1).

FMG's proposal to develop the Pilbara Iron Ore and Infrastructure Project in the Pilbara is being assessed in two stages:

- Stage A: the proposed port at Anderson Point and a 345 km north-south railway to resources in the East Pilbara at Mindy Mindy; and
- Stage B: the development of proposed mining operations at Mindy Mindy, Christmas Creek, Mt Lewin and Mt Nicholas and a connecting 160 km east-west rail spur.

The rail and port facility proposal is being assessed as a Public Environmental Review (PER). The PER (ENVIRON, 2004) was released for an eight week public review period between 20th September and 15th November 2004.

The Minister for the Environment in her appeal determination on level of assessment indicated that there is merit in the mining and infrastructure proposals being assessed as an integrated project, although it is acknowledged that there are timing and practical issues constraining this. The EPA was encouraged to undertake the assessment of the separate stages of the overall project concurrently where possible, such that linkages and interrelationships between the two could be considered and incorporated into the environmental assessment process.

Due to the need to undertake studies in relation to aspects concerning Stage B, the release of the PER for Stage B was delayed. The PER for Stage B (ENVIRON, 2005a) was released for a 10 week public review period between 6th December 2004 and 14th February 2005. Although the assessment of these projects will not be assessed concurrently, both documents make reference to Stage A and Stage B and the proponent recognises that should approval be given for the rail and port facility, that this should not be seen as pre-empting or guaranteeing approval for the mining operations.

The Port

The Minister for the Environment in her appeal determination also requested that the EPA ensure that its consideration of the strategic environmental issues associated with the Port Hedland port development options are incorporated into its assessment of the proposal.

The Port Hedland Port Authority (PHPA) has submitted a draft Ultimate Development Plan to the EPA for comment, however it has yet to refer a finalised Plan to the EPA

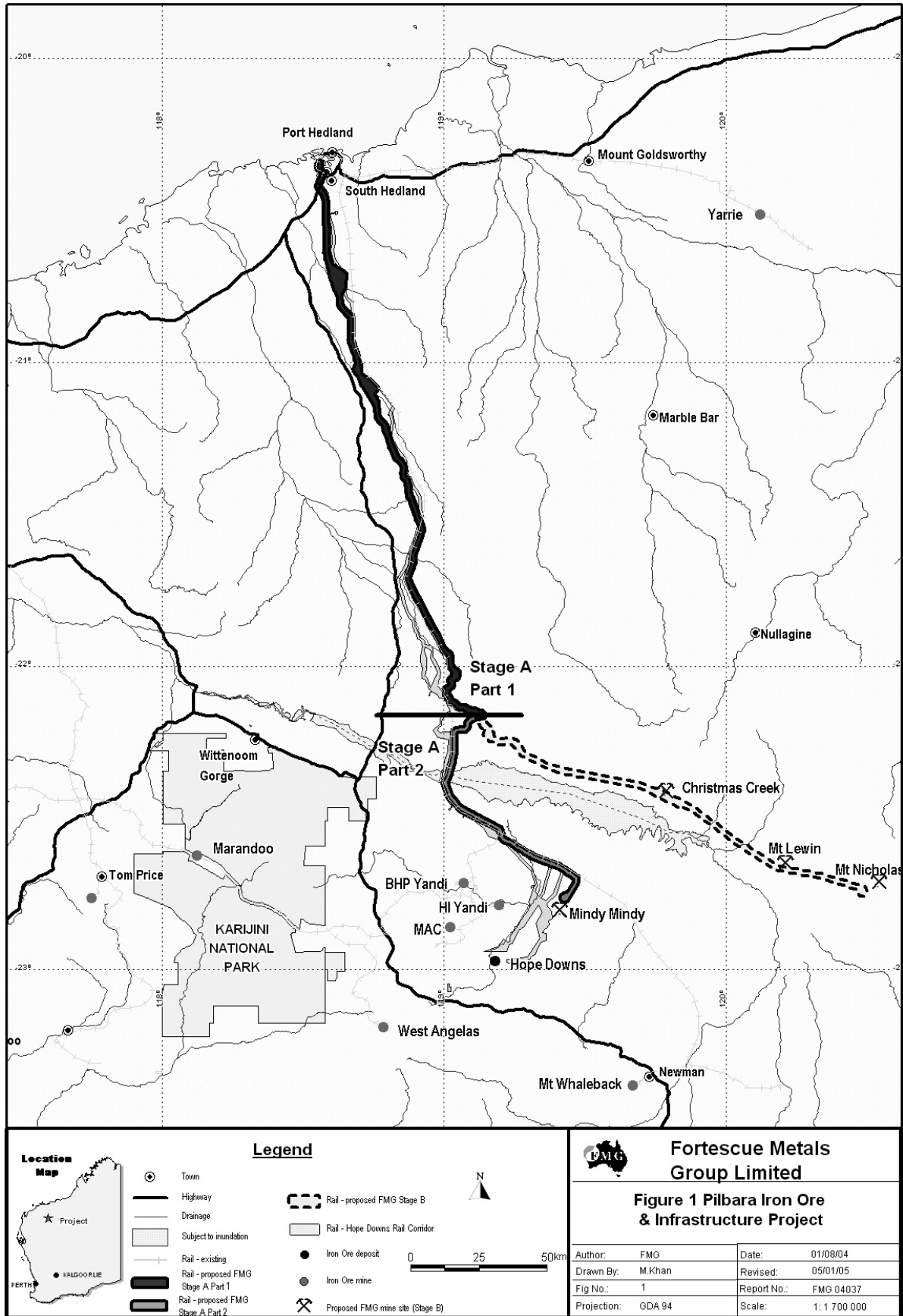


Figure 1: Pilbara Iron Ore and Infrastructure Project.

for assessment under Section 16e of the *Environmental Protection Act 1986*.

The EPA has previously considered and provided advice on a proposal by Hope Downs Management Services Pty Ltd (HDMS) to construct a rail line and port facility to support the development of an iron-ore mine, based on the Hope 1 Deposit (EPA, 2002). This proposal has yet to be implemented but has environmental approval. The FMG proposal, in part, overlays the HDMS proposal. Pursuant to the State Agreement between HDMS and the State of Western Australia, HDMS is required to make detailed proposals to the Minister responsible for the Agreement for consideration and approval. If HDMS submits a development proposal that is approved under the State Agreement, this will have implications to FMG's proposal, and as such FMG will be required to revise and re-submit its proposal for further assessment under Part IV of the *Environmental Protection Act 1986*.

The Railway

Rail systems in the Pilbara have been developed independently as private facilities and are currently exclusively used by their owners. The issue of third party access to private rail facilities is a vexed one and tenure over the corridors within which the existing rail facilities of Rio Tinto and BHP Billiton Iron Ore (BHPBIO) are located, has been granted under project specific Agreement Acts.

One of the obligations placed upon mining companies under these Acts is the requirement to carry freight of the State and of third parties on the railway to the extent that it can do so without unduly prejudicing or interfering with its operations. However, no third party access arrangements have been successfully negotiated to date despite attempts by access seekers and the State.

In July 2004, FMG lodged a request with the National Competition Council for the BHPBIO Mt Newman Line to be declared for use by other parties. If successful, this declaration will allow FMG to access the BHPBIO rail line. The outcome of this declaration process, however, has yet to be determined.

On this basis, and because FMG sees no reasonable prospect of being given access on commercial terms to the BHPBIO railway, FMG has referred a stand-alone proposal to the EPA for a rail and port development.

In addition, the proponent has made it clear that it is committed to a multi-user open access rail and port infrastructure, that will be made available at a commercially competitive cost to other third parties. FMG has also indicated that due to enormous capital expense it is highly unlikely that both HDMS and FMG will construct their own, independent railway and that rail sharing arrangements will need to be resolved between HDMS and FMG (ENVIRON, 2004).

Further details of the proposal are presented in Section 2 of this report. Section 3 discusses the environmental factors relevant to the proposal. The conditions and commitments to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 4. Section 5 provides Other Advice by

the EPA, Section 6 presents the EPA's conclusions and Section 7, the EPA's Recommendations.

The list of submitters appears in Appendix 1 and References are cited in Appendix 2. Appendix 3 identifies the relevant environmental factors and Appendix 4 contains the recommended environmental conditions and commitments. Appendix 5 contains the proponents response to submissions and additional studies carried out following the release of the PER (please refer to the CD at the back of this report).

The summary of submissions and proponent responses is included as a matter of information only and does not form part of the EPA's report and recommendations. Issues arising from this process, and which have been taken into account by the EPA, appear in the report itself.

2. The proposal

The proposal has the following main components:

- a 345 km railway line from Port Hedland to proposed mining operations at Mindy Mindy (see Figures 3a, 3b, 3c and 3d within the PER (ENVIRON, 2004)). This railway will be constructed in two parts: Part 1 from Port Hedland to the Chichester Ranges and Part 2 from the Chichester Ranges to Mindy Mindy (see Figure 1); and
- construction of port facilities consisting of 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 in Port Hedland (see Figure 2).

The Railway

The railway alignment commences at the proposed FMG port facilities at Port Hedland and travels to the west of South Hedland and then south-southeast to the proposed FMG iron ore resource at Mindy Mindy.

The majority of the proposed railway will run parallel and in close proximity to the existing BHPBIO Newman to Port Hedland railway and the proposed HDMS railway alignment. For much of its length, the proposed rail alignment passes through grazing land and is generally two-three km from the existing BHPBIO line and the proposed HDMS alignment. The most southerly extent of the railway is approximately 100 km northwest of the Newman townsite.

The railway however deviates from the HDMS/ BHPBIO corridors in some locations where there are significant environmental, Aboriginal heritage or engineering constraints (refer to Figures 3a-3d within the PER (ENVIRON, 2004)). These deviations occur:

- just south of South Hedland - FMG's proposed railway has been realigned to cross the South West Creek and continue up the western side of the Great Northern Highway, before the existing road bridge, due to concerns regarding risk of flooding in Port Hedland;

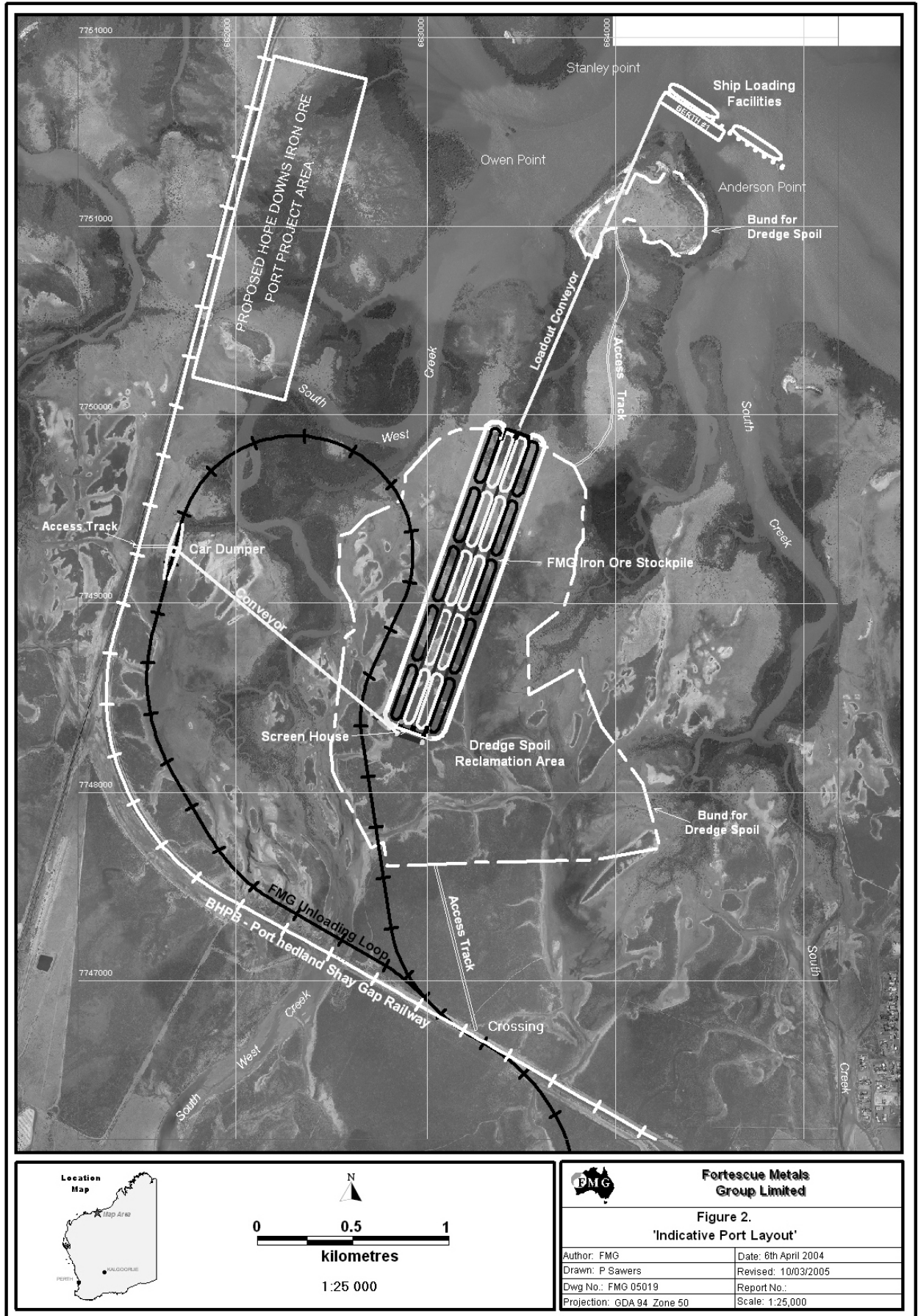


Figure 2: Pilbara Iron Ore and Infrastructure Project – Amended Indicative Port Layout (ENVIRON, 2005b).

- near the east Turner and Turner Rivers, where the railway departs from the HDMS and BHPBIO's railway as they cross these rivers (Sections AB and AE on Figure 3b). In this area, there is no available space between BHPBIO's and HDMS' corridor and the eastern river banks and hence FMG's corridor is generally aligned on the other river bank until there is a suitable crossing point;
- outside of the Yandeyarra Aboriginal Reserve (sections AB and AD on Figure 3c), given the excision of a portion of the reserve was unacceptable by key stakeholders;
- realignment of the corridor (up to 7km east) in the vicinity of the Chichester Ranges due to a number of Aboriginal heritage sites being present in the area and engineering constraints (Section AE on Figure 3c); and
- in areas to reduce impacts on natural drainage systems.

Port and related infrastructure

The proposed port facility will be developed in the south west sector of Port Hedland harbour between the existing BHPBIO Port Hedland-Shay Gap Railway and Anderson Point (see Figure 2). The proposed port facility will be located mostly on PHPA land within the town of Port Hedland boundary, with some Unallocated Crown land in the south-east corner of the proposed port area.

The port facilities will comprise 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. Crushing and screening of ore will be undertaken at the mine sites. The shiploading terminal will have a capacity of 45 million tonnes per annum (Mtpa). A product conveyor from the car dumper to the primary screenhouse will be mounted on an elevated truss to allow tidal and freshwater exchange within the rail loop. A wharf of approximately 750 metres (m) in length, is proposed and the twin shipping berth will allow for two 250,000 dead weight tonnes (DWT) to be berthed. One berth will be serviced by a wharf and shiploader whilst the other is a parking berth only.

Dredging of the harbour to accommodate the berths at Anderson Point will be required and this will be carried out by a cutter suction dredge. The turning basin has been dredged to a navigable depth of 9.3 m and FMG proposes to deepen this area to between 14.6 m and 19.5 m navigable depth. Approximately 3.3 million cubic metres (Mm³) of material will be dredged from the area in front of Anderson Point. The area over which FMG is proposing to construct the reclamation and dewatering ponds is 300 ha. The bund walls will be approximately 4 m high, with a freeboard of approximately 0.5 m for safety considerations. The total storage volume of the reclamation area (excluding the freeboard) is approximately 10.5 Mm³.

The final operational area at Anderson Point will be approximately 100 ha. This area will be established to a level which is above storm surge level (up to RL 7.5 mAHD). The remaining 200 ha will be at a lower elevation and is proposed to be levelled, drained, seeded and used for stormwater harvesting.

The proposed FMG port facility generally conforms with the PHPAs proposed usage of the Anderson Point area and fits into the PHPA draft Ultimate Development Plan. However, the final berth location and orientation will be confirmed during detail

design after the completion of a number of engineering studies such as mooring analysis, manoeuvrability simulations and other factors, and confirming the results and their implications with the PHPA.

The main characteristics of the proposal are summarised in Table 1. A detailed description of the proposal is provided in Section 4 of the PER (ENVIRON, 2004).

Table 1: Summary of Key Proposal Characteristics

Element	Description
General	
Construction period	20 months approximately
Project life	20+ years
Export tonnage	45Mtpa
Railway	
Length	345 kms approximately (Part 1: 244 km, Part 2:101 km)
Support Infrastructure	Sidings Administration offices and warehouses Trip servicing facilities Service and repair workshop Rail loops and marshalling yards Maintenance facilities Substations Communication systems
Port	
Stockyard	2.5Mt capacity (live)
Materials Handling	Car dumper Conveyors and transfer points Rescreening plant 2x Stackers (8,000 tph each) Reclaimer (10,000 tph)
Port development	Single wharf 750m long Parking berth Ships up to 250,000 DWT Shiploader (10,000 tph) Dredging 3.3Mm ³
Buildings	Shift office Control room and amenities Wharf amenities Substations
Infrastructure	
Power	17.5 MW from existing system
Water	45 Mlpa for locomotives and other vehicles
Fuel	General traffic, port access, rail service
Roads	Construction – package treatment plant
Sewerage	Operations – septic systems
Disturbance Areas*	
Area of railway construction	3,100 ha (2385 ha for Part 1 and 715 ha for Part 2)
<ul style="list-style-type: none"> • railway construction corridor • access track, yards, temporary disturbance 	<ul style="list-style-type: none"> • 1,500 ha (1115 ha for Part 1 and 385 for part 2) • 1,600 ha (1270 ha for Part 1 and 330 ha for Part 2)
Area of operating railway	1,500 ha (total)
<ul style="list-style-type: none"> • railway corridor • access road, yards, workshops, maintenance yards 	<ul style="list-style-type: none"> • 688 ha (488 ha for part 1 and 200ha for Part 2) • 812 ha (632 for Part 1 and 180 for Part 2)
Area of port facilities (including spoil reclamation below proposed stockpiles and temporary disturbance areas)	300 ha

Element	Description
Area of operating port facilities	100 ha
Total operational areas	1,600 ha
Workforce (approximate peak levels)	
Construction Operations Accommodation	Rail – 1,000 personnel Port – 500 personnel Port and rail – 225 personnel Construction – single status in Port Hedland Track camps for rail Permanent – new or existing residences in Port Hedland, Newman or permanent rail camp.

Key:			
*	includes a contingency	MW	mega watts
Mtpa	Million tonnes per annum	Glpa	giga litres per annum
tph	tonnes per hour	MLpa	million litres per annum
m	metres	Mt	million tonnes
DWT	dead weight tonne	ha	hectares
Mm ³	million cubic metres	km	kilometre

Since the release of the PER, the EPA requested the following additional studies and information be provided:

- demonstration and additional detail as to how all reasonable and practicable measures are being adopted to protect the environment, including a review of dredge spoil management with a view to further reducing the area of disturbance from the 300 ha currently proposed;
- consideration as to how FMG might contribute to habitat re-establishment within the management unit as part of its proposal;
- a further review of the projected cumulative loss for the 'Port Hedland' management area, as outlined in EPA Guidance Statement No. 29. This assessment should consider cumulative loss of 'closed-canopy mangrove communities', 'open canopy mangrove communities' and 'algal mats';
- advice in relation to cumulative dust and the reliability of FMG's cumulative impact modelling;
- an assessment of sediment quality to identify potential sediment contamination in accordance with the National Ocean Disposal Guidelines for dredged Material (Commonwealth of Australia, 2002);
- an assessment to determine the presence of acid sulphate soil materials;
- quantitative and qualitative detail regarding proposed offset measures; and
- an assessment of the cumulative impact of three railway lines running parallel to one another.

As a result of the above, the following changes have been made to the proposal:

- a reduction in the clearing requirements for core mangrove areas. Revision of the design of the port and clearing requirements for infrastructure has reduced mangrove clearing by an additional 7.2 ha and reduced the overall proportional loss of core mangrove within the harbour from 22 ha to 14.8 ha; and
- a staged approach to the construction of the railway– Part 1 from Port Hedland to the Chichester Ranges and Part 2 from the Chichester Ranges to Mindy Mindy.

The potential impacts of the proposal and their proposed management initially predicted by the proponent are summarised in the PER document (ENVIRON, 2004).

3. Relevant environmental factors and principles

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

The identification process for the relevant factors selected for detailed evaluation in this report is summarised in Appendix 3. The reader is referred to Appendix 3 for the evaluation of factors not discussed below. A number of these factors, such as stygofauna, marine fauna and aboriginal heritage are very relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

It is the EPA's opinion that the following environmental factors relevant to the proposal require detailed evaluation in this report:

- (a) terrestrial biodiversity;
- (b) benthic primary producer habitat- mangroves;
- (c) surface water hydrology;
- (d) dust;
- (e) noise; and
- (f) water and sediment quality.

The above relevant factors were identified from the EPA's consideration and review of all environmental factors generated from the PER document and the submissions received, in conjunction with the proposal characteristics.

Details on the relevant environmental factors and their assessment are contained in Sections 3.1 - 3.6. The description of each factor shows why it is relevant to the proposal and how it will be affected by the proposal. The assessment of each factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

The following principles were considered by the EPA in relation to the proposal:

- (a) the precautionary principle;
- (b) the principle of intergenerational equity; and
- (c) the principle of the conservation of biological diversity and ecological integrity.

3.1 Terrestrial Biodiversity

Description

The rail facility will result in the clearing of approximately 3,100 hectares (ha) of land through the construction of the rail corridor, 345 km in length. The rail corridor to be disturbed during construction is approximately 32 m in width.

The proposal lies within Beard's (1975) Hamersley Plateau, Fortescue Valley, Chichester Plateau and Abydos Plain physiographic units and is within the Pilbara Interim Biogeographical Region (Thackway and Cresswell, 1995).

