Pilbara Iron Ore and Infrastructure Project: Cloud Break (no beneficiation)

Fortescue Metals Group Limited

Report and recommendations of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 1216
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Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
11/7/05	**Level of Assessment set (following any appeals upheld)**	**1**
12/9/05	**Proponent Document Released for Public Comment**	**9**
24/10/05	**Public Comment Period Closed**	**6**
15/11/05	**Final Proponent response to the issues raised**	**3**
30/1/06	**EPA report to the Minister for the Environment**	**10**

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Summary and recommendations

Fortescue Metals Group Limited (FMG) proposes to develop an iron ore mine north of the town of Newman at Cloud Break, to integrate with the previously assessed and approved Stage A and Stage B iron ore projects. 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) flora and fauna;

b) groundwater and subterranean fauna;

c) surface water and mine dewatering discharges;

d) dust, noise, light overspill and vibration;

e) Aboriginal culture and heritage; and

f) landforms, mine closure planning and rehabilitation.

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

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

(a) the precautionary principle;

(b) the principle of intergenerational equity;

(c) the principle of the conservation of biological diversity and ecological integrity; and

(d) the principle of waste minimisation.

The EPA received eleven submissions on this proposal, from State and local governments, organisations and individuals. The main issues related to direct and potential impacts to high value Mulga groves, to the nationally listed Fortescue Marsh and to flora and fauna, in particular the critically endangered Night Parrot. Aspects of the proposal which were considered to influence these values were the setting of the mine itself (ie the clearing, loss of vegetation and habitat), changes to surface and groundwater regimes and the disposal of abstracted groundwater, with their potential effect on vegetation and subterranean fauna.

Other submissions mentioned the scope of the assessment, fauna survey methodology, the lack of invertebrate sampling, the broader cumulative impacts of disturbance to vegetation, fauna, surface drainage, dust, groundwater abstraction and pit dewatering, noise impacts to fauna, the spread of weeds, greenhouse gas emissions, rehabilitation and mine closure.

Conclusion

The EPA has considered the proposal by the Fortescue Metals Group Limited (FMG) to develop an iron ore mine north of the town of Newman at Cloud Break, to integrate with the previously assessed and approved Stage A and Stage B iron ore projects.

The EPA notes that the Cloud Break minesite and the access corridor linking the mine to the rail corridor are located in or near to high conservation value features such as Mulga woodlands and the Fortescue Marsh and that these features are at some risk from project activities. Sightings of the critically endangered Night Parrot and burrows of the Bilby (the latter on State and Commonwealth registers as a species of conservation significance) near the periphery of the Fortescue Marsh serve to emphasise the conservation significance of this feature.

In order to mitigate these risks and impacts FMG proposes to prepare and implement several management plans as well as an offset package directed to assist the Department of Conservation and Land Management in related research fields. The EPA considers that these measures are appropriate and has prepared a complementary set of recommended conditions.

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 their commitments and the recommended conditions set out in Appendix 5 and summarised in Section 4.2.

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 an iron ore mine, on-site accommodation for around 400 personnel and a haul road (to connect to the crusher and proponent's previously assessed Stage B project east-west railway and beneficiation plant at Christmas Creek);
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 5, and summarised in Section 4.2, including the proponent's commitments.
4. That the Minister imposes the conditions and procedures recommended in Appendix 5 of this report.

Conditions

Having considered the proponent's commitments and information provided in this report, the EPA has developed a set of conditions that it recommends be imposed if the proposal

by FMG to develop an iron ore mine and accommodation village at Cloud Break, is approved for implementation. These conditions are presented in Appendix 5. Matters addressed in the conditions include the following:

(a) that the proponent shall fulfill the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 5;

(b) Mulga and other flora and communities;

(c) fauna management;

(d) Fortescue Marsh management;

(e) groundwater management;

(f) subterranean fauna;

(g) surface water management; and

(h) decommissioning and final rehabilitation.

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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 and principles relevant to the proposal by Fortescue Metals Group Ltd (FMG), to develop an iron ore mine and accommodation village 85km NNW of the town of Newman in the Pilbara Region at Cloud Break, to integrate with the previously assessed and approved Stage A and Stage B iron ore projects. The proposed mine is on the southern edge of the Chichester Ranges in the Pilbara region (Figure 1).

The project will involve the mining and transport by rail of up to 30 million tonnes per annum (mtpa) of iron ore to Port Hedland for export. The proposal is being assessed at the level of Public Environmental review (PER) because:

- the mine will require the clearing of a large area (5500ha) of native vegetation which includes Mulga grove woodland; and is upslope from and close to parts of the northern edge of the Fortescue Marsh, a unique and high-conservation value feature of the Pilbara. Disturbances to surface could obstruct and redirect surface water drainage, changing and adversely affecting the distribution of water to Mulga groves downslope;
- mining will go below the water table and will require dewatering of pits, with the potential for associated impacts to vegetation and station bores; and
- water will be used for dust suppression, but excess from dewatering is expected initially and for several years. This is to be discharged to infiltration ponds set up over future mine pits for the first six years and subsequently transported to the Christmas Creek minesite for use in the beneficiation plant which will be commissioned in the seventh year of operations (approved under the Stage B assessment).

Subsequently, a sighting of the critically endangered Night Parrot was made by FMG's fauna consultants between areas to be mined and the Fortescue Marsh.

Table 1 below provides a summary of the key characteristics of the proposal.

Details of the proposal are presented in Section 2 of this report. Section 3 discusses the environmental factors and principles 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.

Appendix 1 contains a list of submitters. The proponent's response to submissions is attached as a compact disc. It 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.