The proposal area has a diverse range of flora and fauna due to a variety of relief and geological types which combine to provide a great diversity of habitats. The most recent and directly relevant survey for this proposal was the systematic biological survey completed for the Hope Downs mine, port and rail developments (HDMS, 2000; Biota and Trudgen, 2002; Biota, 2001a; HDMS, 2002, and Biota, 2003 a-d). This work comprised detailed seasonal sampling of flora, fauna vegetation and mangrove communities. Additional work was also subsequently completed in areas where the HDMS rail corridor was realigned (parallel to Weeli Wolli Creek (Biota, 2004 a and b) and in the Chichester Range (Biota, 2004 c and d). This recent work provided systematic contextual sampling along the same general corridor as the FMG proposal. The proposed rail corridor and port for the HDMS project is in close proximity to the proposed FMG port and rail corridor and in some areas, the rail corridors overlap. This data has therefore been used as the principal reference (ENVIRON, 2004).

The flora and fauna survey undertaken for the proposal (Biota 2004 e) identified a number of vegetation types, communities with conservation significance and priority flora and fauna for the railway corridor (see Table 2). No Declared Rare Flora (DRF) species were recorded (ENVIRON, 2004).

Table 2: Description of Existing Environment

Terrestrial flora	<p>Survey identified:</p> <ul style="list-style-type: none"> • 122 vegetation types; representing a wide range of structural and floristic variants; • 762 taxa of terrestrial vascular flora; • Significant habitats and communities with the highest conservation significance:- <ul style="list-style-type: none"> • linear sand dune (adjacent to the Weeli Wolli Creek delta); • clay based habitats associated with the Fortescue Marsh; • cracking clay habitats (Chichester Ranges and Foothills); • granite rockpiles scattered on the Abydos plain; • major drainage systems; and • mulga woodlands.
Declared Rare and Priority flora	<p>Survey identified:</p> <ul style="list-style-type: none"> • 16 Priority flora species recorded during the FMG survey, and a further five species have been previously recorded within the area during other surveys: <ul style="list-style-type: none"> • priority 1 species: <i>Eremophila spongiocharpa</i> ms, <i>Goodenia omerana</i> ms. and <i>Josephinia? sp.</i> Marandoo; • 7 Priority 2 species: <i>Euphorbia clementii</i>, <i>Gonocarpus ephemerus</i>, <i>Indigofera ixocarpa</i> ms., <i>Ischaemum albobillosum</i>, <i>Olearia fluvialis</i>, <i>Paspalidium retiglume</i> and <i>Stylidium weeliwolii</i>; • 10 Priority 3 species: <i>Albutilon trudgenii</i> ms., <i>Bulbostylis burbidgeae</i>, <i>Eriachne tenuiculmis</i>, <i>Goodenia nuda</i>, <i>Gymnanthera cunninghamii</i>, <i>Hibiscus brachysiphonius</i>, <i>Phyllanthus aridus</i>, <i>Polymeria</i> sp. Hamersley (ME Trudgen 11353), <i>Sida</i> sp., Wittenoom (WR Barker 1962) and <i>Themeda</i> sp. Hamersley Station (ME Trudgen 11,431); • 1 Priority 4 species (<i>Goodenia stellata</i>); • several other poorly known or collected species; and • 11 species of introduced flora were recorded, one of which is a declared weed.
Terrestrial and marine fauna	<p>Survey's identified:</p> <ul style="list-style-type: none"> • 6 frogs; • 58 reptiles; • 84 avifauna (including 12 species of bird fauna restricted to mangrove and littoral habitats); • 22 ground dwelling mammals; • 11 bats; • 3 species of fish; and • 6 amphibians.
Specially protected	<p>Surveys recorded:</p> <ul style="list-style-type: none"> • one Schedule 1 species (Mulgara);

Threatened Fauna	<ul style="list-style-type: none"> • one Schedule 4 species (Peregrine Falcon); and • four Priority 4 species (the Grey Falcon, the short-tailed mouse, and the Australian Bustard, Bush Stonecurlew). <p>A further:</p> <ul style="list-style-type: none"> • two Schedule 1 species (Pilbara Olive Python and Bilby); • one Schedule 4 species (Woma); • one Priority 1 species (<i>Ramphotyphlops ganei</i> (blind snake)); • one Priority 3 species (Spectacled Hare Wallaby); • three Priority 4 species (Ghost bat, Star Finch, Western Pebble-mound mouse), have either been recorded within the corridor during surveys for Hope Downs project, or are considered likely to occur in the area; and • three species considered significant at the scale of the Pilbara bioregion included a gecko (<i>Diplodactylus mitchellii</i>), and two skinks (<i>ctenotus</i> affin. <i>Robustus</i>, and <i>Ctenotus</i> affin. <i>Uber johnstonei</i>).
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This list of priority flora includes all but one of the species recorded during earlier work for the HDMS project. Most of the Priority flora species recorded from the FMG rail corridor were also collected during the HDMS rail corridor surveys (Biota and Trudgen, 2002; Biota 2004 a and c).

Submissions

Key comments focused on:

- adequacy of flora surveys – methodology and timing;
- clearing impacts;
- cumulative impacts;
- rehabilitation and decommissioning;
- minimising clearing;
- weed management;
- fire management;
- vegetation management;
- data interrogation;
- specimen vouchering;
- impact of surface drainage on mulga
- monitoring;
- offsets;
- the proposal overlapping with the proposed 2105 conservation reserve;
- inability to assess impacts arising from the rail route, given the final route for the railway has not been selected; and
- proponent not addressing the National Strategy for Ecologically Sustainable Development.

Assessment

The area considered for assessment is the 345 km rail corridor from Anderson Point at Port Hedland to the proposed mine site at Mindy Mindy. The proposed railway runs parallel (and in some places overlaps) the existing BHPBIO railway and the approved, but yet to be constructed, HDMS railway.

The EPA's environmental objectives for this issue are:

Issue	EPA Objectives
Terrestrial biodiversity	<ul style="list-style-type: none"> • Maintain the abundance, species diversity, geographic distribution and productivity of terrestrial flora and fauna. • Protect Declared Rare and Priority Flora and Specially Protected (Threatened) Fauna consistent with provisions of the <i>Wildlife Conservation Act 1950</i>. • Maintain the ecological function, abundance, species diversity and geographic distribution of marine biota and habitat in order to protect ecosystem health.

The EPA notes that the railway corridor will be constructed in two Parts: Part 1 from Port Hedland to the Chichester Ranges (244km) and Part 2 from the Chichester Ranges to Mindy Mindy (101km) (see Figure 1).

The proposal will result in the clearing of 3,100 ha of land. Part 1 will involve the clearing of 2385 ha (1115 ha for the railway corridor and 1270 ha for access tracks, yards and temporary disturbance) and Part 2 will involve the clearing of 715 ha (385 ha for the railway corridor and 330 ha for access tracks, yards and temporary disturbance).

Following construction, the area of operating railway will occupy 1500 ha. The railway corridor will comprise 688 ha (488 ha for Part 1 and 200 ha for Part 2) and for access tracks, yards, workshop areas and maintenance areas 812 ha (which comprises 632 ha for Part 1 and 180 ha for Part 2). The total area to be rehabilitated following construction is 1600 ha. This comprises 812 ha that was cleared for the railway corridor (627 ha for Part 1 and 185 ha for Part 2), and 788 ha which was cleared for access tracks (638 ha for Part 1, and 150 ha Part 2).

Clearing of vegetation will be required along the railway corridor and for the establishment of infrastructure such as borrow pits, laydown areas and access tracks. Given the similarities between the proposed FMG rail corridor and the previously surveyed HDMS rail corridor, the EPA notes that the impacts associated with the current proposal are essentially the same in nature as those presented by the earlier HDMS proposal.

The EPA notes that no DRF species have been recorded and that none of the habitat types present in the project area appear to be unique to the study corridor or regionally significant.

The level of impact on flora and fauna is likely to increase should both FMG's and HDMS' railways be constructed and this could give rise to issues associated with:

- isolation of fauna habitat and vegetation in linear strips between the railways;
- associated increases in edge effects from fire and other disturbances;
- restriction of fauna population movement and isolation of populations; and
- greater likelihood of weed transport and spread along the general corridor (Biota, 2004e).

The EPA notes that Biota (2004e) calculated that the construction of both the HDMS and FMG railways will require clearing of an estimated 3,502 ha of terrestrial vegetation, based on a 50 m impact corridor (which is wider than the proposed 32m corridor), and that the majority of the vegetation types, will be cleared by less than 10% of the extent mapped for the combined survey's, with three exceptions. Of the three vegetation types none were considered to be of high conservation significance.

The EPA notes that should both railways be constructed, it is unlikely that the conservation status of any Threatened flora, restricted vegetation types or Schedule fauna species will be affected at a regional or sub-regional scale (Biota, 2004e in ENVIRON, 2005b).

It is further noted that the rail line crosses the Fortescue Marsh at its smallest point adjacent to BHPBIO's crossing, and as such the risk of impact to the marsh is considered to be low and localised to an area that has already been disturbed.

There are several habitat types that are significant on a local scale and management measures will be put in place to reduce the impacts on flora and fauna. Some of these management measures include:

- minimising vegetation and habitat clearing by preferentially using disturbed areas for temporary infrastructure (such as construction camps) and the use of pre-existing facilities;
- identifying clearing limits on design documentation and pegging this in the field prior to commencement of clearing operations;
- feral animal control within and adjacent to the project area; and
- designing the railway to:
 - avoid and protect areas of priority flora and vegetation types of high conservation significance;
 - minimise or avoid impacts on significant fauna habitats (including sand dune associations, cracking clay communities, mulga woodlands and rockpile associations) and fauna communities;
 - ensure any impacts on sensitive vegetation and mulga as a result of upstream flooding or downstream starvation is minimised and significant fauna populations are avoided, to the requirements of the Department of Conservation and Land Management (CALM);
 - take into account local hydrological patterns to include adequate provision for drainage line habitats to ensure that back-water or flow restriction is reduced as far as practicable; and
 - control sheetflow by locating culverts to match those in the adjacent railway formations.

The EPA also notes that the proponent has made commitments to:

1. prepare and make publicly available a Fire Management Plan that includes procedures for welding and grinding work, personnel fire procedures, fire response vehicles on site and bushfire contingency plans, to the requirements of CALM; and
2. fund a research project (for three years) at PhD level, in consultation with CALM and Academic advisors on:

- the potential impacts of the project on Mulgara or other threatened species; and
- taxonomic research of *Acacia aneura* in the Pilbara or some other poorly known taxa.

In view of the amount of land to be cleared, the EPA recommends that the following Environmental Conditions be placed on the proponent to:

1. Limit disturbance associated with rail construction to 2385 ha for Part 1 and 715 ha for Part 2 (total clearance of 3100 ha), in accordance with a Railway Corridor Disturbance Management Plan that sets out procedures for:
 - flora, fauna, ethnographic and archaeological surveys prior to railway corridor disturbance;
 - physical and graphical delineation of areas to be disturbed;
 - avoidance and management of significant vegetation, flora and aboriginal sites; and
 - progressive surveying of the total area of disturbed land.
2. Ensure the proponent does not disturb the land surface until significant fauna have been relocated in accordance with a Fauna Management Plan. This Plan will set out procedures for identifying significant fauna populations; identifying suitable relocation sites and relocation techniques; and monitoring and reporting the success of relocation.
3. Rehabilitate all areas not required for ongoing operations in accordance with a Rail Corridor Rehabilitation Plan. The Plan shall set out procedures and or measures for: identification of areas not required for ongoing operations; completion criteria; monitoring the success of revegetation; weed management during construction; topsoil and borrow pit management; revegetation; and rehabilitation maintenance, to the requirements of CALM.

The Rail Corridor Rehabilitation Plan will also address restoration of fauna habitat areas lost or modified during construction activities and fauna habitat reconstruction measures. In addition, the EPA also notes that investigations have been undertaken into rehabilitation methods used in Mulga communities in the Pilbara and that this review highlighted that with appropriate topsoil/ overburden handling and seeding it is feasible to undertake Mulga rehabilitation. Accordingly, it is recommended that procedures for revegetation of Mulga communities be addressed within the rehabilitation Plan.

4. Manage weeds during construction of the project in accordance with a Weed Management Plan that sets out procedures for: identifying target weeds; weed control; monitoring success; hygiene and wash down for all plant and equipment, and reporting.

The EPA further notes that all pastoral leases in Western Australia under the now repealed *Land Act 1933* expire on 30 June 2015. Portions of pastoral land leased in the Pilbara have been nominated by CALM to be released to the conservation estate or to be set aside for conservation management within the pastoral leases under conservation agreements, when the pastoral leases are renewed. Four such pastoral

lease exclusion zones have been proposed on pastoral stations in the vicinity of FMG's proposed project area: Marillana, Roy Hill, Mulga Downs and Hillside. These exclusion zones are currently being negotiated by CALM and the Pastoral Lessees and need to be agreed upon by the Minister for Planning and Infrastructure. If the exclusion zones are agreed and approved by the Minister, a further approval process will be required to be sought for the areas to be included in the conservation estate or conservation agreement reached with the pastoral lessees.

Summary

Having particular regard to:

- (a) none of the habitat types present in the project area being unique to the study corridor or regionally significant;
- (b) it being unlikely that the conservation status of any Threatened flora, restricted vegetation types or Schedule fauna species will be affected at regional or sub-regional scale, as a result of the cumulative impacts of HDMS and FMG's proposed railways being constructed;
- (c) the range of management measures to be implemented as part of the design, construction and operation of the proposed rail line to minimise or avoid any impacts on significant fauna habitats (including sand dune associations, cracking clay communities, mulga woodlands and rockpile associations) and fauna communities;
- (d) the rail corridor being designed, to the requirements of CALM, to ensure any impacts on mulga woodlands as a result of upstream flooding or downstream starvation is minimised;
- (e) protection of areas where priority flora are found;
- (f) the avoidance of vegetation types of higher conservation significance as part of the final rail design and mulga revegetation being addressed in the rehabilitation plan;
- (g) the proponent's commitments; and
- (h) recommended Environmental Conditions 6, 7, 9 and 10 relating to rail corridor disturbance, weed management, fauna management and rehabilitation,

it is the EPA's opinion that the proposal is capable of being managed to meet the EPA's objectives.

3.2 Benthic Primary Producer Habitat - Mangroves

Description

The proposal will disturb approximately 300 ha of supratidal and intertidal habitats through the construction of port facilities. This will result in the direct loss of 109 ha of mangrove habitats comprising 14.8 ha of core closed-canopy mangroves; 94.44 ha of open mudflat with scattered samphires and occasional low *Avicennia marina*; 50.28 ha of algal mats; and 53.44 ha of bare sand/mud as a result of stockpile and infrastructure construction.

Clearing of the core closed-canopy mangrove habitat within the project area is predominantly associated with the footprint of the rail loop, stockpile and the causeway linking the stockpile area with the loading facility over Anderson Point.

Surveys conducted for the project area identified:

- five mangrove species - *Avicennia marina* (White or grey mangrove), *Ceriops tagal* (yellow-leaved Spurred mangrove), *Rhizophora stylosa* (stilt-rooted mangrove), *Aegialitis annulata* (club mangrove), *Aegiceras corniculatum* (horned mangrove). A sixth species known for the area, *Bruguiera exaristata* (rib-fruited orange mangrove), occurs as scattered individuals, largely in the eastern portion of the harbour (Paling et al, 2003);
- areas of cyanobacterial mats (algal mats) on some tidal flat areas;
- mangal habitats, backed by open to very open samphire and halophyte communities on hypersaline flats;
- all mangroves associations as being in good to very good condition; and
- mangrove and mud flat habitats being significant on a local scale (given the dependence of some bird and bat species on this habitat, including migratory species).

Submissions

Comments raised in submissions focused on:

- loss of mangroves (including cumulative) through clearing;
- the need for an offset package;
- the application of Guidance Statement No. 29 in terms of cumulative loss, management unit size, and Port Hedland being an industrial area;
- impact avoidance and the need for a 300 ha footprint;
- alternative port layouts;
- impacts of mangrove loss on the tidal creek system;
- long-term impacts causing further mangrove loss;
- consistency with the State Sustainability Strategy;
- effect of bund wall and change in flooding regime over affected mangrove areas;
- effects of dust deposition on mangroves;
- development of a mangrove monitoring programme; and
- development of a combined management response with HDMS to minimise any negative effects on mangrove fauna.

Assessment

The area considered for assessment includes:

- the project port area within the PHPA Boundary; and
- a “Port Hedland Management Unit” that encompasses an area of 154.3 km².

The EPA’s environmental objective for this issue is to maintain ecological integrity of the defined management unit where ecosystem integrity means the capability of an ecosystem to support and maintain key ecological processes and organisms so that the species composition, diversity and functional organisations it supports are as comparable as possible to those occurring in natural habitats within the region (EPA, 2004).

Two EPA Guidance Statements (GS) are relevant to the assessment of impacts on mangroves and their habitats in Port Hedland Harbour:

- GS No. 1 for the protection of tropical arid zone mangroves along the Pilbara coastline (EPA, 2001) which (i) identifies areas along the Pilbara coast that

support arid zone mangroves that have *special conservation significance*; and (ii) sets out the EPA's expectations for the protection of these mangroves, while recognising current and potential future development areas; and

- GS No. 29 entitled 'Benthic Primary Producer Habitat Protection for Western Australia's Marine Environment' (EPA, 2004) that addresses cumulative loss of BPPH and the maintenance of overall ecosystem integrity. Application of GS No.29 is underpinned by a set of principles that require proponents to demonstrate how their proposals have been designed to avoid/minimise loss of BPPH. If losses are unavoidable, then those losses are determined within ecological units called "management units". The sum of the historic losses of each of the different BPPHs within the management unit are each compared against a "cumulative loss threshold".

Following release of the PER document, the EPA advised the proponent that both GS No. 1 and 29 were to be applied to this proposal and that the area identified in GS No. 1 as the 'Port Hedland industrial area' would be the defined management unit for the purpose of considering the cumulative losses of BPPH.

Conservation Significance

The EPA GS No. 1 identifies an area around Port Hedland as a Guideline 4 area. The Guideline 4 areas such as the 'Port Hedland industrial area' have been identified on the basis that they include "...mangrove areas that occur inside areas that have been designated as industrial areas, associated ports or other developments and not covered by Guideline 3".

The boundary of 'Port Hedland industrial area' encompasses the Port Hedland inner harbour and some coastal areas to the east and west. To the west, the "Port Hedland industrial area" is bounded by the Oyster Passage Barrier area, which supports regionally significant mangroves, to which the EPA offers the highest degree of protection with respect to geographical distribution, biodiversity, productivity and ecological function.

The EPA agreed that the area identified in GS No. 1 as the "Port Hedland industrial area" would be the defined 'management unit' for the purpose of considering cumulative loss of mangrove habitat in the context of GS No. 29 for this proposal.

Cumulative Impact

To evaluate the cumulative loss of core closed-canopy mangrove in Port Hedland, an estimate was first made of historical losses and approved clearing of core closed-canopy mangal from within the defined management unit. The original extent of mangrove habitat in the management unit was estimated to have been 2676 ha and approximately 342 ha of mangroves have been lost and would be lost as a result of existing and approved projects in the management unit (see table below) (ENVIRON, 2005b).

Management Unit	Current Mangrove area in management unit	1960 mangrove extent	Historical losses	Cumulative loss to date due to existing and approved developments (%)
Port Hedland Industrial Area (154.3km ²)	2,334 ha	2676 ha	Area of 342 ha <ul style="list-style-type: none"> • BHP E Creek et al - 155ha • Hope Downs - 89 ha • Cargill Salt condensers - 86 ha • Cargill salt crystallisers - 12 ha 	12.8
Port Hedland Industrial Area (154.3km ²)	2,334 ha	2676 ha	<ul style="list-style-type: none"> • 342 ha plus FMG Stage A Port – 14.8 ha + 356.8 ha 	13.3

From the analysis in the table above the EPA notes that should all existing and approved developments be implemented in the defined management unit, the cumulative loss of original core closed-canopy mangrove habitat in the management unit would amount to 12.8%, which exceeds the cumulative loss threshold for Category E - Development Areas of 10% (EPA, 2004). The EPA further notes that should FMG's proposal proceed, this cumulative loss would increase to 13.3%.

In considering the loss of BPPH under the framework set out in GS No. 29, the EPA is aware that the proponent has only considered the loss of core closed-canopy mangrove habitat. With regard to scattered mangrove habitat and cyanobacterial algal mats, the proponent argues, in its response to submissions (ENVIRON, 2005b), that:

- the more sparse mangrove habitat – (occasional *A. marina* and mixed samphires) are not true benthic habitats as benthic habitat is habitat being related to, or happening on the bottom under a body of water and that the sparse mangrove habitat is predominantly terrestrial (as it is only tidally wet less than one day per month) and is not used by marine biota or specialist mangrove fauna components; and
- cyanobacterial algal mats should not be considered in the context of the GS because they are not explicitly mentioned.

The EPA disagrees with these views and contends that these habitats are BPPHs given:

- the EPA has a broad definition of BPPH in the GS and specifically refers to intertidal organisms, the communities they form and the habitats that support them as being included in the scope of GS No. 29;
- the presence of mangroves in the habitat category 'occasional *Avicennia marina* and mixed samphires', by definition, is mangrove habitat;
- the habitat category above is inundated by seawater during high tides which means they lie within the intertidal zone and should therefore be considered in the context of GS No. 29; and
- a case to exclude the habitat categories 'scattered samphires and occasional *A. marina*' and 'cyanobacterial mats' from consideration in the context of GS No. 29 does not recognise the contribution of these habitats to the ecological processes, and nutrient and energy fluxes that maintain overall ecosystem integrity.

FMG have advised the EPA that because it has been unable to source suitable historical data, the extent of mangrove habitats that support sparse cover of mangrove trees, samphires and algal mats that have been lost due to existing and approved projects has not been determined. The EPA acknowledges the limitations on sourcing suitable historical data. This has restricted the EPA's quantitative assessment of cumulative loss of BPPH associated with this proposal to core closed-canopy mangrove habitat. This should not be seen as setting a precedent for future proposals.

Loss of core closed canopy mangroves

The EPA notes that during the assessment process, the direct loss of core closed-canopy mangrove habitat has been reduced by 7.2 ha (i.e. from 22 ha to 14.8 ha – a reduction of 33%) and that this was achieved as a result of the proponent adjusting the boundaries of the dredge spoil reclamation area (see Figure 2).

In order to better understand the evaluation of options to minimise loss of mangroves and the overall footprint of the development (including offshore spoil disposal), the proponent was requested to review port layout alternatives, which included evaluating a number of different rail loop configurations.

The proponent concluded that its preferred layout, as presented in the PER, was the best possible compromise between project requirements and other issues and constraints including: geotechnical and stability issues; design criteria; there being no prospect of future expansion by FMG, the PHPA or other users; operational and safety implications; and alienation/ inconvenience to the majority of the Port Hedland Port Authority's (PHPA's) areas A and B (ENVIRON, 2005b).

With regard to reducing the footprint of the development, the proponent indicated that (i) dredging 3.3 Mm³ typically requires management of many times that volume of material because of the entrainment of seawater during dredging, and that (ii) offshore disposal of dredge material or partial offshore disposal would potentially impact on marine habitat as the PHPA ocean disposal site was reaching capacity, and that FMG would need to establish a new ocean disposal site.

The EPA accepts the proponent's arguments for its preferred layout and considers that the proponent has taken reasonable measures to reduce mangrove disturbance to a 'minimum practicable level'.

It is also noted, however, that the PHPA has not yet given agreement to FMG's port layout and that the PHPA will require access across FMG's rail to the land within it so that those parts of Area A (as identified in the PHPA's draft Ultimate Development Plan) that would otherwise be neutralised by the extent of the rail loop could potentially be used for future bulk liquids or bulk minerals storage.

Accordingly, if the proposal is required to be re-designed as a result of access issues, or issues arising from the PHPA's Draft Ultimate Development Plan, the EPA will expect the proponent to identify areas where impact avoidance/-minimisation principles can be further applied with respect to each of the BPPHs in the proposed development area.

Rehabilitation

The proponent has acknowledged that reclamation areas that were tidal prior to construction would be difficult to rehabilitate to their former condition if they are no longer subject to tidal influences.

The final operational area at Anderson Point will be approximately 100 ha and this area will be established to a level which is above storm surge (up to RL 7.5 mAHD) requiring an average of three metres of fill over the area. This level is higher than existing levels. The proponent has proposed that much of the remaining 200 ha will be at a lower elevation (as only 0.3 Mm³ will be spread over this area), drained, levelled, seeded and used for stormwater harvesting. The perimeter bund will also contain internal stormwater runoff, which will be harvested and used for dust control and excess surface runoff will be treated via an oil separator and a sediment interceptor basin, prior to discharging to the environment.

Alternatively, this area may be suitable for recolonisation by species typical of pre-existing habitats, however, without significant re-contouring to pre-existing conditions, options may be limited. The EPA notes that although this area has been 'earmarked' for future industrial expansion, there is currently no firm intended use for this area. If this area was to be developed in the future, additional fill would need to be sourced to raise it to above the storm surge level.

In considering the above, it is the EPA's preference that the parts of the remaining 200 ha not required for operations be progressively rehabilitated as soon as practicable during construction to a condition similar to pre-construction. In the case of the dredge spoil reclamation areas and settling ponds proposed to be located on areas that were tidally influenced prior to construction, the bunds would need to be removed, and the area cleared of dredge spoil to return tidal influence and allow for regeneration to a similar condition. While the EPA is not aware of such large-scale mangrove rehabilitation having been successfully undertaken elsewhere, it notes that during the earthworks required to return areas to tidal influence, there would be opportunities to engineer areas of greater tidal inundation and to create new areas that could support closed canopy mangrove communities to off-set the 14.8 ha lost as a result of construction. The proponent should be strongly encouraged to explore these opportunities to regenerate intertidal BPPHs and implement those options with potential for success.

In addition, the EPA expects that the likely finished level of the 'non-operational' parts of the 200 ha area will be addressed in the recommended Dredging and Reclamation Monitoring and Management Plan (see section 3.6).

Dust and mangroves

The presence of iron ore stockpiles, materials handling, vehicle movement and other port activities all have the potential to generate dust within the port area. Mangroves in the locality are currently in good condition and generally unaffected by the dust that coats mangroves in other parts of the harbour (ENVIRON, 2004).

Studies have demonstrated that iron ore dust in particular does not appear to cause any significant structural damage to mangrove leaf structures (Paling et al., 2001). Given the proposed dust suppression measures to be implemented at the port, the risk of

significant dust impacts occurring to mangroves as a result of this proposal is considered low.

Accordingly, the EPA considers that although mangrove communities in the area may experience increased dust deposition levels, there is a minimal risk of dust impacts on mangroves.

Management Measures and Commitments

The EPA notes that management measures proposed by FMG include:

- the rehabilitation of approximately 0.74 ha (3m either side of the proposed rail loop) with mangrove species;
- reinstatement of tidal flows/flushing and replanting of mangroves using seedling stock;
- implementing best practice engineering designs to promote the natural regrowth of mangroves around siltation ponds and other plant facilities, including designing embankments, drainage channels and other areas to mimic natural mangrove habitats wherever practicable;
- ensuring tidal flushing of mangroves areas and local drainage, by incorporating culverts through the embankment of the access causeway supporting the loadout conveyor and roadway from the stockyard to Anderson Point shiploading facilities; and building the rail loop on a solid causeway with culverts designed to allow adequate tidal flow in creek areas;
- best practice dust suppression; and
- best practice management of all surface drainages including run-off from stockpile facilities and surface stabilisation of the dredge spoil bund walls.

The proponent has also committed (as a secondary offset) to undertake and fund environmental baseline mapping and monitoring using airborne hyperspectral data for at least three years, in conjunction with CSIRO, to:

- establish an inventory (types, density and geographical/ spatial distribution) of the mangroves surrounding FMG's facility;
 - undertake research to establish accurate and spatially comprehensive measurements to assess physiological conditions of mangroves; and
 - establish the pre-facilities level of iron oxide dust deposition on the mangroves and ongoing dust deposition during operations;
- or
- contribute to a biodiversity initiative of equivalent value.

The EPA accepts that the proposal cannot avoid impacts on mangroves and their habitats, and that offsets to re-establish mangrove habitat are practically difficult. Nevertheless as noted previously, the EPA encourages the proponent to work to promote natural regeneration of mangrove habitats disturbed by the proposal and considers that, to endeavour to offset the impacts of the proposal, the proponent should fully explore opportunities and where possible implement actions, to regenerate BPPHs in areas not required for operations and which were BPPH prior to commencement of development. The EPA also considers that the proponent should pay particular attention to the location of the stormwater harvesting basins to promote rehabilitation in lower lying tidally influenced areas.

Based on the above, the EPA recommends that conditions be placed on the proponent in relation to:

- ensuring the proponent does not cause the loss of, or serious damage to, any mangroves or their habitats other than in accordance with a Mangrove Protection Plan within the port area. The Plan will set out: (i) clear physical and geographical delineation of areas to be directly and indirectly disturbed within, and adjacent to, the project area during construction and operations; (ii) descriptions of how and when during construction the different mangrove associations and habitats would be progressively disturbed; (iii) procedures for progressive surveys of total area disturbed; (iv) the cause and effect pathways for the physical and biological stressors, associated with construction and operation of the proposal, on mangroves, their habitats and the key ecological processes that contribute to ecosystem integrity; (v) the early warning indicators of change in the condition/health of the individual mangroves, different mangrove associations and their habitats, and processes and conditions required for mangrove survival; (vi) criteria measures for each of the early warning indicators; (vii) procedures for documenting baseline mangrove and mangrove habitat abundance, distribution and condition/health; (viii) standard methodologies for regularly monitoring the indicators of mangrove and mangrove habitat abundance, distribution and condition/health throughout the life of the project, and for a minimum of two years post closure if the facility is decommissioned; (ix) management actions to be implemented to restore mangrove and mangrove habitat condition/health to acceptable levels in the event that monitoring results reveal that criteria are not being met; and reporting;
- limiting the total area of core canopy closed mangroves to be disturbed to 14.8 ha; and
- rehabilitation of all areas not required for ongoing operations in accordance with a Port Area Rehabilitation Plan. This plan shall set out procedures and/or measures for: identifying disturbed areas that will not be required for operations; establishing rehabilitation objectives and completion criteria; rehabilitation/regeneration of all areas not required for operations; monitoring the success of rehabilitation and regeneration against completion criteria; propagating and/or transplanting seedlings including the establishment of a nursery; protection of juvenile plants; contingencies and reporting.

Summary

The EPA recognises the intrinsic value of tropical arid zone mangroves and the need to protect distribution and function along the Pilbara coastline. Having particular regard to :

- (a) the proponent minimising the loss of mangroves;
- (b) all mangrove associations occurring elsewhere within the Port Hedland harbour;
- (c) the incremental cumulative loss of core closed-canopy mangroves being 0.5%;
- (d) some mangrove colonisation being likely to occur along the perimeter of the completed works areas;
- (e) maintenance of tidal flushing regimes;
- (f) the proponent's management measures and commitments; and
- (g) Recommended Environmental Conditions 12 and 13 to ensure mangrove protection and rehabilitation of areas not required for operations,

it is the EPA's opinion that the proposal is capable of being managed to meet the EPA's environmental objective for this factor.

3.3 Surface water hydrology

Description

The railway alignment crosses four main catchments – Port Hedland, Turner River, Yule River, and the Upper Fortescue River catchment. These catchments contain ephemeral drainages that only flow following rainfall events, with the exception of isolated springs and pools (ENVIRON, 2004).

The major creeks, rivers and wetland features that are intercepted by the railway are the Fortescue River, the Fortescue Marsh (which is listed as a nationally important wetland), Turner River, East, Chinnamon Pool, Gillam Creek, Turner River, Coorong Creek, Yule River and Coonarrie Creek, Shaw River, Weeli Wolli Creek, and South West Creek.

A description of the existing hydrological features within the rail corridor alignment are presented in Section 6.2 of the PER (ENVIRON, 2004).

Railway construction has the potential to interrupt surface water flow resulting in upstream flooding of vegetation, downstream vegetation being starved of water (drainage shadow effects) and excessive scour and erosion.

Submissions

Comments raised in submissions focused on:

- cumulative impacts of three railways on surface water flows;
- alteration of surface water flows;
- potential impact on flows in South West Creek, South Creek and potential for increased flooding of South Hedland Rural estate and White Hills areas;
- impact of the railway on surface water drainage within the Fortescue Marsh and the impact of surface water management and flooding on mulga communities;
- drainage design structures in the vicinity of the Fortescue Marsh and Mulga areas;
- sheet flow management actions, redistribution system and maintenance;
- monitoring and remedial actions; and
- the need to address the increased risk of impacts relating to the Fortescue Marsh and the biological values that it contains from threats related to the construction and operation of the railway such as fire, chemical spills and dust.

Assessment

The area considered for assessment includes the 345 km railway line from Port Hedland to proposed mining operations at Mindy Mindy, that is to be constructed in two parts.

The EPA's environmental objective for this factor is to maintain the integrity, functions and environmental values of watercourses and sheetflow.

The EPA notes that the rail alignment will run close to and parallel with, the existing BHPBIO rail alignment and proposed HDMS rail corridor from Port Hedland to its

southern extent at Mindy Mindy. The EPA also notes that FMG has deviated the railway formation away from the BHPBIO route, to avoid topographical constraints, reduce impacts on the existing BHPBIO railway, drainage structures or on natural drainage systems (for example at the Turner River and Turner River East crossings).

The main sheetflow areas with dependent downstream vegetation are located along the flanks of the Fortescue Marshes. Through this area, the FMG railway corridor has been predominantly located parallel to the existing BHPBIO and the approved HDMS railway routes and drainage arrangements through the adjacent embankments will need to be matched.

Given the undulating terrain along the rail alignment, accompanied by the high rainfall intensities, a number of drainage structures such as bridges and culverts will be required to ensure that stress on the surrounding vegetation from flooding or drainage shadow effects is minimised and that scour and erosion is reduced.

The existing BHPBIO railway formation already causes some interruptions to the surface water environment, and the FMG railway formation will also potentially cause some additional surface water interruptions. To reduce the potential for further surface water impacts, where feasible, the FMG corridor has generally been located adjacent to the existing BHPBIO and approved HDMS railway formations.

The EPA notes that based on modelling undertaken for potential storm surge and flooding the increase in flood level at Wedgefield due to the proposal would be insignificant for the 1:50 year storm surge event. In addition, the projects rail embankment in the area south of the North West Coastal Highway will reduce the peak flood level at the South West Creek bridge and hence potential overflow into South Creek and its consequential impacts on South Hedland and Wedgefield (ENVIRON, 2004).

In addition, studies have shown that there will not be an impact on flood levels at Wedgefield or South Hedland due to the combined effects of storm surge and overland flooding. This is a result of the significant lag between the peak oceanic storm surge and the peak overland flow, due to the time surface flows take to propagate through the catchment (Worley, 2004) cited in (ENVIRON, 2005b).

It is also noted that based on studies undertaken and the proponent's response to submissions (ENVIRON 2005b) that:

- the railway was realigned across the South West Flood plain to prevent flooding to South Hedland and Wedgefield;
- the flood review indicated:
 - the rail yards in the flood plain between the North West Coastal Highway and the BHPBIO rail yard should not result in increased flood risk to the highway, South Hedland or Wedgefield; and
 - the rail line will act as a barrier to flood waters flowing towards the South West bridge crossing and therefore peak flood heights would be reduced at the South West Creek during a large flood event;
- existing surface water flood levels in tidal creeks would not be impacted by construction of dredge spoil and reclamation areas (Aquaterra, (2004) cited in ENVIRON 2005b);

- flood modelling of the South West Creek was undertaken for the “Greater Port Hedland Storm-Surge Study (GEMS, 2000) and the South West Creek catchment response time could be expected to vary between 8 and 12 hours for the peak 50 and 100 year ARI design floods;
- in all sheetflow areas regular culverting and a redistribution system will be installed to minimise indirect impacts due to water shadow. This redistribution system will be monitored and maintained; and
- the Fortescue Marsh acts as a flood storage area, receiving runoff from surrounding catchments and installation of the railway will not reduce the storage volume of the Marsh or affect the existing surface water drainage patterns.

Environmental management measures proposed by the proponent include:

- adoption of best practice engineering solutions to neutralise adverse water flow impacts from bridge and culvert constructions, such as the provision of guidebanks, hydraulically streamlining flow areas and installing riprap or similar scour protection blankets;
- designing bridges to withstand a 50 year ARI flood event; culverts to withstand a 20 year ARI flood event; and the project to withstand a 1:100 year flood event without overtopping the facility or uncontrolled release of potentially polluted stormwater runoff;
- incorporating culverts through the embankment of the access causeway supporting the loadout conveyor and roadway from the stockyard to Anderson Point shiploading facilities to enable tidal flushing of the mangrove areas and local drainage;
- constructing the product conveyor from the car dumper to the primary screenhouse on an elevated truss to allow tidal and freshwater exchange with the rail loop; and
- best practice drainage design.

The EPA notes that the proponent has committed to design and construct the project to minimise disturbance to natural surface water flows, and to design and construct bridges, culverts and other drainage structures to maintain surface water flows if there are dependent ecosystems downstream during the design phase. It is also noted that FMG is currently testing sheetflow redistribution concept designs to assess different methods to convert water flow from a point source such as a culvert to sheetflow.

Given the potential for three railway lines to be constructed and the potential impact of the railway to interrupt surface water flow, the EPA recommends that a condition be placed on the proponent to ensure that activities outside the port area do not interfere with surface water flow other than in accordance with a Surface Water Management Plan (Recommended Environmental Condition 8). This plan is envisaged to set out procedures and/or management measures to establish existing surface flow regimes, identify significant surface water dependent ecological systems that may be impacted by changes to surface flow, controlling turbidity caused by erosion directly related to railway infrastructure; maintaining the integrity of flow paths and water quantities, minimising the potential for contaminants to enter waterways; monitoring and reporting.

The proponent is required to obtain permits under s17 of the *Rights in Water and Irrigation Act* (RIWI Act) for its bridge and culvert sites that intercept major

tributaries and a 5C Licence to take groundwater for all Stage A railroad construction water requirements and ancillary water use (construction camps etc).

Summary

Having particular regard to :

- (a) Recommended Environmental Condition 8 that ensures the proponent does not interfere with surface water flow other than in accordance with a Surface Water Management Plan;
- (b) the proponent requiring to obtain permits to obstruct or interfere with bed and banks under the RIWI Act and a 5C Licence to take groundwater for railroad construction and ancillary water use; and
- (c) the proponent's management measures,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor.

3.4 Dust

Description

Port Hedland townsite has been traditionally exposed to elevated dust levels through iron ore operations at Nelson Point and Finucane Island. The dust problem is exacerbated due to the semi-arid nature of the Port Hedland area, which contributes a significant background dust source compared to similar areas within a temperate environment (HDMS, 2002).

The greatest potential for dust during port operations at Anderson Point is from rail car dumpers during unloading, ore conveyors, including windblown emissions from conveyor belts and conveyor transfer points; from wind erosion of the iron ore stockpiles, ship loading, stockpile stacking and reclaiming activities and vehicle traffic.

Modelling undertaken for the proposal (ENVIRON, 2004) indicates that there will be a small increase in the maximum 24-hour average concentrations of particulates in the Port Hedland townsite associated with FMG's proposal by:

- less than 1% increase in the maximum 24-hour average concentration of total suspended particulate (TSP);
- approximately 6% increase in the maximum 24-hour average concentrations of PM₁₀, particulate below 10µm in diameter, and PM_{2.5} particulate below 2.5µm in diameter; and
- approximately 10% increase in the average annual concentration of PM_{2.5}.

Due to the prevailing westerly winds typically experienced during the summer months in Port Hedland, FMG's project is predicted to contribute to dust levels experienced in Wedgefield as follows:

- between 3.9% and 8.8% increase in the maximum 24 hour average concentrations of TSP, PM₁₀ and PM_{2.5}; and
- approximately 10% increase in the annual average concentration of PM_{2.5}.

Applying the anticipated emission estimates for FMG and HDMS, FMG's project is predicted to contribute less to the dust levels experienced in Wedgefield by:

- between 2.3% and 4.9% increase in the maximum 24 hour average concentrations of TSP, PM₁₀ and PM_{2.5}; and
- an approximate 5.8% increase in the annual average concentration of PM_{2.5} (ENVIRON, 2004).

The proposed 45Mtpa ship loading facility will handle two ore types – 10 Mtpa of direct shipped ore from Mindy Mindy (a pisolitic ore) and 35 Mtpa of Chichester ore (a marra mamba ore) from a combination of the proposed Mt Nicholas, Mt Lewin and Christmas Creek mines. Given the Chichester ore will be processed through a wet beneficiation plant where the majority of ultra fines are removed, the resultant ore will have a relatively high moisture content and will be less susceptible to dust generation through material handling (ENVIRON, 2004).

Under the proposed operation, the Mindy Mindy ore will be conditioned at the mine to the optimum moisture content, and transported to the port facility by rail. The Chichester ore will be crushed and screened for beneficiation at the mine site and the beneficiated ore will then be railed to the port.

Submissions

Key Comments raised in submissions focused on:

- dust being the most significant cumulative impact of industrial development at Port Hedland which is a significant community concern;
- the high background dust level in the region and existing dust exceedences;
- cumulative dust impacts in Port Hedland;
- potential for increased dust levels in Port Hedland and Wedgefield;
- reducing overall dust levels in the community;
- management of dust;
- reliability of modelling;
- cumulative impact modelling currently being undertaken by DoIR and the need for FMG to revise its modelling if FMG's modelling is viewed to be incorrect;
- the need to consider acceptable dust levels in the interim and in the long-term (5-10 years), which may be higher than the NEPM standards;
- the need to establish a comprehensive and coordinated dust monitoring system for the region;
- the need for dust management to include a comprehensive ambient air quality monitoring programme and validate source emissions estimates;
- the cumulative impact study being undertaken by DoIR to provide a data base for proponents to use in modelling both project specific impacts and the projects contribution to overall impacts; and
- support for a co-operative approach involving government, PHPA, port users and other industry within Port Hedland to address the issue of cumulative industry impacts.

Assessment

The area considered for assessment includes:

- the 345 km rail line from Port Hedland to Mindy Mindy; and

- ore handling and export facilities at Anderson Point Port Hedland.

The EPA’s environmental objectives for this factor are:

Factor	EPA Objectives
Dust	<ul style="list-style-type: none"> • Protect the surrounding land users such that dust and particulate emissions will not adversely impact upon their welfare and amenity or cause health problems. • Ensure that particulate/ dust emissions, both individually and cumulatively, meet appropriate criteria and do not cause an environmental or human health problem.

Railway

The EPA considers that the generation of dust from the construction and operation of the railway is expected to have a minimal environmental or health impact. In addition, due to high moisture content of the ore, it is not anticipated that loaded trains will generate significant dust during their daily operations.

Port

The EPA notes that based on modelling there will be a small increase in the maximum 24-hour average concentrations of particulates in the Port Hedland townsite associated with FMG’s proposal. In addition, the modelling results show that the annual average concentrations of TSP associated with FMG’s project is predicted to contribute $3.9\mu\text{g}/\text{m}^3$ at the Port Hedland townsite. Taking into consideration the predicted impacts associated with emissions from the established iron ore industry operations (including BHPBIO’s proposed expansion) and the proposed HDMS project, it is estimated that FMG will contribute less than 5% to the annual average TSP concentrations. As such, this represents a relatively minor contributor to annual average TSP concentrations at the Port Hedland townsite.

Comparison of the model results with the relevant ambient dust standards indicates that the maximum predicted 24-hour average and annual average concentrations of TSP, PM_{10} and $\text{PM}_{2.5}$ associated with FMG’s project, if considered in isolation, comfortably complies with the standards.

The EPA notes that the greater distance of the FMG proposal to the Port Hedland Townsite and the location of the proposal in relation to the prevailing winds mean that the FMG contribution to dust levels in the townsite is minor in comparison to the contributions from BHPBIO's operations.

Cumulative Impact

While it is acknowledged that FMG’s contribution to overall dust impacts is relatively small, the overwhelming evidence is that there is a major dust problem in Port Hedland.

Whilst dust monitoring results show that there has not been an increase in dust levels measured in the town over the last five years, there is concern that the expansion of BHPBIO’s facilities and the proposed FMG and HDMS facilities will cause an increase in dust levels.

The cumulative impacts arising from the established operations, HDMS and FMG are predicted to result in an increase in the annual number of predicted exceedences of nominated dust concentrations.

At the time the PER was released, the EPA became aware that FMG, in its modelling had to make a number of assumptions as it was unable to obtain emissions data from BHPBIO for its operations. At the same time, the DoIR had just commenced an assessment of the cumulative impacts associated with the continued growth of Port Hedland Port, including issues associated with dust.

Although the DoIR study is not expected to be finalised until mid 2005, the EPA notes that preliminary information currently available from the study indicates that initial comparisons with FMG's model show that dust emissions from BHPBIO's operations have been overestimated and hence FMG's PER results are most likely conservative. That is, modelling results presented in the PER are an overestimation of the potential PM_{2.5} and PM₁₀ impacts that may arise from the existing and proposed operations.

Although FMG has over-estimated the cumulative emission, this will not reduce the rigour of management measures proposed for the project. Key dust control strategies that will be employed to ensure the minimisation of dust during operations include:

- management of cumulative dust emissions during construction and operations in Port Hedland in consultation with the other industries in the area;
- integrated ore moisture monitoring and management system and maintenance of the moisture content of the ore above the optimum threshold (expected to be between 4-6%);
- installation of dust suppression equipment including a dust extraction system for the car dumping facility; water canon use in the stockpile area; covers over the conveyors from the car dumper to the screening building and out to the ship loader; automating stackers to minimise the drop heights to stockpiles and fitting the stacker booms with spray heads; and enclosing conveyor transfer points with water spray jets at each loading point to wet the surface of the ore;
- general site maintenance including: regularly checking dust control equipment and ensuring that the required maintenance and repairs are conducted in a timely manner; maintenance of belt scrapers; optimising vehicle movements; sealing of port operational areas, progressive rehabilitation of disturbed areas to minimise potential for dust generation; and undertake visual inspections of port construction areas to ensure dust control management measures are implemented and remain effective;
- the use of a real time continuous dust monitoring network to provide real time feedback on the effectiveness of the dust control measures; and
- planting a shelter belt if feasible to reduce wind speed and therefore reduce wind erosion from the stockpiles and surrounding areas.

The issue of dust is considered manageable and it is proposed that a recommended condition be placed on the proponent to monitor and control dust associated with construction and operations in accordance with a Dust Management Plan. The Dust Management Plan will set out procedures for establishing and implementing a comprehensive ambient air quality monitoring programme including validation of source emissions estimates, and require the proponent to review air quality modelling

and assumptions, in the event that the cumulative impact assessment study currently being undertaken on behalf of the DoIR, indicates a significant variance from that modelling.

In relation to dust management, it is also important to note that there are a number of initiatives proposed or currently underway to address dust in Port Hedland. These include:

- the Port Hedland Enquiry By Design (Department of Planning and Infrastructure) that has involved workshops to identify planning scenarios for future development in Port Hedland;
- the establishment of a cooperative dust monitoring program, with resources provided by the major port users, and with participation from Government and community stakeholders to identify current impacts, validate models used to predict future impacts and verify appropriateness of buffers defined in future landuse planning; and
- a high level committee with Directors from the Department of Health, DoIR, the Pilbara Development Commission and other Government authorities to consider the dust issue and options for Government responses.

Further, the EPA has re-confirmed its commitment to implement the Ambient Air Quality NEPM across the State as an Environmental Protection Policy. The Air Quality NEPM establishes a set of ambient air quality standards, with a goal of achieving the standards by 2008.

Summary

Having particular regard to:

- (a) FMG's contribution to overall dust impacts being relatively small;
- (b) preliminary information from the DoIR cumulative modelling study indicating that the FMG PER results are most likely conservative;
- (c) best practice management being adopted in the design and operation of the ore handling facility for construction and operations;
- (d) the proponent, through beneficiation, incorporating into its design philosophy the requirement to maintain moisture content for lump and fines at the optimum levels to reduce dust generation;
- (e) dust being managed under Part V licence conditions;
- (f) Recommended Environmental Condition 17 which provides for a Dust Management Plan; and
- (g) proponent management measures,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor.

3.5 Noise

Description

The noise environment in Port Hedland is dominated by BHPBIO's operations at Nelson Point and Finucane Island.

Noise at the port will be generated as a result of ship loading, stackers/reclaimers, screens, conveyor drives and the car dumper.

The predicted noise level at the most constraining noise sensitive location in Port Hedland (Crowe Street), under worst case wind conditions, resulting from the FMG port facility are predicted Lloyd (2004) cited in ENVIRON (2004) to:

- comply with the noise regulations during the daytime;
- comply with the noise regulations during the evenings and Sundays/ public holidays between 0900 and 1900 hours; and
- exceed the noise regulations by 4 dB(A) during night-time under worst case meteorological conditions at the most sensitive location (Crowe Street).

The noise levels at South Hedland, Wedgefield and White Hills Rural residential area resulting from FMG's port facility are predicted to be below the assigned noise levels during both the daytime and the night-time periods.

The construction of the railway will increase the ambient noise levels in areas adjacent to operations. The night-time noise level from the proposed railway is predicted to range from L_{Aeq} 20 dB(A) to 45 dB(A) at noise sensitive premises adjacent to the corridor. When combined with the existing railway (BHPBIO) and proposed HDMS railway, the L_{Aeq} will exceed the preliminary draft EPA Guidance for Road and Rail Transportation noise at a number of locations along the rail alignment.

Submissions

Comments raised in submissions focused on:

- modelling outcomes;
- cumulative noise impacts;
- exceedence of noise levels in Port Hedland;
- noise mitigation measures;
- compliance with the preliminary draft EPA Guidance for Road and Rail Transportation noise and the Noise Regulations;
- compliance with noise management strategy; and
- approvals for third party users.

Assessment

The area considered for assessment includes:

- the 345 km railway from Port Hedland to the proposed mine site at Mindy Mindy;
- port facilities at Anderson Point; and
- surrounding areas including Port Hedland, South Hedland, Wedgefield and the White Hills Rural Residential Area.

The EPA's environmental objectives for this factor are:

Factor	EPA Objectives
Noise	<ul style="list-style-type: none"> • Ensure noise emanating from proposed railway construction, other construction activities, any increase in port operations, dredging, reclamation, comply with statutory requirements and acceptable (and appropriate standards). • Ensure that the FMG emission is at a level that is consistent with a future scenario where the BHPBIO noise emission has been substantially reduced to a level that is much closer to the assigned level. • Minimise the impact to noise sensitive premises from increased train movement.

Port

The EPA notes that the assigned noise levels, as prescribed by the Noise Regulations, are currently being exceeded in the Port Hedland area as a result of existing operations.

It is also noted that the Noise Regulations define a noise source to “significantly contribute” to the exceedance of allowable levels if that noise emission exceeds a value which is 5dB(A) below the assigned level at the point of reception. Therefore, given the assigned noise levels are already being exceeded, any additional noise from the proposed FMG facility must be 5dB(A) below the assigned noise level for that noise sensitive receiver.

Noise modeling undertaken by Lloyd (2004) shows that the predicted noise emissions from the proposed ship loading and associated operations at Anderson Point would comply with the *Environmental Protection (Noise) Regulations 1997* during daytime and evenings/Sundays, but would exceed the prescribed standard for night time by 4dB(A) under worst case conditions for sound propagation.

Noise emissions from FMG when taken in isolation would comply with the night time assigned level under the noise regulations, however, in the presence of BHPBIO’s operations (that currently exceed the assigned level) the EPA notes that FMG is unable to meet this lower level. Accordingly FMG will need to reduce the primary noise source (conveyors and shiploader) by 7dB(A) in order to reduce overall noise from FMG by 4dB(A).

In view of managing noise levels to exactly 5dB(A) below the assigned level, it is important to note that the purpose of the "significantly contributing" requirement of the Noise Regulations is to prevent the situation where several noise contributors, each operating at the assigned level, in combination cause an exceedance ("creeping noise"). In this case, the emission that causes the exceedance is so far above that of FMG that the FMG emission would make no measurable difference to the overall noise level, whether it was at the assigned level or 5dB(A) below it.

The EPA's objective is to ensure that the FMG emission is at a level that is consistent with a future scenario where the BHPBIO noise emission has been substantially reduced to a level that is much closer to the assigned level. Accordingly, it is considered reasonable for FMG to work towards the fully compliant noise level over a period of time.

Rail Noise

With regard to rail noise, it is noted that the existing L_{Aeq} level of 55dB(A) at *Abydos Station* is cause for concern and represents a significant noise issue requiring ameliorative measures. While the individual noise increases from FMG and HDMS are within the allowable increase under preliminary draft Guidance No.14 – Road and rail Transportation Noise, the combined increase of 1dB(A) in noise from these two proposals exceeds the allowable increase.

The EPA's objective is to ensure indoor noise levels do not exceed 35dB L_{Aeq} in bedrooms. This criterion could be achieved with an outdoor noise level of 45dB(A) when windows are open, or about 50dB(A) with windows closed (requiring mechanical ventilation or air-conditioning).

The other criterion to be noted is the current draft of the Western Australian Planning Commission's Statement of Planning Policy on Road and Rail Transport Noise, still in preparation. This document classifies night time L_{Aeq} levels between 50 and 55dB(A) as "conditional", where further ameliorative measures should be investigated. Such ameliorative measures could take the form of operational measures on the railway, construction of noise barriers, or noise insulation of the dwellings.

FMG has indicated in its response to submissions (ENVIRON, 2005b) that noise management measures to minimise disturbances to residences could include:

- rail design (eg turning circles) to minimise wheel noise;
- use of low-noise equipment;
- management of train operations, such as reduction of notch speed to reduce locomotive noise near residences;
- cuttings and or noise barriers; and
- as a last resort acoustic treatment of buildings (for example mechanical ventilation, air conditioning or noise insulation of the dwellings).

With regard to Wedgefield, White Hills, South Hedland, Mulga Downs Outcamp and Indee Station, the existing L_{Aeq} noise levels are in the range 39 – 44dB(A) and these levels are considered acceptable. The noise level at Marillana Creek (47dB(A)) is considered marginal. In all cases the increases resulting from the combined FMG and HDMS proposals would exceed the allowable increases under the preliminary draft Guidance No.14. The resulting noise levels would be in the range 46 – 50dB(A) at all of these locations. These noise levels would be high enough that the EPA goal of 35dB L_{Aeq} in bedrooms would be exceeded with windows open.

Based on the above, the EPA recommends that a condition be placed on the proponent to address noise emissions from port and rail operations in accordance with an Operations Noise Management Plan (Recommended Environmental Condition 18). This plan would set out procedures for:

- achieving compliance with the Noise Regulations for port operations;
- achieving compliance with rail noise criteria,
- identifying noise-sensitive premises;
- implementing management measure as far as practicable;
- monitoring;

- community consultation; and
- a complaints process.

In addition, it should be noted that the proponent is required to prepare and implement a Construction Noise Management Plan in Accordance with Regulation 13 of the *Environmental Protection (Noise) Regulations 1997*, to the requirements of the Town of Port Hedland. The Construction Noise Management Plan will detail hours of operation, proposed equipment, expected impacts to noise sensitive premises and noise management measures.

Summary

Having particular regard to:

- (a) Recommended Environmental Condition 18 which requires a Noise Management Plan; and
- (b) the proponent's management measures,

it is the EPA's opinion that the proposal can be managed to be consistent with the EPA's environmental objective for this factor.

3.6 Water and Sediment Quality

Description

Port Hedland is a macro-tidal creek system, first dredged in the 1960's and is a naturally turbid environment (DALSE, 2004). Anderson Point is a low relief area that is part of the coastal flats of Port Hedland.

Approximately 3.3 Mm³ of material will be dredged from the area in front of Anderson Point. Dredge material will be disposed of onshore (in two areas – the area at the end of Anderson Point behind the mangroves and the area inland where the stockpiles are located) via a pipeline to bunded ponds to ensure that the spoil remains in place and that sedimentation is maximised prior to release of discharge water back to the harbour. The supernatant discharge water will be released back to the harbour after it has passed through a settling basin to minimise the return of suspended solids (DALSE, 2004).

The area over which FMG is proposing to construct the reclamation and dewatering ponds is 300 ha. The bund walls will be approximately 4 m high, with a freeboard of approximately 0.5 m for safety considerations. Therefore the total storage volume of the reclamation area (excluding the freeboard) is approximately 10.5 Mm³.

The final operational area at Anderson Point will be approximately 100 ha. This area will be established to a level which is safely above storm surge level (up to RL 7.5 mAHD). An average of 3 m of fill will be required across the 100 ha to establish the safe level and 3 Mm³ of material will be required to achieve this level. This accounts for the majority of the material that is proposed to be dredged. This does not include the fill required for the rail loop so any excess is likely to be used in the construction of the rail loop.

The remaining 0.3 Mm³ of dredged material will be spread over the 200 ha. This area will not be raised to the required level above storm surge and will effectively become ponds, which can be used for collection of runoff, but could be subject to inundation in a major storm event.

The port area includes areas with low lying waterlogged soils which, due to their low elevation, are considered to potentially be acid sulphate soils (ASS) which contain pyrite or iron sulphate. ASS are usually found in Holocene deposits associated with mangroves as the formation of pyrite occurs naturally in the mangrove environment (Paling, 2002). Exposure of ASS to oxygenation by drainage or excavation leads to the generation of sulphuric acid (ASSMAC, 1997).

Submissions

Concerns raised in submission focused on:

- dredging and potential sediment plumes;
- increased turbidity impacting on marine biota and mangroves;
- suitability of dredge spoil for reclamation;
- management of stormwater runoff around spoil deposition;
- possibility of spoil disposal offshore or partial disposal;
- development of an EMP to include hydrocarbon management, waste management, ballast water and marine pest management, marine vertebrate management and vessel movement management;
- too many aspects of the port design not being finalised until environment approval is given;
- cessation of dredging should monitoring reveal a problem;
- footprint of the reclamation area;
- modelling to determine siltation;
- quantification of proposed port's ultimate impacts; and
- the need to undertake sediment sampling, ASS sampling and assessment of return water quality.

Assessment

The area considered for assessment is Anderson Point at Port Hedland and its surrounds.

The EPA's environmental objectives for this issue are:

Issue	EPA Objectives
Marine Water and sediment quality	<ul style="list-style-type: none"> • Minimise the risk to the environment resulting from Acid Sulphate Soils. • Maintain or improve marine water and sediment quality to protect Environmental Values and Environmental Quality Objectives 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/ARMCANZ, 2000). • Minimise the risk of introduction of exotic marine pest organisms. Organisms.

Port layout

During the assessment of the proposal, and as previously indicated under section 3.2, the proponent has indicated that a 300 ha reclamation area is required to manage the volume of sediment to be dredged to ensure dredge spoil settles and drains within the construction period.

Given the naturally turbid environment, the EPA notes that the sub-tidal marine communities in the harbour are tolerant of the natural levels of turbidity and that the inner harbour does not support any significant seagrass or coral reef. In addition, increases in turbidity are not expected to impact on turtles or dolphins.

The EPA however notes that elevated turbidity levels are expected in the southern portion of the harbour during the dredging period and that there is a risk that a 12 month dredging campaign could result in water of higher than background turbidity leaving the harbour on ebb tides with the potential to increase turbidity stress on reef communities (recreational assets) that occur outside the harbour in front of Finucane Island and Port Hedland (DALSE, 2004; URS, 2004 cited in ENVIRON, 2004).

For this reason, and because dredging and reclamation forms a key aspect of this proposal, the EPA recommends that a condition be placed on the proponent to monitor and control water quality changes associated with dredging operations in accordance with a Dredging and Reclamation Monitoring and Management Plan (Recommended Environmental Condition 14). The Plan will set out (amongst other aspects):

- results of plume dispersion modelling to determine potential impact on sensitive environmental values including reef areas that occur inside and outside the Port Hedland harbour in front of Finucane Island and Port Hedland;
- procedures for undertaking a assessment of risk to the environmental values posed by dredging and reclamation;
- details of a monitoring program for sublethal indicators of stress in key environmental attributes and water quality;
- management actions and contingency measures;
- management and control of return water; and
- surface drainage management for the reclamation area including water harvesting.

In association with the above recommended condition, it is considered appropriate that a condition be placed on the proponent to prevent/minimise the risk of introducing marine pest species to the Port Harbour on the dredging equipment (Recommended Environmental Condition 15).

This will ensure that the dredge and associated vessels required as part of this proposal do not represent a potential pathway for exotic marine organisms or diseases to be introduced into the Port Hedland marine environment

It is noted that the proponent has made commitments to have in place and make publicly available a:

- Hydrocarbon Management Plan/ Oil Spill Contingency Plan; and a
- Marine Pest Management Plan which includes prevention of hull cleaning and scraping at the FMG berth, and compliance with AQIS requirements in relation to ballast and water control.

The DoE is currently undertaking community and stakeholder consultation to develop community-derived Environmental Values (EVs) and Environmental Quality Objectives (EQOs) for marine waters from Exmouth to Port Hedland. Once derived, these values and objectives will underpin an environmental quality management framework (EQMF) to protect the marine environment of the Pilbara from the effects of waste discharges and deposits. It is expected that, consistent with the *State Water Quality Management Strategy Document No.6*, the EQMF arising from the consultative process, as endorsed by the EPA, will form the basis of ongoing environmental quality monitoring and management programs carried out in the marine waters of the Pilbara region.

Acid Sulphate Soils/ Sediment

With regard to the sediment survey and ASS survey (Oceanica 2005, cited in ENVIRON, 2005b), the EPA notes that:

- more than 1,000 tonnes of ASS with ≥ 0.03 % sulphur were identified in the vicinity of the proposed northern stockpile and northern train unloader areas;
- ASS were recorded from one location on the intertidal area of Anderson Point and described at another site within the proposed dredging areas. Levels of sulphur (0.08%) were slightly higher than the DoE action criteria of 0.03%. The amount of this material within the areas to be dredged is relatively small, is not highly acidic (upon oxidation), and contains a high proportion of calcium carbonate; and
- investigations of sediment in areas proposed to be dredged indicated the spoil can be classified as non-toxic in terms of nickel and chromium, as their bioavailability is acceptably low (compared with the National Ocean Disposal Guidelines Screening levels), and that the single exceedance of arsenic, when re-examined was found to be relatively non-bioavailability (below screening levels).

Based on the above, the EPA recommends that a condition be placed on the proponent to outline strategies to manage potential impacts of dredging and reclamation works that are likely to disturb ASS, in accordance with an ASS Management Plan (Recommended Environmental Condition 16). This Plan will set out procedures and management measures to identify and describe the occurrence of actual and potential ASS on site to be disturbed; specify potential impacts, performance criteria and mitigation strategies together with relevant monitoring and reporting requirements.

With regard to sediment quality, and on the basis of information provided to date by FMG, the EPA notes that data suggests that risks of impacts on marine biota due to the release of some metals may not be high (excepting nickel and chromium). However, given the way in which the data has been presented (Oceanica, 2005), there is a lack of clarity about whether data have been analysed and compared against relevant screening levels in accordance with the protocols recommended in the National Ocean Disposal Guidelines (Commonwealth of Australia, 2002). In addition, further analysis may be required to determine whether elevated levels of metals (particularly nickel) in the harbour are indicative of naturally high levels in the region.

Accordingly, the EPA recommends that a revised evaluation of sediment quality data be conducted prior to the development of the Dredging and Reclamation Monitoring Plan, including assessment of those data against relevant guidelines using procedures

recommended in the National Ocean Disposal Guidelines. The outcomes of the revised evaluation, including any active management measures required to meet acceptable standards of water and sediment quality, should be addressed as a component of the Dredging and Reclamation Monitoring and Management Plan (Recommended Environmental Condition 14).

Summary

Having particular regard to the:

- proponent's commitments and management measures;
- EPA Recommended Conditions 14, 15 and 16; and
- port facilities (for example the shiploader) being managed under Part V works approval/ licence requirements,

it is the EPA's opinion that the proposal is capable of being managed to meet the EPA's objectives for this factor.

3.7 Relevant Environmental Principles

In preparing this report and recommendations, the EPA has had regard for the object and principles contained in s4A of the *Environmental Protection Act (1986)*. Appendix 3 contains a summary of the EPA's consideration of the principles.

4. Conditions and Commitments

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the impacts of the proposal on the environment. The commitments are considered by the EPA as part of its assessment of the proposal and, following discussion with the proponent, the EPA may seek additional commitments.

The EPA recognises that not all of the commitments are written in a form which makes them readily enforceable, but they do provide a clear statement of the action to be taken as part of the proponent's responsibility for, and commitment to, continuous improvement in environmental performance. The commitments, modified if necessary to ensure enforceability, then form part of the conditions to which the proposal should be subject, if it is to be implemented.

4.1 Proponent's commitments

The proponent's commitments as shown in Appendix 4, should be made enforceable. These commitments relate to:

- offset measures;
- a Fire Management Plan;

- turtles;
- a Hydrocarbon Management Plan/ Oil Spill Contingency Plan; and
- a Marine Pest Management Plan.

4.2 Recommended conditions

Having considered the proponent's commitments and the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Fortescue Metals Group to construct a port at Anderson Point in Port Hedland and a connecting north-south railway (to be constructed in two parts) over a distance of 345km to resources in the east Pilbara at Mindy Mindy is approved for implementation.

These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

1. that the proponent shall fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 4;
2. disturbance of land within the railway corridor and limiting the total area to be disturbed to 3100ha (2385 ha for Part 1 and 715 ha for Part 2);
3. relocation of significant fauna;
4. surface water management;
5. rehabilitation of all areas disturbed during construction of the rail corridor, not required for ongoing operations;
6. weed management during construction;
7. protection of subterranean fauna;
8. mangrove protection and limiting the total area of core closed canopy mangroves to be disturbed to 14.8 ha;
9. rehabilitation of the port area;
10. dredging and reclamation;
11. introduced marine species and ballast water for dredging equipment;
12. acid sulphate soil management;
13. dust management during construction and operations; and
14. noise management during port and rail operations.

It should be noted that other regulatory mechanisms relevant to the proposal include:

- works approval/ licensing under Part V of the *Environmental Protection Act 1986*;
- permits and licenses under the provisions of the *Rights in Water and Irrigation Act 1914*; and
- preparation and implementation of a Construction Noise Management Plan in accordance with Regulation 13 of the *Environmental Protection (Noise) Regulations 1997*, to the requirements of the Town of Port Hedland.

5. Other Advice

Noise

The EPA notes that the HDMS rail and port proposal and FMG's proposal has highlighted the fact that industrial noise emissions currently exceed the prescribed limits, set by the *Environmental Protection (Noise) Regulations 1997*, for residential

locations within the Port Hedland townsite. It is also recognised that the noise environment in Port Hedland is currently dominated by BHPBIO's operations at Nelson Point and Finucane Island.

The EPA acknowledges that Port Hedland is a town that, over many years, has evolved with industry in close proximity and which relies on industry for its long term sustainability. With this in mind, the EPA considers that it may be appropriate for allowable noise levels to be slightly higher in Port Hedland than is normally the case in other areas of the State. However, it is evident from the assessment of this proposal that existing cumulative noise levels are beyond normally acceptable limits and that noise levels within the town of Port Hedland need to be reduced over time.

The EPA notes that new industrial proposals for the Port Hedland area, including FMG's and HDMS' proposals, have the potential to exacerbate this existing cumulative noise problem. Ideally, future proposals for the Town of Port Hedland area will need to demonstrate that their individual noise emissions will be at a level that will not compromise a longer term strategy that aims to reduce cumulative noise emissions to more acceptable levels for the community.

The EPA considers that cumulative noise emissions in the Port Hedland townsite need to be progressively reduced. To achieve this outcome a whole of industry approach is needed in Port Hedland, with encouragement and facilitation to be provided by the Government, as appropriate. It is recommended that Government, in conjunction with industry, develop a strategy to resolve the cumulative noise issue in Port Hedland with the aim of moving towards achieving real noise reductions in Port Hedland over time. The strategy needs to encourage industry to reduce cumulative noise emissions, as far as is practicable, towards a level which is reasonable for a town of this nature.

It is further recommended that given BHPBIO, FMG and HDMS will contribute to resulting noise levels, that these companies be required to contribute to a joint noise amelioration program. This could take the form of operational measures on the railway, construction of noise barriers, or noise insulation of the dwellings. A study should be carried out to identify the most cost-effective railway noise ameliorative measures for these receiving locations.

Rail Duplication

To date no open access agreement has been reached or appears imminent for operating railways in the Pilbara.

In 2004, FMG lodged a request with the National Competition Council for the BHPBIO Mt Newman Line to be declared for use by other parties, however the outcome of this declaration process has not been determined, and may not be for some time.

In addition, the DoIR and the PHPA have recently commissioned Worley Parsons to investigate options for rail access into the western berths of the port of Port Hedland (i.e. BHPBIO, HDMS and FMG railways), however, this study is in its infancy and results are not expected for at least 3-4 months.

The EPA considers it would be preferable for FMG to share existing railway infrastructure, rather than to duplicate an existing railway line and that should access to the BHPBIO line not be possible, it would be preferable for HDMS and FMG to share railway infrastructure, to reduce cumulative impacts and thereby avoid the worst case scenario of potentially three railway lines running parallel to one another.

The EPA also believes that the Government should give consideration to the rationalisation of future rail, road and other corridors in the Pilbara and to the means to ensure that the environmental impacts of future cumulative access proposals are acceptable.

Port Hedland Port Authority's Draft Ultimate Development Plan

The PHPA intends to seek comment from the EPA on its future port development options under Section 16e of the *Environmental Protection Act 1986*. In November 2004 the PHPA submitted a draft Ultimate Development Plan (UDP) to the EPA for comment, however it has yet to refer a finalised Plan to the EPA for advice.

The goal of the UDP is to plan for adequate capacity and suitable service corridors to external infrastructure. The emphasis of the UDP is on addressing growth for new port facilities and the implications for surrounding land use, most particularly along the southern boundary of the Port Authority.

The draft Plan identifies proposed service corridors required to link all newly developed areas of the Port with appropriate berths, support areas and the major access routes into Port Hedland. The FMG development has integrated its layout into this draft plan. Preliminary advice received from the PHPA indicates that the location of a conveyor within the proposed Boodarie Industrial Estate to Anderson Point services corridor would be consistent with the intent of the PHPA draft Plan.

In addition, the EPA is aware that the DoIR is trying to resolve how the HDMS and FMG railways are to cross BHPBIO's Finucane line and acknowledges that the solution to this complex issue is likely to impact on the alignment of the PHPA's services corridor.

Port Area Tenure

The EPA notes that the proposed location of the FMG rail loop in Port Hedland overlays HDMS' File Notation Area (FNA) 5145.

The area of FNA 5145, that falls within the PHPA lease, is designated for the HDMS Project by the Iron Ore (HDMS) Agreement (1992) as amended on 22 October 2003. FMG also have a State Agreement dated 10 November 2004, and as a consequence, the DoIR has registered FNA No. 6268 over areas, including the area of the port FMG intends to use for the activities proposed within the Stage A PER.

On advice received from the PHPA, the EPA is aware that the PHPA will need to issue both HDMS and FMG leases so that they have tenure over their land and so they have the right to develop and operate in accordance with approved plans.

Under the variation to the HDMS State Agreement in late 2003, the area within which HDMS will be granted a lease was described on a drawing which formed part of the

Variation. HDMS has been given an option over the whole of the area described in the plan, including a quarry for good fill and a backfill area for unwanted dredge spoil. The precise boundaries have yet to be defined, however part of this “quarry” area is traversed by FMG’s proposed rail loop. Hence, although there is agreement that this “quarry” area will not form part of the eventual lease to HDMS, HDMS has tenure over the area until it has finished its development.

Accordingly, the PHPA advised that it will not grant FMG a lease or licence for its development within the area over which HDMS has tenure unless FMG reaches agreement in writing with HDMS on the terms under which FMG may commence construction of its rail loop before HDMS has completed its operation and has released the area. The Port Authority will also need to approve this agreed arrangement. Failing agreement between the parties that allows FMG to develop first, FMG will need to delay construction of its rail loop until HDMS has completed its development and released the land.

6. Conclusions

The EPA has considered the proposal by FMG to construct a port facility at Anderson Point in Port Hedland and a connecting north-south railway, over a distance of 345 km to resources in the east Pilbara at Mindy Mindy.

The EPA has previously considered and provided advice on a proposal by HDMS to construct a rail line and port facility to support the development of an iron-ore mine, based on the Hope 1 Deposit (EPA, 2002). This proposal has yet to be implemented but has environmental approval. The FMG proposal, in part, overlays the HDMS proposal. Pursuant to the State Agreement between HDMS and the State of Western Australia, HDMS is required to make detailed proposals to the Minister responsible for the Agreement for consideration and approval. If HDMS submits a development proposal that is approved under the State Agreement, this will have implications for this proposal by FMG, and as such FMG will be required to revise and re-submit its proposal for further assessment under Part IV of the *Environmental Protection Act 1986*.

In relation to terrestrial biodiversity and surface water hydrology the EPA has concluded that:

- none of the habitat types present in the project area appear to be unique to the study corridor or regionally significant;
- although the impact on flora and fauna will increase if both HDMS and FMG’s railways are constructed, it is unlikely that the conservation status of any Threatened flora, restricted vegetation types or Schedule fauna species will be affected at a regional or sub-regional scale;
- the range of management measures to be implemented as part of the design, construction and operation of the proposed rail line will effectively minimise or avoid any impacts on significant fauna habitats (including sand dune associations, cracking clay communities, mulga woodlands and rockpile associations) and fauna communities; and
- the integrity and function of the existing hydrological system will be maintained.

Recommended conditions relate to:

- limiting the disturbance of land to be cleared for the railway corridor to 3100 ha in two parts - 2385 ha for Part 1 and 715 ha for Part 2;
- relocation of significant fauna prior to any disturbance;
- rehabilitation all areas not required for ongoing operations;
- weed management during operations; and
- management of surface water.

With regard to BPPH, two EPA GSs are considered relevant to this assessment – GS No. 1 for the protection of tropical arid zone mangroves along the Pilbara coastline, and GS No. 29 that addresses cumulative loss of BPPH. In considering cumulative impact, the EPA agreed that the area identified in GS No. 1 as the “Port Hedland industrial area” would be the defined ‘management unit’ for the purpose of considering cumulative loss of mangrove habitat in the context of GS No. 29 for this proposal.

The EPA concluded that FMG has taken all practicable measures to reduce mangrove disturbance and notes that the loss of core closed-canopy mangroves has been reduced from 22 ha to 14.8 ha during the course of the assessment. The EPA further notes that should all existing and approved developments proceed in the port area, that the cumulative loss of core canopy mangrove extent amounts to 12.8%. As a result of FMG’s proposal, this cumulative loss will increase to 13.3%.

The EPA acknowledges that should the proposal proceed, there will be an unavoidable loss of mangroves. Accordingly, the EPA recommends that the proponent take measures to prevent the loss of, or serious damage to, any mangroves or their habitats other than in accordance with a Mangrove Protection Plan and to rehabilitate those areas not required for ongoing operations to BPPH.

With regard to dust, the EPA notes that Port Hedland townsite has been traditionally exposed to elevated dust levels through iron ore operations at Nelson Point and Finucane Island. Predictive modelling undertaken for the proposal indicates that there will be small increases in the maximum 24-hour and annual cumulative dust concentrations for total suspended particulates (TSP), PM₁₀ - particulate below 10µm in diameter, and PM_{2.5} -particulate below 2.5µm in the study area with existing operations still the predominant contributor to ambient dust concentrations in Port Hedland.

In addition, given the greater distance of the FMG proposal to the Port Hedland Townsite and the location of the proposal in relation to the prevailing winds, the FMG contribution to dust levels in the townsite is considered to be minor. As the ore will be conditioned at the mine to the optimum moisture content and transported to the port facility by rail it is not anticipated that loaded trains will generate significant dust during daily operations.

The EPA notes that preliminary information, from the DoIR’s cumulative modelling, suggests that BHPBIO’s emissions are lower than used in the FMG PER and as such the FMG PER results are most likely conservative.

The issue of dust is considered manageable and it is proposed that a condition be placed on the proponent to monitor and control dust.

In terms of noise emissions for the Port Hedland area, the EPA notes that this proposal highlights the fact that industrial noise emissions currently exceed the prescribed limits set by the Noise Regulations, for residential locations within the Port Hedland townsite.

Noise modelling undertaken by Lloyd (2004) shows that the predicted noise emissions from the proposed shiploading and associated operations at Anderson Point would comply with the *Environmental Protection (Noise) Regulations 1997* during daytime and evenings/Sundays, but would exceed the prescribed standard for night time by 4dB(A) under worst case conditions for sound propagation.

Noise emissions from FMG when taken in isolation will comply with the night time assigned level under the noise regulations, however, in the presence of BHPBIO's operations (that currently exceed the assigned level) FMG is unable to meet this lower level. Accordingly FMG will need to reduce the primary noise source (conveyors and shiploader) by 7dB(A) in order to reduce overall noise from FMG by 4dB(A).

The EPA's objective is to ensure that the FMG emission is at a level that is consistent with a future scenario where the BHPBIO noise emission has been substantially reduced to a level that is much closer to the assigned level. Accordingly, the EPA has concluded that it is reasonable for FMG to work towards the fully compliant noise level over a period of time.

With regard to rail noise, the EPA notes that the existing L_{Aeq} level of 55dB(A) at *Abydos Station* is cause for concern and represents a significant noise issue requiring ameliorative measures. Accordingly, the EPA considers that a condition should be placed on the proponent to address noise emissions from port and rail operations in accordance with an operations Noise Management Plan.

In addition, it is recommended that given BHPBIO, FMG and HDMS will all contribute to resulting noise levels, that these companies be required to contribute to a joint noise amelioration programme, that could take the form of operational measures on the railway, construction of noise barriers, or noise insulation of the dwellings.

In terms of dredging and reclamation associated with the proposal, the EPA accepts the proponent's requirement for a 300 ha development footprint for construction, and , that 100 ha of that development footprint would be utilised for operations. However, the EPA considers that this needs to be managed appropriately, particularly as acid sulphate soils have been identified on site and because there is a risk of elevated turbidity levels (during a 12 month dredging campaign) impacting on the water quality and ecological processes within the Port Hedland harbour and environmental attributes in the adjacent nearshore marine environment (eg reef communities).

Conditions to be placed on the proponent relate to monitoring and controlling water quality changes associated with dredging; managing the disturbance of ASS, and ensuring dredging equipment utilised does not present a risk to the ecosystem integrity of the marine waters of Port Hedland.

With regard to rail duplication, the EPA in its assessment of the HDMS port and rail facility (EPA, 2002) noted that it would be preferable for HDMS to share existing railway infrastructure, rather than to duplicate an existing railway line. The EPA maintains this view and considers it would be preferable for FMG, HDMS and BHPBIO to share existing railway infrastructure to minimise the cumulative impact of rail infrastructure and transport.

In terms of future development of the port, the PHPA intends to seek comment from the EPA under Section 16e of the *Environmental Protection Act 1986*. The PHPA's draft Ultimate Development Plan identifies proposed service corridors required to link all newly developed areas of the port with appropriate berths, support areas and the major access routes into Port Hedland. The FMG development has integrated its layout into this draft plan.

The EPA, however, is aware that the DoIR is trying to resolve how the HDMS and FMG railways are to cross BHPBIO's Finucane line and acknowledges that the solution to this complex issue is likely to impact on the alignment of the PHPA's services corridor.

7. Recommendations

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister notes that the proposal being assessed is for construct a port facility at Anderson Point in Port Hedland which includes shipping facilities, reclaimed areas for iron ore handling infrastructure, stockpiles and ancillary facilities and a connecting north-south railway, over a distance of 345km to resources in the east Pilbara at Mindy Mindy;
2. That the Minister considers the report on the relevant environmental factors and principles, as set out in Section 3;
3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarised in Section 4, including the proponent's commitments;
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report;
5. That in accordance with previous EPA advice where rail facilities in the Pilbara have been assessed, it would be preferable for FMG to share existing railway infrastructure rather than to duplicate an existing railway line; and
6. That Government, in conjunction with industry, develop a strategy to resolve the cumulative noise issue in Port Hedland with the aim towards achieving real noise reductions in Port Hedland over time.

Appendix 1

List of submitters

State/ Local Government

Department of Environment
Department of Conservation and Land Management
Department of Industry and Resources

Organisations and the Public

BHP Billiton Iron Ore
Care for Hedland Environmental Interest Group
Conservation Council
Hope Downs Management Services
W Jacka
Karlka Nyiyaparli Aboriginal Corporation
Mumbultjari Aboriginal Corporation
D Perret
Pilbara Development Commission
Town of Port Hedland
G. Thompson
Yamatji Marlpa Barna Baba Maaja Aboriginal Corporation
Wedgefield Association Inc.
Wildflower Society of Western Australia

Appendix 2

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Appendix 3

Summary of identification of relevant environmental factors and principles

Summary of Identification of Relevant Environmental Factors and Principles

Preliminary Environmental Factors	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
BIOPHYSICAL			
Terrestrial flora – vegetation communities	<p>Clearing of approximately 3,100 ha (proposed corridor of 32 m) of land through the construction of the rail corridor (345km in length) and associated infrastructure and services.</p> <p>Survey identified:</p> <ul style="list-style-type: none"> • 122 vegetation types, representing a wide range of structural and floristic variants; and • 762 taxa of terrestrial vascular flora. <p>Significant habitats and communities:</p> <ul style="list-style-type: none"> • linear sand dune (adjacent to the Weeli Wollie Creek delta); • clay based habitats associated with the Fortescue Marsh; • cracking clay habitats (Chichester Ranges and Foothills); • granite rockpiles scattered on the Abydos plain; • major drainage systems; and • mulga woodlands. <p>The construction of both the HDMS and FMG railways will require clearing of an estimated 3,502 ha of terrestrial vegetation (based on a 50m impact corridor). The majority of the vegetation types will be cleared by less than 10% of the extent mapped for the combined survey's, with 3 exceptions. Of the 3 vegetation types none were considered to be of high conservation significance (Biota, 2004 b).</p>	<p>CALM: Key comments focused on the need for the proponent to:</p> <ul style="list-style-type: none"> • minimise clearing of all vegetation types; • consider the cumulative impacts of the FMG and HDMS alignments; • undertake further flora survey work to address deficiencies for 'greenfield' parts of the corridor and removed from the BHPBIO and HDMS alignments; • undertake an analysis of floristic data using PATN to ensure significant vegetation communities are avoided; • lodge voucher specimens; • commit to more rigorous monitoring methodology including fixed photo points and a quadrat based monitoring regime to include vegetation cover and species presence/absence; • develop a weed management plan and set appropriate timeframes for ongoing monitoring of success criteria and weed control; • develop a fire management plan; • commit to rehabilitation monitoring and remedial work if monitoring shows rehabilitation has not met desired standards; • develop a substantial environmental offsets program; and • address the impact of surface drainage on mulga. <p>Conservation Groups and the Public Comments focused on:</p> <ul style="list-style-type: none"> • unacceptable environmental impacts associated with clearing; • adequacy of flora surveys; • the need to consider the cumulative impact of three railways; • the proposal being unacceptable as it overlaps the 2015 proposed conservation reserve; • the inability to assess the likely impacts arising from the rail route, given the final route for the railway has not been selected; • the need to address the National Strategy for Ecologically Sustainable Development; • rehabilitation and decommissioning – monitoring and funding; and • the need for borrow pits to be rehabilitated in a timely manner. 	<p>Considered to be a relevant factor. To be addressed under the issue of Terrestrial Biodiversity.</p>
Terrestrial flora – Declared rare and priority flora; flora of conservation significance	<p>Clearing of 3,400 ha land through the construction of the rail corridor (3,100ha), port facilities (300 ha) and associated infrastructure and services.</p> <p>Survey identified:</p> <ul style="list-style-type: none"> • 16 Priority flora species recorded during the FMG survey, and a further five species 	<p>CALM Given the flora survey is limited to the extent that not all areas were ground-truthed, FMG should survey the whole alignment for rare and priority flora and significant vegetation types prior to the commencing of clearing.</p> <p>Public, Community Groups Comments focused on:</p>	<p>Considered to be a relevant factor. To be addressed under the issue of Terrestrial Biodiversity.</p>

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Preliminary Environmental Factors	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
	<p>previously recorded within the area during other surveys:</p> <ul style="list-style-type: none"> • several other poorly known or collected species; • 11 species of introduced flora, one of which is a declared weed; and • No DRF or priority species recorded. 	<ul style="list-style-type: none"> • habits are significant on a local scale; and • lack of information relating to the extent to which the final alignment of the railway line will impact on priority flora. 	
Terrestrial fauna	<p>Direct fauna habitat disturbance and modification through clearing 3,400 ha land.</p> <p>Survey's identified:</p> <ul style="list-style-type: none"> • 6 frogs; • 58 reptiles; • 84 avifauna (including 12 species of bird fauna restricted to mangrove and littoral habitats); • 22 ground dwelling mammals; • 11 bats; • 3 species of fish; and • 6 amphibians. <p>Several habitats are considered significant on a local scale. These include linear sand dune (adjacent to the Weeli Wolli Creek delta), Fortescue basin flats, cracking clay habitats (Chichester Ranges and Foothills), granite rockpiles, major drainage systems, and mangroves.</p>	<p>CALM: Comments raised focused on:</p> <ul style="list-style-type: none"> • habitat isolation between the two railway corridors and the need to sufficiently rationalise the separation distances between the rail corridors in the area; • fauna surveys to be undertaken for borrow pit areas and areas not adequately surveyed; and • reporting of fauna deaths during construction, identification and vouchering. <p>Conservation Groups, the Public Issues raised related to:</p> <ul style="list-style-type: none"> • restrictions to fauna movement due to the effects of three railways; • impacts of construction camps resulting in increased feral cat presence; • the importance of the Fortescue Marsh for waterbirds; • the PER being heavily dependent on previous reports and as such a summary of methods and quality of the data should have been provided; • the need to assess the impact on terrestrial vertebrate fauna in each of the habitat types and provide summary data; • the inadequacy of the trapping protocol information; • potential impacts and management strategies being based on inadequate data; • the need for averaged species accumulation curves to be presented; • timing of surveys and surveys not being undertaken in accordance with EPA Position Statement No. 3; • insufficient information being provided on terrestrial fauna assemblages; and • vouchering of specimens. 	<p>Considered to be a relevant factor. To be addressed under the issue of Terrestrial Biodiversity.</p>
Terrestrial fauna – specially protected (Threatened) Fauna.	<p>Habitat clearing and modification during rail construction activities.</p> <p>Surveys recorded:</p> <ul style="list-style-type: none"> • one Schedule 1 species (Mulgara); • one Schedule 4 species (Peregrine Falcon); and • four Priority 4 species (the Grey Falcon, the short-tailed mouse, and the Australian Bustard, Bush Stonecurlew). 	<p>CALM: Comments raised related to the need to:</p> <ul style="list-style-type: none"> • prepare fauna management plans for specific species, such as the mulgara if significant fauna are located within the rail corridor area; and • resurvey the proposed rail alignment for verification of mulgara presence/absence. 	<p>Considered to be a relevant factor. To be addressed under the issue of Terrestrial Biodiversity.</p>

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Preliminary Environmental Factors	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
	<p>A further:</p> <ul style="list-style-type: none"> • two Schedule 1 species (Pilbara Olive Python and Bilby); • one Schedule 4 species (Woma); • one Priority 1 species (Ramphotyphlops ganei (blind snake); • one Priority 3 species (Spectacled Hare Wallaby); and • three Priority 4 species (Ghost bat, Star Finch, Western Pebble-mound mouse), have either been recorded within the corridor during surveys for Hope Downs project, or are considered likely to occur in the area. <p>Three species recorded during the survey considered significant at the scale of the Pilbara bioregion included a gecko (<i>Diplodactylus mitchelii</i>), and two skinks (<i>Ctenotus</i> affin. <i>Robustus</i>, and <i>Ctenotus</i> affin. <i>Uber johnstonei</i>).</p>		
<p>Marine biota and associated habitat (mangroves, benthic and other marine floral and faunal communities).</p>	<p>Direct loss of marine and near shore habitat as a result of dredging for berthing ore vessels and spoil disposal.</p> <p>Loss of 109 ha of mangroves as a result of stockpile and infrastructure construction. This includes 14.8 ha of core mangroves within the harbour and a further 94.44 ha of open mudflat with scattered samphires and occasional low <i>Avicennia marina</i>. The cumulative mangrove benthic primary producer habitat loss amounts to 13.3% of the harbours current mangrove assemblage which exceeds the 10% threshold as identified by Guidance Statement No. 29.</p> <p>Surveys have identified:</p> <ul style="list-style-type: none"> • no DRF species were recorded. • 183 species of benthic invertebrates (HGM, 1997); • bird (12) and bat species that are effectively restricted to mangrove and associated littoral habitats; 	<p>CALM:</p> <p>Key comments relate to:</p> <ul style="list-style-type: none"> • a suitable offset package being developed for the clearing of mangroves; • there being no turtle breeding habitat affected by the port construction; • monitoring programme being prepared and implemented to determine the efficacy of lighting management measures (in terms of marine fauna) and subsequent remedial action if required, in consultation and agreement with CALM; • justifying the dismissal in the PER of the potential usage by dolphins of the harbour, given that it has been identified by PHPA (2003a) as a major concern; and • the need to supply information that quantifies the potential risk to, and species impacted in mangrove areas, rather than dismissing this as a low risk activity. <p>DoIR:</p> <ul style="list-style-type: none"> • the management of impacts on mangroves has major implications for industrial development in Port Hedland and the EPA's decision on the proposal should acknowledge the continually and potentially expanding use of the Port Hedland area for industrial development; and • if EPA GS No. 29 is to be applied then the management unit should cover the whole geomorphic unit to ensure that any cumulative effect resulting from the proposal is assessed on its effect on the mangal environment quality in the whole of the unit. <p>EPA SU</p>	<p>The loss of mangroves is considered to be a relevant factor to be addressed under the issue of Benthic Primary Producer Habitat.</p> <p>With regard to marine fauna, the EPA notes that clearing of mangal will result in the removal of habitat for mangrove dependent bird and bat species and a range of other marine and littoral invertebrate fauna. Surveys and field work suggest that mangrove-dependent terrestrial fauna, occur throughout the closed canopy mangrove cover. The revised FMG port design will result in the clearance of 14.8ha of closed canopy mangroves, leaving over 900 ha of habitat for mangrove dependent fauna. Whilst the proposal will result in a reduction of available habitat locally for mangrove specialist fauna, this represents approximately 1% of the current extent of these habitats in the harbour (FMG, 2005).</p>

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	<ul style="list-style-type: none"> • occasional flatback turtles; • areas of cyanobacterial mats (algal mats) on some tidal flat areas; • five species of mangroves; • mangrove and mud flat habitats being significant on a local scale (given the dependence of some bird and bat species on this habitat, including migratory species); and • mangal habitats being in good to very good condition, backed by open to very open samphire and halophyte communities on hypersaline flats. 	<p>Comments focused on the need for FMG to:</p> <ul style="list-style-type: none"> • apply and address the requirements of EPA GS No. 29 in terms of cumulative loss and management unit; • consider open mangrove habitat and closed mangrove habitat separately and the cumulative losses of each separately; • demonstrate how the principle of impact avoidance has been addressed; • justify the port layout footprint; and • investigate a number of alternative port layouts. <p>Public, Conservation groups, Local Government: Comments focused on:</p> <ul style="list-style-type: none"> • loss of mangroves through clearing; • cumulative loss of habitat; • impacts of mangrove loss on the tidal creek system; • long-term impacts causing further mangrove loss; • quality and impact on certain mangrove species to be cleared; • proposal being inconsistent with the State Sustainability Strategy; • need for proposal to be assessed in accordance with EPA GS. No. 29; • effect of bund wall and change in flooding regime over affected mangrove areas; • effects of dust deposition on mangroves; • support for the development of a mangrove monitoring programme; • the need for further detail on offsets; • timing of dredging to avoid turtle laying/hatching; • development of a combined management response with HDMS to minimise any negative effects on mangrove fauna; and • revegetation of dredge spoil. 	<p>While mangrove dependent vertebrates are effectively restricted to mangal habitat, they occur relatively widely along the Pilbara coast (FMG, 2005). It is noted that there appears to be a low risk of any changes to the conservation status of any vertebrate species as a result of the proposal (Biotra, 2004a).</p> <p>The EPA notes that CALM has concurred that there is likely to be no turtle breeding habitat affected by the port construction, although light can be a major issue for turtles and this should be addressed.</p> <p>In response to CALM’s concerns, the proponent has committed to install frequency controlled lighting to avoid affecting hatchling and juvenile turtle orientation and minimise light overspill from the port facility by shielding, on the advice of CALM. The proponent has also committed to implementing a monitoring programme to determine the effectiveness of controlled lighting on turtles.</p> <p>With regard to marine biodiversity, the EPA recommends that a condition be placed on the proponent to address quarantine measures for dredge vessels. This will ensure that the dredge and associated vessels required as part of this proposal do not represent a potential pathway for exotic marine organisms or diseases to be introduced into the Port Hedland marine environment</p> <p>Marine fauna is not considered to be a relevant factor as it can be managed under the proponent’s commitments and EPA Recommended Environmental Conditions.</p>

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Stygofauna	<p>A review of potential stygofauna habitats was completed as part of the parallel Hope Downs rail corridor (HDMS, 2002) which indicated that no major calcretised areas are crossed by the proposed rail corridor;</p> <p>Recharge to groundwater from creeks and rivers.</p>	<p>Conservation Council Questions raised were:</p> <ul style="list-style-type: none"> • who has sampled for stygofauna at the port and the whole 345km length of the proposed railway?; and • why can't actual species diversity and abundance be measured as well as monitoring groundwater drawdown? <p>CALM:</p> <ul style="list-style-type: none"> • The Stygofauna Management Plan should be prepared by the proponent, in consultation with and agreed to by CALM, prior to reaching the point of significant groundwater drawdowns in water supply bores. 	<p>The EPA notes that:</p> <ul style="list-style-type: none"> • No sampling for stygofauna has been undertaken at the proposed port or along the length of the railway; • bores used for construction of the rail line will only be used for a short period of time and small localised draw-downs (250m) and a quick recovery (4-5 weeks) of aquifers are predicted; and • the proponent has indicated that the short-term perturbation would probably have a local population level impact on stygofauna (if present), but would be unlikely to have a significant effect at the taxon or conservation status level and that any stygofauna in gravels along creek lines are unlikely to be affected by short-term abstraction for railway construction (FMG, 2005). <p>The EPA considers that this factor can be managed through a condition placed on the proponent to investigate potential impacts on subterranean fauna, prior to groundwater abstraction, and to carry out management actions in accordance with a Subterranean Management Plan (Recommended Environmental Condition 11) to the requirements of CALM and the WRC.</p> <p>Not considered to be a relevant factor.</p>
Coastal processes	Construction of port facilities.	<p>Town of Port Hedland, Community Groups Concern was expressed in relation to the effects of:</p> <ul style="list-style-type: none"> • the change of tidal currents; • increased siltation and impoundment of water on the mangroves; • implications of sea level rise; and • protection (Town of Port Hedland, Wedgefield and the airport) from storm surge. 	<p>The EPA notes that based on modelling by Worley (2004) that:</p> <ul style="list-style-type: none"> • the flushing and exchange of Port Hedland harbour and circulation of currents and sedimentation within the harbour are unlikely to be significantly altered; • impacts on tidal currents will be localised to the berth pockets (changes to tidal range predicted to be 2cm) with

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Preliminary Environmental Factors	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
			<p>minimal impact in the broader creek and mangrove regions; and</p> <ul style="list-style-type: none"> based on the small magnitude of the predicted changes in water levels (approx 1 cm) in the mangrove areas, the inundation of mangroves will not change significantly. <p>It is also noted that:</p> <ul style="list-style-type: none"> the rail loop will be built on a solid causeway with culverts designed to allow adequate tidal flow in creek areas; the conveyor from the car dumper to the screen house will be built on elevated trusses; the loadout conveyor will be built on a causeway with culverts to allow adequate creek tidal flows and the loadout conveyor into the harbour itself will be trestled forming a jetty; and port facilities will be designed to take into account sea level rise. <p>Not considered to be a relevant environmental factor</p>
Surface Water hydrology	The major creeks, rivers and wetland features that are intercepted by the railway are the Fortescue River, the Fortescue Marsh (which is listed as a nationally important wetland), Turner River East, Chinnamon Pool, Gillam Creek, Turner River, Coorong Creek, Yule River and Coonarrie Creek, Shaw River, Weeli Wolli Creek, and South West Creek.	<p>Conservation Groups, Public, Local Government, CALM, DoE</p> <p>Comments related to:</p> <ul style="list-style-type: none"> cumulative impacts and alteration of surface water flows; detailed drainage design information being made publicly available; potential impact on flows in South West Creek (including catchment response time), South Creek and potential for increased flooding of South Hedland Rural estate and White Hills areas; sheet flow management actions, redistribution system and maintenance; monitoring and remedial action; duplication of the existing surface drainage and engineering structures that have been installed and maintained by BHPBIO in mulga woodland areas; impact on surface water drainage and flooding on mulga and the Fortescue Marsh; protection (Town of Port Hedland, Wedgefield and the airport) from storm water runoff. risk of contamination from railway operations (chemical spills, dust). 	<p>Interruption to existing surface water flow may occur from rail construction leading to:</p> <p>upstream flooding of vegetation;</p> <ul style="list-style-type: none"> downstream starvation of vegetation (drainage shadow effects); and scour, erosion and siltation of drainage channels; <p>Considered to be a relevant environmental factor.</p>

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<p>Water supply</p>	<p>Groundwater from production bores along the railway will be extracted for fill material conditioning and dust suppression (maximum 1 ML/day for 9 months).</p> <p>Water supply for port operations will be supplied by the Water Corporation (2 GL/a).</p>	<p>Pilbara Development Commission, Town of Port Hedland, Care for Port Hedland Comments raised focused on</p> <ul style="list-style-type: none"> • water usage and water efficiency; and • preference for FMG to use non-potable water for dust suppression and using potable water as a last resort. <p>DoE Comments focused on:</p> <ul style="list-style-type: none"> • water usage and the need for water efficiency in Port Hedland; • water supply and availability for the railway; • support for non-water based dust suppression measures such as bag houses and skirting/enclosure of transfer points and wind shield covers on conveyors; • water supply for the rail construction having no long-term impact on the groundwater resource; and • localised environmental impacts being reviewed during the groundwater licensing process. <p>CALM Concerns expressed related to:</p> <ul style="list-style-type: none"> • impact of short-term abstraction on the Fortescue Marsh; and • avoidance of bores known to be vulnerable to unacceptable impacts. 	<p>Port The EPA notes that:</p> <ul style="list-style-type: none"> • the Water Corporation will supply 2GL water/year and address any associated approvals (Appendix D, ENVIRON, 2004); • the environmental impact/ risk will be carried by the Water Corporation with all future borefield expansions to be reviewed as part of the groundwater licensing process; • management measures to be implemented include water conservation measures such as: minimising water use for dust suppression (by enclosing/covering equipment where possible and sealing roads and high traffic areas) and harvesting of surface water runoff at the port site to supplement scheme supplies; and • FMG, in collaboration with the Water Corporation, will investigate non-potable water supplies for dust suppression such as grey water, brackish water and waste water. <p>Railway With regard to groundwater required for railway construction the EPA:</p> <ul style="list-style-type: none"> • expects the proponent to demonstrate groundwater availability and that there will be no adverse impacts; • notes FMG's commitment to monitor groundwater levels and pumping rates in each water supply bore to ensure sustainable abstraction rates are not exceeded during railway construction and operations on advice of DoE; • notes that the impact to water resources, the environment and other

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			<p>users will be considered during the groundwater licensing process; and</p> <ul style="list-style-type: none"> notes FMG will not use or locate any production bore within 400m of the Fortescue Marsh and that it will avoid bores if they are known to be vulnerable to short-term abstraction or there will be unacceptable impacts from using these bores. <p>Not considered to be a relevant environmental factor.</p>
POLLUTION			
<p>Water quality – Surface Water and groundwater</p>	<p>Construction and operation of a railway corridor and port facilities.</p>	<p>CALM:</p> <ul style="list-style-type: none"> Need for a management plan to address hydrocarbon contamination and spills in the Upper Fortescue river catchment including the Fortescue Marsh. 	<p>The EPA notes that:</p> <ul style="list-style-type: none"> the proponent is required to apply for a groundwater licence, under the RIWI Act; no significant reduction in groundwater quality during the construction or operation phases of the project is expected; the proponent has committed to have in place and make publicly available a Hydrocarbon Management Plan which will address spill prevention and clean up procedures for both construction and operations. The plan will also include a section on rail derailment and accidents involving hydrocarbons; management actions by the proponent include: <ul style="list-style-type: none"> treating any waste water or surface water runoff that is potentially contaminated prior to discharging to the environment; monitoring surface water on a regular basis at the Marsh; and storing all potentially hazardous materials in accordance with relevant legislation.

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<p>Water Quality</p> <ul style="list-style-type: none"> • Marine water quality; • Sediment and dredge spoil; and • acid sulphate soils. 	<p>Construction and operation of port facilities, including cutter suction dredging and onshore spoil disposal via a pipeline.</p> <p>Dredging of the harbour (3.3 Mm³) to create the berths will result in the disturbance of approximately 36.8 ha including 17.8 ha of mudflats and 19.0 ha of seabed to a navigable depth of between 14.6 m and 19.5 m.</p>	<p>Public, Town of Port Hedland, Conservation Groups</p> <p>Concerns focused on:</p> <ul style="list-style-type: none"> • dredging and potential sediment plumes; • increased turbidity impacting on marine biota and mangroves; • presence of acid sulphate soils; • suitability of dredge spoil for reclamation; • management of stormwater runoff around spoil deposition; • offshore disposal; • development of an EMP to include hydrocarbon management, waste management, ballast water and marine pest management, marine vertebrate management and vessel movement management; • too many aspects of the port design not being finalised until environment approval is given; and • cessation of dredging should monitoring reveal a problem. <p>EPA SU</p> <p>Concerns focused on:</p> <ul style="list-style-type: none"> • footprint of the reclamation; • modelling to determine siltation; • quantification of proposed port's ultimate impacts; and • the need to undertake sediment sampling, acid sulphate soil sampling and assessment of return water quality. 	<p>Not considered to be a relevant environmental factor.</p> <p>Considered to be a relevant factor. To be addressed under the issue of Marine and Sediment Quality.</p>
<p>Contamination – oil spill</p>	<p>Construction of a railway and port facilities.</p>	<p>Town of Port Hedland, Care for Hedland</p> <ul style="list-style-type: none"> • Third party compliance with hydrocarbon management measures and need for all third party users to be educated and trained. <p>Public</p> <ul style="list-style-type: none"> • Fuel management. 	<p>The EPA notes that:</p> <ul style="list-style-type: none"> • the proponent has made a commitment to have in place and make publicly available a Hydrocarbon Management Plan/ Oil Spill Contingency Plan for the port addressing spill prevention and clean-up procedures that will be linked to the requirements of the PHPA Emergency Response Plan; • management actions to be undertaken by the proponent include: <ul style="list-style-type: none"> • storing and handling hydrocarbons in accordance with appropriate standards and legislation. This includes adequate bunding, treatment of surface runoff from areas where hydrocarbons may be

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			<p>present (through an oil/water separator);</p> <ul style="list-style-type: none"> • collecting for recycling used or spilt hydrocarbons by a licensed contractors; • only storing diesel at the marshalling yards; • educating and training staff/contractors to ensure they are able to implement hydrocarbon management and emergency response procedures and work with the PHPA; and • ensuring third party users of the infrastructure comply with the projects environmental approvals. <p>Not considered to be a relevant environmental factor</p>
Introduction of exotic organisms.	Increased shipping activity (180-200 ship visits each year) associated with the project.	<p>Public:</p> <ul style="list-style-type: none"> • Development of an EMP to include ballast water and marine pest management. 	<p>The EPA notes the proponent has committed to a have in place and make publicly available a Marine Pest Management Plan addressing:</p> <ul style="list-style-type: none"> • pest species; • regular pest surveys (for example every three years); • the prevention of hull cleaning and scraping at FMG berths; and • compliance with AQUIS requirements in relation to ballast water control. <p>The EPA recommends a condition be placed on the proponent in relation to introduced marine species and ballast water for dredging equipment (Recommended Environmental Condition 15).</p> <p>To be addressed under the issue of Water and Sediment Quality</p>
Air Quality	The total carbon released as a result of vegetation	Public	The EPA notes that management actions

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<p>– Greenhouse gases</p>	<p>clearing is expected to be equivalent to 16,259 CO_{2e}.</p> <p>The estimated annual greenhouse gas emissions is 191,889 tCO_{2e}.</p> <p>The project is estimated to produce, 4.3kgCO_{2e} /t of ore shipped.</p> <p>Greenhouse gas emissions will be created by:</p> <ul style="list-style-type: none"> • combustion of diesel fuel (equipment and locomotives); • decomposition of cleared vegetation and release of carbon from the soil; and • combustion of natural gas or diesel for power supply. 	<ul style="list-style-type: none"> • Need for commitment to best practice in ensuring that greenhouse gas emissions are minimised. 	<p>proposed by FMG include:</p> <ul style="list-style-type: none"> • minimising clearing; • establishing an ongoing program of greenhouse gas reduction, including monitoring greenhouse gas emissions; • using renewable energy sources where appropriate (eg solar panels for power in remote areas); and • maximising the overall efficiency of the project including type of locomotive used and their operational regimes. <p>Not considered to be a relevant environmental factor.</p>
<p>Air Quality - Particulates/ dust emissions during construction and operations</p>	<p>Dust emissions will be generated during construction of port and rail facilities.</p> <p>Dust emissions will be generated during operations from activities such as ore stockpiling, ore stockpiles, ore reclaiming, conveyor transfer points, ship loading operations and vehicle traffic.</p> <p>Overall dust levels in the Town of Port Hedland are predicted to be:</p> <ul style="list-style-type: none"> • less than 1% increase in the maximum 24-hour average concentration of TSP; • approximately 6% increase in the maximum 24-hour average concentrations of PM₁₀ and PM_{2.5}; and • approximately 10% increase in the annual average concentration of PM_{2.5} 	<p>Public Concerns focused on:</p> <ul style="list-style-type: none"> • cumulative dust impact; • increased dust levels in Port Hedland and Wedgefield as a result of iron ore expansion at the Port; • reducing overall dust levels in the community; • possible presence of asbestos in ore to be mined; • existing dust exceedences; • management of dust issues and compliance of third party users with measures to minimise dust emissions; • reliability of modelling; and • cumulative impact modelling currently being undertaken by DoIR and the need for FMG to revise its modelling if FMG’s modelling is viewed to be incorrect. <p>DoIR Comments raised focused on:</p> <ul style="list-style-type: none"> • dust is the most significant cumulative impact of industrial development at Port Hedland; • dust is a significant community concern; • given high background dust levels, there is a need to consider acceptable dust levels in the interim and in the long-term (5-10 years), which may be higher than the NEPM standards; • there is a need to establish a comprehensive and coordinated dust monitoring system for the region; • DoIR has engaged a consultant to assess cumulative impacts on Port Hedland, 	<p>Considered to be a relevant factor. To be addressed under the issue of dust.</p>

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Preliminary Environmental Factors	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
		<p>including dust. This will provide a data base for proponents to use in modelling both project specific impacts and the projects contribution to overall impacts; and</p> <ul style="list-style-type: none"> • support for a co-operative approach involving government, PHPA, port users and other industry within Port Hedland to address the issue of cumulative industry impacts. <p>DoE Comments focused on:</p> <ul style="list-style-type: none"> • cumulative impacts and reliability of modelling; • emissions estimates; • modelling; and • comprehensive ambient air quality monitoring programme and validation of source emissions estimates. 	
<p>Noise - construction - port -railway</p>	<p>Construction activities will increase the ambient noise levels in areas adjacent to operations.</p> <p>Noise at the port will be generated as a result of ship loading, stackers/reclaimers, screens, conveyor drives and the car dumper.</p> <p>Noise levels are predicted to:</p> <ul style="list-style-type: none"> • comply with the noise regulations during the daytime; • comply with the noise regulations during the evenings and Sundays/ public holidays between 0900 and 1900 hours; and • exceed the noise regulations by 4 dB(A) during night-time under worst case meteorological conditions at the most sensitive location (Crowe Street). <p>The night-time noise level from the proposed railway is predicted to range from $L_{Aeq}(8 \text{ hour})$ 20 dB(A) to 45 dB(A) at noise sensitive premises adjacent to the corridor. When combined with the existing railway (BHP) and proposed HDMS railway, the L_{Aeq} will exceed the preliminary draft EPA Guidance for Road and Rail Transportation noise at a number of locations along the rail alignment.</p>	<p>DoE/ EPA SU Concerns focused on:</p> <ul style="list-style-type: none"> • modelling outcomes; • cumulative noise impacts; • compliance with the Noise Regulations; and • noise mitigation measures. <p>Conservation Groups, Town of Port Hedland, Public Comments focused on:</p> <ul style="list-style-type: none"> • exceedance of noise levels in Port Hedland; • noise mitigation measures; • compliance with the preliminary draft EPA Guidance for Road and Rail Transportation noise; • cumulative noise impact; and • compliance with noise management strategy and approvals for third party users. 	<p>Noise is considered to be a relevant factor.</p> <p>Noise also addressed under ‘Other Advice’</p>

Summary of Identification of Relevant Environmental Factors and Principles

Preliminary Environmental Factors	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
SOCIAL SURROUNDINGS			
Recreational activity	Access to the port and rail areas will be restricted during construction and operations.	<p>Town of Port Hedland, Conservation Groups, Public</p> <p>Issues of concern relating to recreation include:</p> <ul style="list-style-type: none"> • reduction in recreational areas around the port; • tidal mud flat areas are used for fishing, crabbing and general recreation; • the ability by small recreational vessels to use the harbour is under threat; and • consultation with the community. 	<p>The EPA notes that the proponent, within the PER, has indicated that:</p> <ul style="list-style-type: none"> • during construction and operation of the port facility, access to the general public will be restricted in the Anderson Point and the South West Creek Areas; and • access to recreational fishing areas will be discussed with key stakeholders with the view to establishing an acceptable outcome for all parties, without compromising public safety or the export's operations. <p>In the proponent's response to submissions, FMG has indicated that it is currently in the process of consulting with the community to develop appropriate management measures or suitable alternative recreational sites and that details will be made available to interested parties as the consultation progresses.</p> <p>Not considered to be a relevant environmental factor</p>
Visual amenity	<p>Construction of railway corridor and port facilities.</p> <p>The port development will be visible from Wedgefield and possibly from South Hedland. The rail corridor will be visible from along the Great Northern Highway and the Port Hedland to Wittenoom Road.</p>	No comments	<p>The EPA notes that management actions proposed by the proponent include:</p> <ul style="list-style-type: none"> • minimising the visual impact of the project through design and location and where visual impacts are unavoidable, to plant vegetative screens; and • rehabilitating all disturbed surfaces not required for ongoing operations. <p>Not considered to be a relevant environmental factor</p>
Heritage – Aboriginal culture and heritage, European heritage	The port development and a large portion of the proposed railway corridor crosses five native title claims.	<p>Comments:</p> <ul style="list-style-type: none"> • the PNTS does not represent the Nyiyaparli Claim Group; • aboriginal cultural and heritage surveys should be conducted to enable the 	<p>The EPA notes that management actions proposed within the PER include:</p> <ul style="list-style-type: none"> • developing and implementing a

Summary of Identification of Relevant Environmental Factors and Principles

Preliminary Environmental Factors	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
	No known European Heritage Sites.	<ul style="list-style-type: none"> delineation and protection of Aboriginal heritage sites; and Aboriginal heritage sites should be avoided. 	<p>Cultural Heritage Management Plan for the project in consultation with Aboriginal Traditional Owners to</p> <ul style="list-style-type: none"> ensure that Aboriginal monitors oversee the construction of project infrastructure and that no known Aboriginal sites are inadvertently impacted upon; ensure that changes to the physical and biological environment do not affect Aboriginal heritage and culture; contain procedures for the protection and mitigation of any Aboriginal sites that may be uncovered during construction (eg human burials, stratified deposits); contain procedures for the physical management o Aboriginal sites in close proximity to the construction (eg fencing and signposting engravings); ensure that Aboriginal traditional Owners continue to have access to traditional fishing grounds; include management measures to ensure access to food, medicinal and other natural resources are provided; avoiding the disturbance of Aboriginal sites in the final design of the project; and undertaking appropriate consultation and management strategies, in conjunction with the traditional owners, to mitigate any disturbance. <p>The proponent has also indicated that should it need to disturb a site, that it will apply under section 16 or 18 of the <i>Aboriginal Heritage Act 1972</i>, only after it has exhausted options to avoid the Aboriginal site in question and after consultation with the affected Native Title</p>

Summary of Identification of Relevant Environmental Factors and Principles

Preliminary Environmental Factors	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
			<p>claimant group has occurred.</p> <p>The EPA has recommended that the proponent shall not disturb the railway corridor other than in accordance with a Railway Corridor Disturbance Management Plan that sets out procedures for:</p> <ul style="list-style-type: none"> • ethnographic and archaeological surveys prior to disturbance; • physical and graphical delineation of areas to be disturbed; and • avoidance of aboriginal sites. <p>Not considered to be a relevant environmental factor</p>

PRINCIPLES		
Principle	Relevant	Consideration
<p>1. The precautionary principle</p> <p>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.</p> <p>In application of this precautionary principle, decisions should be guided by –</p> <ul style="list-style-type: none"> • careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and • an assessment of the risk-weighted consequences of various options. 	Yes	<p>In considering this principle, the EPA notes that:</p> <ul style="list-style-type: none"> • the loss of mangroves associated with this proposal is unavoidable; • the proponent has avoided, where practicable, the direct loss of core closed-canopy mangroves and reduced the loss of mangroves, through re-designing the dredge spoil reclamation area, by 7.2 ha; and • the proponent has minimised the loss of vegetation.
<p>2. The principle of intergenerational equity</p> <p>The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations</p>	Yes	<p>In considering this principle, the EPA notes:</p> <ul style="list-style-type: none"> • the proponent has committed to ensuring efficient energy and water use, minimising waste and encouraging recycling; and • the proponent will contribute to economic development and infrastructure provision in the Pilbara.

Summary of Identification of Relevant Environmental Factors and Principles

Principle	Relevant	Consideration
3. The principle of the conservation of biological diversity and ecological integrity		
Conservation of biological diversity and ecological integrity should be a fundamental consideration	Yes	<p>In considering this principle, the EPA notes that:</p> <ul style="list-style-type: none"> • none of the habitat types present in the project area are unique to the study area or regionally significant; • the conservation status of any Threatened flora, restricted vegetation types or Schedule fauna species will not be affected at a regional or sub-regional scale as a result of FMG's proposed railway and HDMS's railway being constructed; • areas of priority flora are to be protected; • vegetation types of higher conservation significance will be avoided during the final rail design; • all mangrove associations occur elsewhere within the Port Hedland harbour; • although the assessment of cumulative loss of BPPH associated with this proposal has been limited to core closed-canopy mangrove habitats, the ecosystem integrity of the Port Hedland industrial management unit will be maintained; and • the incremental cumulative loss of core closed-canopy mangroves is 0.5%. <p>In addition, the EPA:</p> <ul style="list-style-type: none"> • has recommended that the non-operational reclamation area be progressively rehabilitated as soon as practicable during construction to a condition similar to pre-construction; and • encourages the proponent to work to promote natural regeneration of mangrove habitats disturbed and considers that to endeavour to offset the impacts of the proposal, the proponent should fully explore opportunities and where possible implement actions, to regenerate BPPHs in areas not required for operations and which were BPPH prior to commencement of development.

Appendix 4

Recommended Environmental Conditions and Proponent's Consolidated Commitments

RECOMMENDED ENVIRONMENTAL CONDITIONS

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF THE ENVIRONMENTAL PROTECTION ACT 1986)

PILBARA IRON ORE AND INFRASTRUCTURE PROJECT: PORT AND NORTH-SOUTH RAILWAY (STAGE A)

Proposal: Construction of a port at Anderson Point in Port Hedland which includes shipping facilities, reclaimed areas for iron ore handling infrastructure, stockpiles and ancillary facilities and a connecting north-south railway over a distance of approximately 345 kilometres to resources in the east Pilbara at Mindy Mindy, as documented in Schedule 1 of this statement.

Proponent: Fortescue Metals Group Limited

Proponent Address: 50 Kings Park Road
WEST PERTH WA 6005

Assessment Number: 1505

Report of the Environmental Protection Authority: Bulletin 1173

The proposal referred to above may be implemented by the proponent subject to the following conditions and procedures:

1 Implementation

1-1 The proponent shall implement the proposal as documented in schedule 1 of this statement subject to the conditions of this statement.

2 Proponent Commitments

2-1 The proponent shall implement the environmental management commitments documented in schedule 2 and schedule 3 of this statement.

3 Proponent Nomination and Contact Details

3-1 The proponent for the time being nominated by the Minister for the Environment under section 38(6) or (7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal until such time as the Minister for the Environment has exercised the Minister's power under section 38(7) of the Act to revoke the nomination of that proponent and nominate another person as the proponent for the proposal.

- 3-2 If the proponent wishes to relinquish the nomination, the proponent shall apply for the transfer of proponent and provide a letter with a copy of this statement endorsed by the proposed replacement proponent that the proposal will be carried out in accordance with this statement. Contact details and appropriate documentation on the capability of the proposed replacement proponent to carry out the proposal shall also be provided.
- 3-3 The nominated proponent shall notify the Department of Environment of any change of contact name and address within 60 days of such change.

4 Commencement and Time Limit of Approval

- 4-1 The proponent shall substantially commence the proposal within five years of the date of this statement or the approval granted in this statement shall lapse and be void.

Note: The Minister for the Environment will determine any dispute as to whether the proposal has been substantially commenced.

- 4-2 The proponent shall make application for any extension of approval for the substantial commencement of the proposal beyond five years from the date of this statement to the Minister for the Environment, prior to the expiration of the five-year period referred to in condition 4-1.

The application shall demonstrate that:

1. the environmental factors of the proposal have not changed significantly;
2. new, significant, environmental issues have not arisen; and
3. all relevant government authorities have been consulted.

Note: The Minister for the Environment may consider the grant of an extension of the time limit of approval not exceeding five years for the substantial commencement of the proposal.

5 Compliance Auditing and Performance Review

- 5-1 The proponent shall prepare an audit programme and submit compliance reports to the Department of Environment which address:
1. the status of implementation of the proposal as defined in schedule 1 of this statement;
 2. evidence of compliance with the conditions and commitments; and
 3. the performance of the environmental management plans and programs.

Note: Under sections 48(1) and 47(2) of the *Environmental Protection Act 1986*, the Chief Executive Officer of the Department of Environment is empowered to monitor the compliance of the proponent with the statement

and should directly receive the compliance documentation, including environmental management plans, related to the conditions, procedures and commitments contained in this statement.

- 5-2 The proponent shall submit a performance review report every five years following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act 1986*, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority, which addresses:
1. the major environmental issues associated with implementing the project; the environmental objectives for those issues; the methodologies used to achieve these; and the key indicators of environmental performance measured against those objectives;
 2. the level of progress in the achievement of sound environmental performance, including industry benchmarking, and the use of best practicable measures available;
 3. significant improvements gained in environmental management, including the use of external peer reviews;
 4. stakeholder and community consultation about environmental performance and the outcomes of that consultation, including a report of any on-going concerns being expressed; and
 5. the proposed environmental objectives over the next five years, including improvements in technology and management processes.
- 5-3 The proponent may submit a report prepared by an auditor approved by the Department of Environment under the “Compliance Auditor Accreditation Scheme” to the Chief Executive Officer of the Department of Environment on each condition or commitment of this statement which requires the preparation of a management plan, programme, strategy or system, reporting on the fulfilment of the requirements of each condition or commitment.

6 Railway Corridor Disturbance

- 6-1 The proponent shall not disturb Part 1 or Part 2 of the railway corridor, as defined in schedule 1, other than in accordance with a Railway Corridor Disturbance Management Plan prepared to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

The Railway Corridor Disturbance Management Plan shall set out the measures for:

1. flora, fauna, ethnographic and archaeological surveys prior to disturbance;
2. physical and graphical delineation of areas to be disturbed;

3. avoidance and management of significant vegetation, flora and aboriginal sites; and
 4. progressive surveying of total area disturbed.
- 6-2 The total disturbed area associated with construction of Part 1 of the railway corridor (as defined in schedule 1, including borrow pit areas) shall not exceed 2385 hectares without prior written authorisation of the Minister for the Environment.
- 6-3 The total disturbed area associated with construction of Part 2 of the railway corridor (as defined in schedule 1, including borrow pit areas) shall not exceed 715 hectares without prior written authorisation of the Minister for the Environment.
- 6-4 The proponent shall implement the Railway Corridor Disturbance Management Plan required by condition 6-1.
- 6-5 The proponent shall make the Railway Corridor Disturbance Management Plan required by condition 6-1 publicly available.

7 Fauna

- 7-1 For the portion of the project area that lies outside the Port Hedland Port Authority Boundary, the proponent shall conduct pre-clearance fauna surveys, and if significant fauna are identified, shall not disturb the land surface until significant fauna have been relocated in accordance with a Fauna Management Plan prepared to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

Note: In preparation of advice to the Minister for the Environment, the Environmental Protection Authority expects that the advice of the following agency will be obtained:

- Department of Conservation and Land Management.

The Fauna Management Plan shall set out measures for:

1. follow-up surveys and delineation of significant fauna populations;
 2. identifying suitable relocation sites and relocation techniques; and
 3. monitoring and reporting the success of relocation.
- 7-2 The proponent shall implement the Fauna Management Plan required by condition 7-1.
- 7-3 The proponent shall make the Fauna Management Plan required by condition 7-1 publicly available.

8 Surface Water

- 8-1 For the portion of the project area that lies outside the Port Hedland Port Authority Boundary, the proponent shall not interfere with surface water flow other than in accordance with a Surface Water Management Plan prepared to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

Note: In preparation of advice to the Minister for the Environment, the Environmental Protection Authority expects that advice of the following agencies will be obtained:

- Department of Conservation and Land Management; and
- Water and Rivers Commission.

The Surface Water Management Plan shall:

1. establish existing surface flow regimes; and
2. identify significant surface water dependent ecological systems that may be impacted by changes to surface water regimes.

The Surface Water Management Plan shall set out measures for:

1. controlling excessive turbidity caused by erosion directly related to railway infrastructure;
2. minimising the potential for contaminants to enter waterways;
3. maintaining the integrity of flow paths and water quantities to protect surface water dependent ecological systems; and
4. monitoring and reporting of any changes in surface water flow regimes caused by implementation of the proposal, and impacts on surface water dependent ecological systems.

- 8-2 The proponent shall implement the Surface Water Management Plan required by condition 8-1.

- 8-3 The proponent shall make the Surface Water Management Plan required by condition 8-1 publicly available.

9 Rail Corridor Rehabilitation

- 9-1 For the portion of the project area that lies outside the Port Hedland Port Authority Boundary, the proponent shall rehabilitate all areas not required for ongoing operations in accordance with a Rail Corridor Rehabilitation Plan prepared to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

Note: In preparation of advice to the Minister for the Environment, the Environmental Protection Authority expects the advice of the following agency will be obtained:

- Department of Conservation and Land Management.

The Rail Corridor Rehabilitation Plan shall set out measures for:

1. identification of disturbed areas not required for ongoing operations;
 2. topsoil management;
 3. borrow pit management;
 4. weed management during operations;
 5. restoration of fauna habitat areas lost or modified during construction activities, fauna habitat reconstruction, and rehabilitation of disturbed areas (including rehabilitation of mulga communities);
 6. the derivation of completion criteria;
 7. monitoring the success of rehabilitation against completion criteria;
 8. maintenance of rehabilitation; and
 9. progressive surveying of total area rehabilitated.
- 9-2 The proponent shall rehabilitate not less than 1600 hectares of land disturbed for the railway construction corridor (1265 hectares for Part 1 and 335 hectares for Part 2), access tracks, yards and other infrastructure, unless written authorisation has been obtained from the Minister for the Environment to vary this.
- 9-3 The proponent shall implement the Rail Corridor Rehabilitation Plan required by condition 9-1.
- 9-4 The proponent shall make the Rail Corridor Rehabilitation Plan required by condition 9-1 publicly available.

10 Weed Management

- 10-1 The proponent shall manage weeds during construction of the project in accordance with a Weed Hygiene and Management Plan prepared to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

Note: In preparation of advice to the Minister for the Environment, the Environmental Protection Authority expects that the advice of the following agency will be obtained:

- Department of Conservation and Land Management.

The Weed Management Plan shall set out measures for:

1. identifying target weeds having regard for weed species outside the corridor;
2. weed control during construction;
3. hygiene and wash down for all plant and equipment; and
4. monitoring the success of weed control.

10-2 The proponent shall implement the Weed Hygiene and Management Plan required by condition 10-1.

10-3 The proponent shall make the Weed Hygiene and Management Plan required by condition 10-1 publicly available.

11 Subterranean Fauna Survey and Protection

11-1 Prior to groundwater abstraction, the proponent shall carry out surveys for subterranean fauna and implement actions to protect subterranean fauna in accordance with a Subterranean Fauna Management Plan prepared to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

Note: In preparation of advice to the Minister for the Environment, the Environmental Protection Authority expects that advice of the following agencies will be obtained:

- Department of Conservation and Land Management; and
- Water and Rivers Commission.

The Subterranean Fauna Management Plan shall set out measures for:

1. surveying and identifying subterranean fauna species in areas potentially affected by groundwater abstraction;
2. monitoring groundwater drawdowns;
3. monitoring subterranean fauna populations in areas affected by groundwater drawdown;
4. determining acceptable drawdown levels; and
5. management actions to protect significant subterranean fauna species in the event that trigger levels are exceeded.

11-2 The proponent shall implement the Subterranean Fauna Management Plan required by condition 11-1.

11-3 The proponent shall make the Subterranean Fauna Plan required by condition 11-1 publicly available.

12 Mangrove Protection

12-1 The proponent shall not cause the loss of, or serious damage to, any mangroves or their habitats other than in accordance with a Mangrove Protection Plan prepared to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

The Mangrove Protection Plan shall set out:

1. clear physical and geographical delineation of areas (in the form of spatially referenced maps, electronic data), including the different mangrove associations and habitats, to be directly and indirectly disturbed within, and adjacent to, the project area during construction and operations;
2. descriptions of how and when during the construction period the different mangrove associations and habitats delineated by meeting the requirements of item 1 above would be progressively disturbed;
3. procedures for progressive surveys of total area disturbed to confirm the descriptions required by item above as well as the management actions to be implemented to ensure disturbance is consistent with the information required by 1 above;
4. based on current scientific understanding, the cause and effect pathways for the physical and biological stressors, associated with construction and operation of the proposal, on mangroves, their habitats and the key ecological processes that contribute to ecosystem integrity;
5. using information from 4 above, the early warning indicators of change in the condition/health of the:
 - a. individual mangroves;
 - b. different mangrove associations and their habitats, and
 - c. processes and conditions required for mangrove survival;
6. the measures (i.e. criteria, preferably quantitative) for each of the early warning indicators identified in 5 above that specify acceptable mangrove and mangrove habitat condition/health, and the ranges within which processes and conditions required for mangrove survival may vary (criteria should be established on the basis of pre-construction baseline data collected from the project area and/or data from suitable reference sites located outside the zone of influence of the proposal);
7. the procedures for documenting baseline mangrove and mangrove habitat abundance, distribution and condition/health (using scientifically appropriate quantitative measures), and the status of relevant processes and conditions required for mangrove survival in areas that may be directly or indirectly impacted by the proposal and at appropriate reference sites prior to the commencement of construction;

8. the procedures, including clear descriptions of standard methodologies, for regular monitoring of the indicators of mangrove and mangrove habitat abundance, distribution and condition/health, including relevant processes and conditions required for mangrove survival, at sites within the area of influence of the proposal, and at suitable reference sites as appropriate, throughout the life of the project, and for a minimum of two years post closure if the facility is decommissioned;
 9. the management actions that will be implemented to restore mangrove and mangrove habitat condition/health (including processes and conditions required for mangrove survival) to acceptable levels in the event that monitoring reveals that criteria required by 6 above are not being met;
 10. the links between this Plan and the Port Area Rehabilitation Plan required by condition 13 and how these links are to be addressed; and
 11. procedures for reporting monitoring data, including assessments of performance against criteria and implementation of any management actions to improve performance.
- 12-2 The total area of core closed-canopy mangroves directly and indirectly disturbed within the port project area shall not exceed 14.8 hectares, as depicted/specified by meeting the requirements of condition 12-1(1) above, without prior written authorisation of the Minister for the Environment on advice of the Environmental Protection Authority.

Note: For the purposes of condition 12-2, 'core closed-canopy mangroves' are defined as the following mangrove associations: closed canopy *Rhizophora stylosa*; Closed canopy *Rhizophora stylosa*, *Avicennia marina*; Closed canopy *Avicennia marina* (seaward); Closed canopy *Avicennia marina* (landward); and Low open woodland *Avicennia marina*.

- 12-3 The proponent shall implement the Mangrove Protection Plan required by condition 12-1.
- 12-4 The proponent shall make the Mangrove Protection Plan required by condition 12-1 publicly available.

13 Port Area Rehabilitation

- 13-1 For that portion of the project area that lies within the Port Hedland Port Authority Boundary, the proponent shall rehabilitate all areas not required for ongoing operations in accordance with a Port Area Rehabilitation Plan prepared to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

The Port Area Rehabilitation Plan shall set out measures for:

1. identification of disturbed areas not required for ongoing operations;
2. establishing rehabilitation objectives and completion criteria;

3. implementation of management actions in the event that the completion criteria referred to in item 2 are not met;
4. rehabilitation and/or revegetation of all areas not required for operations using species that occur naturally in Port Hedland;
5. the rehabilitation of not less than 0.74 hectares of core closed-canopy mangroves on both sides of the rail loop at the port facility;
6. establishing a schedule, including timing, for mangrove rehabilitation and revegetation works;
7. monitoring the success of rehabilitation, regeneration and revegetation against completion criteria;
8. propagating and/or transplanting seedlings, including the establishment of a nursery to provide seedling stock for mangrove rehabilitation using local stock with a mixture of species and at the proportions which occur naturally in Port Hedland;
9. protecting juvenile plants from effects that reduce viability (for example contamination, siltation, wind and tidal erosion, excessive evaporation);
10. contingencies and remedial works to be implemented if the objectives or completion criteria are not met, or rehabilitation strategies are not being implemented; and
11. reporting on rehabilitation success against completion criteria.

13-2 The proponent shall implement the Port Area Rehabilitation Plan required by condition 13-1.

13-3 The proponent shall make the Port Area Rehabilitation Plan required by condition 13-1 publicly available.

14 Dredging and Reclamation Monitoring and Management

14-1 The proponent shall monitor and control water quality changes associated with dredging operations in accordance with a Dredging and Reclamation Monitoring and Management Plan prepared to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

Note: In preparation of advice to the Minister for the Environment, the Environmental Protection Authority expects that advice of the following agencies will be obtained:

- Department for Planning and Infrastructure (Maritime Division);
- Department of Fisheries;
- Department of Conservation and Land Management; and
- Port Hedland Port Authority.

The objectives of the Plan are to:

- a) define the zones of influence of turbidity plumes generated by dredging and reclamation activities; and
- b) protect the environmental values of the port (including marine communities and habitats, mangrove ecosystem, near shore tidal reef system and recreational fishing) by controlling impacts associated with dredging and reclamation that may adversely impact on these values such as sedimentation and erosion, water turbidity and contaminants.

The Dredging and Reclamation Monitoring and Management Plan shall set out:

1. arrangements for dredging including locations of areas and volumes of material to be dredged and disposed of, type of dredge(s) to be used and mode of operation;
2. the most probable and worst-case timing and duration of dredging and spoil disposal activities;
3. procedures and/or measures for management of dredging and reclamation to meet timelines identified in point 2, including contingencies for addressing unforeseen delays;
4. and spatially define the water quality objectives to be achieved and the key environmental attributes, (including sensitive marine habitats) that require protection from reduced water quality during dredging and reclamation activities;
5. the results of plume dispersion modelling (using an appropriate validated model for the area) showing most probable and worst case turbidity plume scenarios in terms of plume location, intensity, effects on water quality and likely frequency/duration of interaction with key sensitive environmental attributes including reef areas that occur inside and outside the Port Hedland Harbour in front of Finucane Island and Port Hedland;
6. measures for undertaking a determination of risks posed by dredging and reclamation activities to water quality objectives and the key sensitive environmental attributes (including sensitive marine communities and habitats), based on the outcomes of modelling required in item 5;
7. details of a monitoring programme that focuses on relevant water quality parameters and sublethal indicators of stress in the key sensitive environmental attributes, identified as being at risk from dredging and reclamation activities including the establishment of management triggers which if not met will require the implementation of a management response;

8. details of a program to monitor water quality parameters, which at a minimum shall include turbidity, dissolved oxygen and pH at sites located inside and outside the Port Hedland Harbour and which includes the establishment of management triggers based on data collected from appropriately located unimpacted reference sites against which monitoring data shall be evaluated;
9. management actions and contingency measures (including deployment of silt curtains, temporary cessation of dredging and/or reclamation activities) that will be implemented in the event that management triggers related to water quality objectives and key environmental attributes (including sensitive marine communities and habitats) are exceeded;
10. evaluation of sediment quality data against relevant guidelines using procedures recommended in the *National Ocean Disposal Guidelines (Commonwealth of Australia, 2002)*;
11. the management and control of return water from the reclamation area to ensure no loss of mangrove systems, outside the area identified in condition 12-1;
12. the spoil disposal and reclamation process, including management of reclamation ponds and dewatering, total storage volume of the reclamation area and final level(s) of the reclamation area;
13. measures for surface drainage management for the reclamation/ spoil disposal area, including water harvesting and contingencies for extreme storm events (for example tropical cyclones); and
14. reporting.

Note: The term sensitive marine and intertidal ecological habitats means mangroves, reef habitats (including those located outside the Port Hedland Harbour), and the biota associated with these habitats.

- 14-2 The total area of land disturbed by dredging and reclamation within the Port Hedland port area shall not exceed 300 hectares without prior written authorisation of the Minister for the Environment.
- 14-3 The proponent shall implement the Dredging and Reclamation Monitoring and Management Plan required by condition 14-1.
- 14-4 The proponent shall make the Dredging and Reclamation Monitoring and Management Plan required by condition 14-1 publicly available.

15 Introduced Marine Species and Ballast Water for Dredging Equipment

- 15-1 Prior to the commencement of dredging and within 48 hours following entry of the dredging equipment and other vessels associated with the proposal into the Port Hedland Harbour, the proponent shall arrange and undertake an inspection by an appropriately qualified expert to ensure that:

- there is no sediment on or within the dredging equipment;
- ballast water (if any) has been managed according to the Australian Quarantine Inspection Service ballast water requirements; and
- any fouling organisms on the dredging equipment do not present a risk to the ecosystem integrity of the marine waters of Port Hedland.

15-2 The proponent shall manage any sediment or fouling organism found as a consequence of the inspection required by condition 15-1 to the requirements of the Minister for the Environment.

15-3 If following completion of dredging and disposal activities, the dredging equipment is to be transferred to another location within Western Australian territorial waters, the proponent shall undertake an investigation employing an appropriately qualified marine scientist to identify the presence of/ the potential for introduced marine pest species.

15-4 In the event that any introduced marine pest species are detected, the proponent shall put in place a Marine Pests Management Strategy to ensure that introduced marine pest species are not transferred to other locations within Western Australian territorial waters.

Note: In auditing compliance in relation to the report(s) requirements of conditions 15-1 to 15-4, the Environmental Protection Authority expects that advice from the following agencies will be obtained:

- Department of Fisheries; and
- Australian Quarantine Inspection Service.

16 Acid Sulphate Soils

16-1 For that portion of the project area that lies within the Port Hedland Port Authority Boundary, the proponent shall not disturb soils, other than in accordance with an Acid Sulphate Soil Management Plan prepared to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

The Acid Sulphate Soil Management Plan shall set out measures for:

1. identification and description of the occurrence of actual and potential acid sulphate soils on site to be disturbed;
2. management strategies to be implemented;
3. timing of environmental management initiatives;
4. performance criteria to be used to assess the effectiveness of acid sulphate soil management and monitoring;
5. monitoring of soils, surface and groundwater quality to enable the effectiveness of the management strategy to be assessed;

6. contingencies to be implemented on site to deal with unexpected events or in the event of failure of management, including remedial actions and restoration; and
 7. reporting on environmental performance objectives.
- 16-2 The proponent shall implement the Acid Sulphate Soil Management Plan required by condition 16-1.
- 16-3 The proponent shall make the Acid Sulphate Soil Management Plan required by condition 16-1 publicly available.

17 Dust

- 17-1 The proponent shall monitor and control dust associated with construction and operation of the port in accordance with a Dust Management Plan prepared to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

Note: In preparation of advice to the Minister for the Environment, the Environmental Protection Authority expects that advice of the following agencies will be obtained:

- Department of Industry and Resources; and
- Town of Port Hedland.

The Dust Management Plan shall set out measures for:

1. defining an objective tool for measuring effectiveness of dust management strategies (for example monitoring for benchmarking and performance evaluation);
 2. controlling the generation of dust during construction and operations;
 3. researching and justifying the application of best practice dust mitigation and management during construction and operations;
 4. establishing and implementing a comprehensive ambient air quality monitoring programme including validation of source emissions estimates;
 5. participating in a consolidated monitoring programme, involving major industry in the Port Area;
 6. continually improving and reducing emissions;
 7. a complaints process; and
 8. reporting monitoring results.
- 17-2 The proponent shall review air quality modelling and assumptions presented in the Public Environmental Review and Response to

Submissions, in the event that the cumulative impact assessment study commissioned by the Department of Industry and Resources indicates a significant variance from that modelling, to the requirements of the Department of Environment.

17-3 The proponent shall implement the Dust Management Plan required by condition 17-1.

17-4 The proponent shall make the Dust Management Plan required by condition 17-1 publicly available.

18 Operations Noise

18-1 The proponent shall not commence port or rail operations other than in accordance with the Operations Noise Management Plan prepared to the requirements of the Minister for the Environment, on advice of the Environmental Protection Authority and the Town of Port Hedland.

The Operations Noise Management Plan shall address noise emissions from the port and rail operations associated with the proposal and set out measures for:

1. achieving compliance with the *Environmental Protection (Noise) Regulations 1997*, for port operations;
2. achieving compliance with sound levels of $35\text{dB}L_{\text{Aeq,1hour}}$ and $45\text{dB}L_{\text{Amax}}$ when determined within indoor sleeping areas, and $40\text{dB}L_{\text{Aeq,1hour}}$ and $50\text{dB}L_{\text{Amax}}$, when determined within indoor living areas of dwellings on affected noise-sensitive premises, for rail operations;
3. identification of noise-sensitive premises affected by noise emissions from either port or rail operations;
4. identification of noise management measures to minimise disturbances to dwellings on affected noise-sensitive premises;
5. implementation of noise management measures as far as practicable;
6. noise monitoring and reporting; and
7. a community consultation and complaints process.

18-2 The proponent shall implement the Operations Noise Management Plan required by condition 18-1.

18-3 The proponent shall make the Operations Noise Management Plan required by condition 18-1 publicly available.

Procedures

- 1 Where a condition states “to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority”, the

Environmental Protection Authority will provide that advice to the Department of Environment for the preparation of written notice to the proponent.

2. The Environmental Protection Authority may seek advice from other agencies or organisations, as required, in order to provide its advice to the Department of Environment.
3. Where a condition lists advisory bodies, it is expected that the proponent will obtain the advice of those listed as part of its compliance reporting to the Department of Environment.
4. Due to the requirements for adaptive management in the implementation of this proposal, the Environmental Protection Authority may vary the criteria referred to in condition 14 from time to time, provided that the result of any such changes is unlikely to lead to unacceptable impacts on the environmental values of local marine ecosystems.

Notes

1. The Minister for the Environment will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environment over the fulfilment of the requirements of the conditions.
2. The proponent is required to apply for a Works Approval and Licence for this project under the provisions of Part V of the *Environmental Protection Act 1986*.
3. The proponent is required to obtain Permits for this project to Obstruct or Interfere with Bed and Banks, under the provisions of Section 17 of the *Rights in Water and Irrigation Act 1914*.
4. The proponent is required to obtain a 5C Licence to take groundwater for all Stage A railroad construction water requirements and ancillary water use for this project under the provisions of the *Rights in Water and Irrigation Act 1914*.
5. The proponent is required to prepare and implement a Construction Noise Management Plan in accordance with Regulation 13 of the *Environmental Protection (Noise) Regulations 1997*, to the requirements of the Town of Port Hedland.

The Proposal (Assessment Number 1505)

The proposal involves the construction of a port facility at Anderson Point in Port Hedland and a connecting north-south railway (to be constructed in two parts) stretching approximately 345 kilometres south south-east to iron ore resources at Mindy Mindy.

The proposal has the following main components:

- the staged construction of a 345 kilometre railway line from Port Hedland to proposed mining operations at Mindy Mindy (see Figure 1). Part 1 involves the construction of a 244 kilometre railway line from Port Hedland to the Chichester Ranges and Part 2 involves the construction of a 101 kilometre railway line from the Chichester Ranges to Mindy Mindy ; and
- construction of port facilities consisting of 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 in Port Hedland (see Figure 2).

The key characteristics of the proposal are described in Table 1 below.

Table 1: Key Proposal Characteristics

Element	Description
General	
Construction period	20 months approximately
Project life	20+ years
Export tonnage	45Mtpa
Railway	
Length	345 kms approximately (Part 1: 244 km, Part 2:101 km)
Support Infrastructure	Sidings Administration offices and warehouses Trip servicing facilities Service and repair workshop Rail loops and marshalling yards Maintenance facilities Substations Communication systems
Port	
Stockyard	2.5Mt capacity (live)
Materials Handling	Car dumper Conveyors and transfer points Rescreening plant 2x Stackers (8,000 tph each) Reclaimer (10,000 tph)
Port development	Single wharf 750m long Parking berth Ships up to 250,000 DWT Shiploader (10,000 tph)
Buildings	Dredging 3.3Mm ³ Shift office Control room and amenities Wharf amenities Substations
Infrastructure	
Power	17.5 MW from existing system
Water	2 Glpa from existing system
Fuel	45 Mlpa for locomotives and other vehicles
Roads	General traffic, port access, rail service
Sewerage	Construction – package treatment plant

Element	Description
	Operations – septic systems
Disturbance Areas*	
Area of railway construction <ul style="list-style-type: none"> • railway construction corridor • access track, yards, temporary disturbance 	3,100 ha (2385 ha for Part 1 and 715 ha for Part 2) <ul style="list-style-type: none"> • 1,500 ha (1115 ha for Part 1 and 385 for part 2) • 1,600 ha (1270 ha for Part 1 and 330 ha for Part 2)
Area of operating railway <ul style="list-style-type: none"> • railway corridor • access road, yards, workshops, maintenance yards 	1,500 ha (total) <ul style="list-style-type: none"> • 688 ha (488 ha for part 1 and 200ha for Part 2) • 812 ha (632 for Part 1 and 180 for Part 2)
Area of port facilities (including spoil reclamation below proposed stockpiles and temporary disturbance areas)	300 ha
Area of operating port facilities	100 ha
Total operational areas	1,600 ha
Workforce (approximate peak levels)	
Construction Operations Accommodation	Rail – 1,000 personnel Port – 500 personnel Port and rail – 225 personnel Construction – single status in Port Hedland Track camps for rail Permanent – new or existing residences in Port Hedland, Newman or permanent rail camp.

Key:			
*	includes a contingency	MW	mega watts
Mtpa	Million tonnes per annum	Glpa	giga litres per annum
tph	tonnes per hour	Mlpa	million litres per annum
m	metres	Mt	million tonnes
DWT	dead weight tonne	ha	hectares
Mm3	million cubic metres	km	kilometre

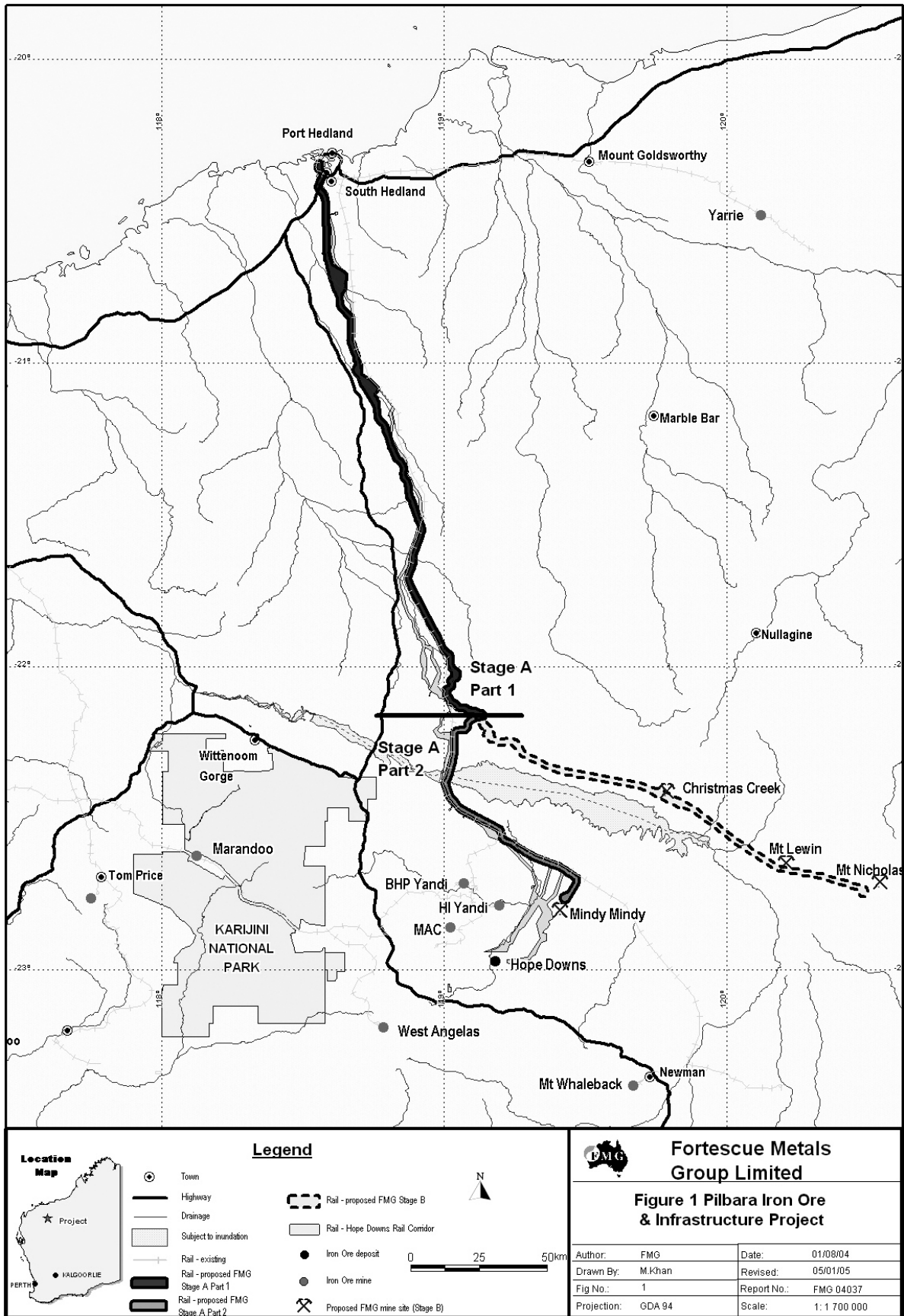


Figure 1: Pilbara Iron Ore and Infrastructure Project

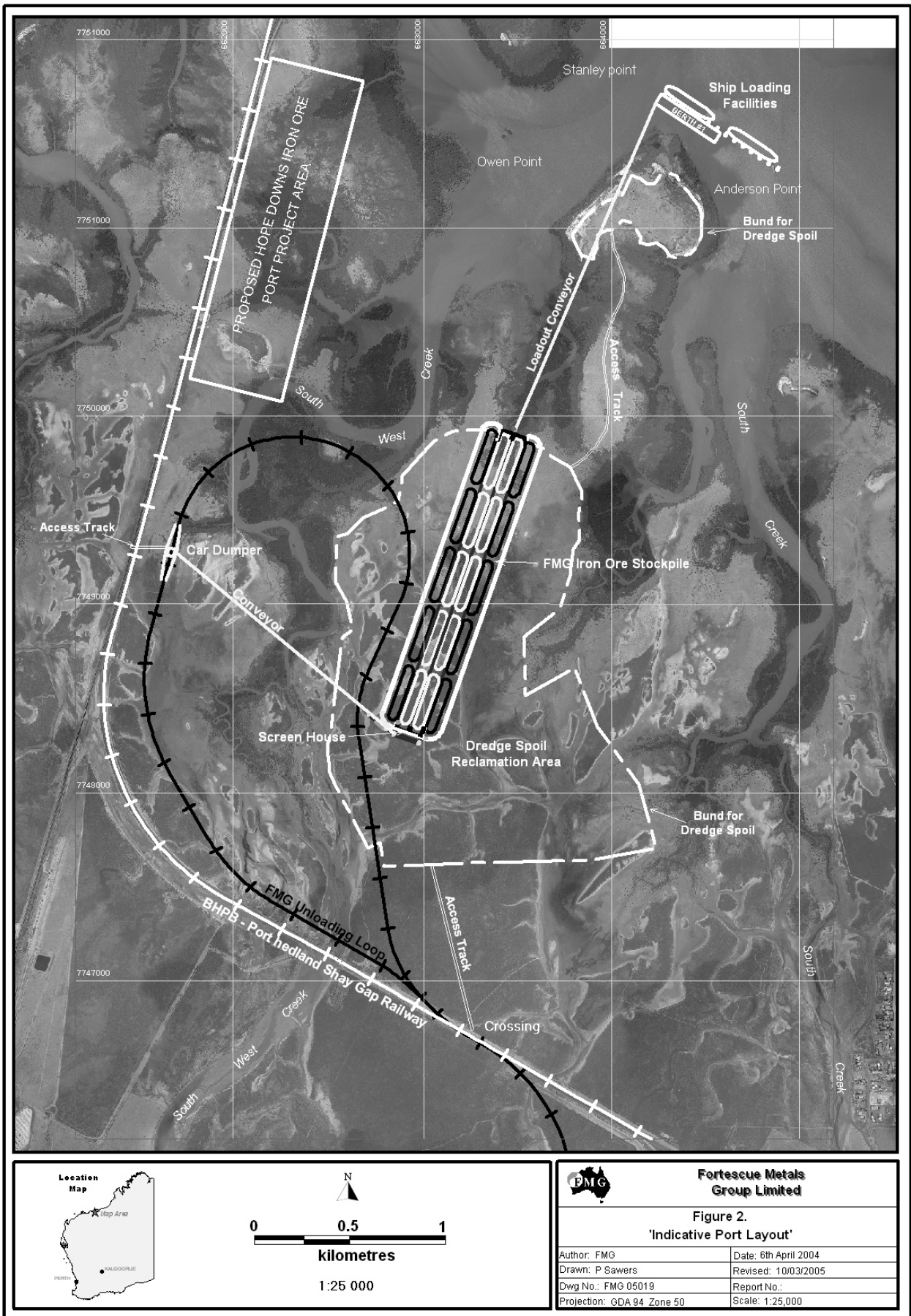


Figure 2: Pilbara Iron Ore and Infrastructure Project – Amended Indicative Port Layout.

Schedule 2

**Pilbara Iron ore and Infrastructure Project: Port and North-South railway (Stage A)
Assessment No. 1505
Proponent's commitments**

Topic	Objectives	Actions	Timing	Advice from
Offset measures	EPA Position Statement No 9 - offsets	1. Fund a detailed research program into relevant taxonomic research at PhD level or equivalent for three years on: <ul style="list-style-type: none"> • the potential impacts of the project on <i>Mulgara</i> or other threatened species; and • taxonomic research of <i>Acacia aneura</i> in the Pilbara or some other poorly known taxa such as Malvacea or Tiliacea. 2. Undertake and fund environmental baseline mapping and monitoring using airborne hyperspectral data for at least three years, in conjunction with CSIRO, to: <ul style="list-style-type: none"> • establish an inventory (types, density and geographical/spatial distribution) of the mangroves surrounding the facility; • undertake research to establish accurate and spatially comprehensive measurements to assess physiological conditions of mangroves; and • establish the pre-facilities level of iron oxide dust deposition on the mangroves and ongoing dust deposition during operations; Or <ul style="list-style-type: none"> • contribute to a biodiversity initiative of equivalent value. 	During construction Prior to port construction	CALM

Topic	Objectives	Actions	Timing	Advice from
Fire Management Plan	Reduce the risk of unplanned fires and provide contingency measures to minimise any impacts in the event that a fire is started.	3. Have in place and make publicly available a Fire Management Plan to include work procedures for all welding and grinding work, personnel fire hazard procedures, fire response vehicles on site and bushfire contingency plans.	Prior to construction.	CALM
Turtles	Minimise the impact of the port facility on turtles in the port area.	4. Install frequency controlled lighting to avoid affecting hatchling and juvenile turtle orientation, and minimise light overspill from the port facility, providing shielding (of lights). 5. Implement a monitoring program to determine the effectiveness of controlled lighting on Turtles.	During construction During operations	CALM CALM
Hydrocarbon Management Plan/Oil Spill Contingency Plan	To maintain or improve the quality of surface and groundwater, to ensure that existing and potential uses, including ecosystem maintenance is protected.	6. Have in place and make publicly available, a Hydrocarbon Management Plan / Oil Spill Contingency Plan for the Port addressing: <ul style="list-style-type: none"> • spill prevention; • clean-up procedures; • control of contamination from berth activities; • control of fuel handling operations; and • management measures. 	Prior to port construction.	PHPA DPI
Marine Pest Management Plan	Maintain the ecological function, abundance, species diversity and geographic distribution of marine biota and habitat in order to protect ecosystem health.	7. Have in place and make publicly available an Introduced Marine Pests Management Plan addressing: <ul style="list-style-type: none"> • pest species; • monitoring (including supporting any monitoring conducted by PHPA); • regular marine pest surveys (for example every three years); • management measures (including prevention of hull cleaning and scraping at the FMG berth); • compliance with AQIS requirements in relation to ballast water control; and • a management framework which can be implemented to prevent or mitigate any identified environmental impacts. 	Prior to, construction	PHPA AQIS

Key:

CALM – Department of Conservation and Land Management

DPI – Department for Planning and Infrastructure

PHPA – Port Hedland Port Authority

AQIS – Australian Quarantine Inspection Service

Appendix 5

Summary of Submissions and Proponent's Response to Submissions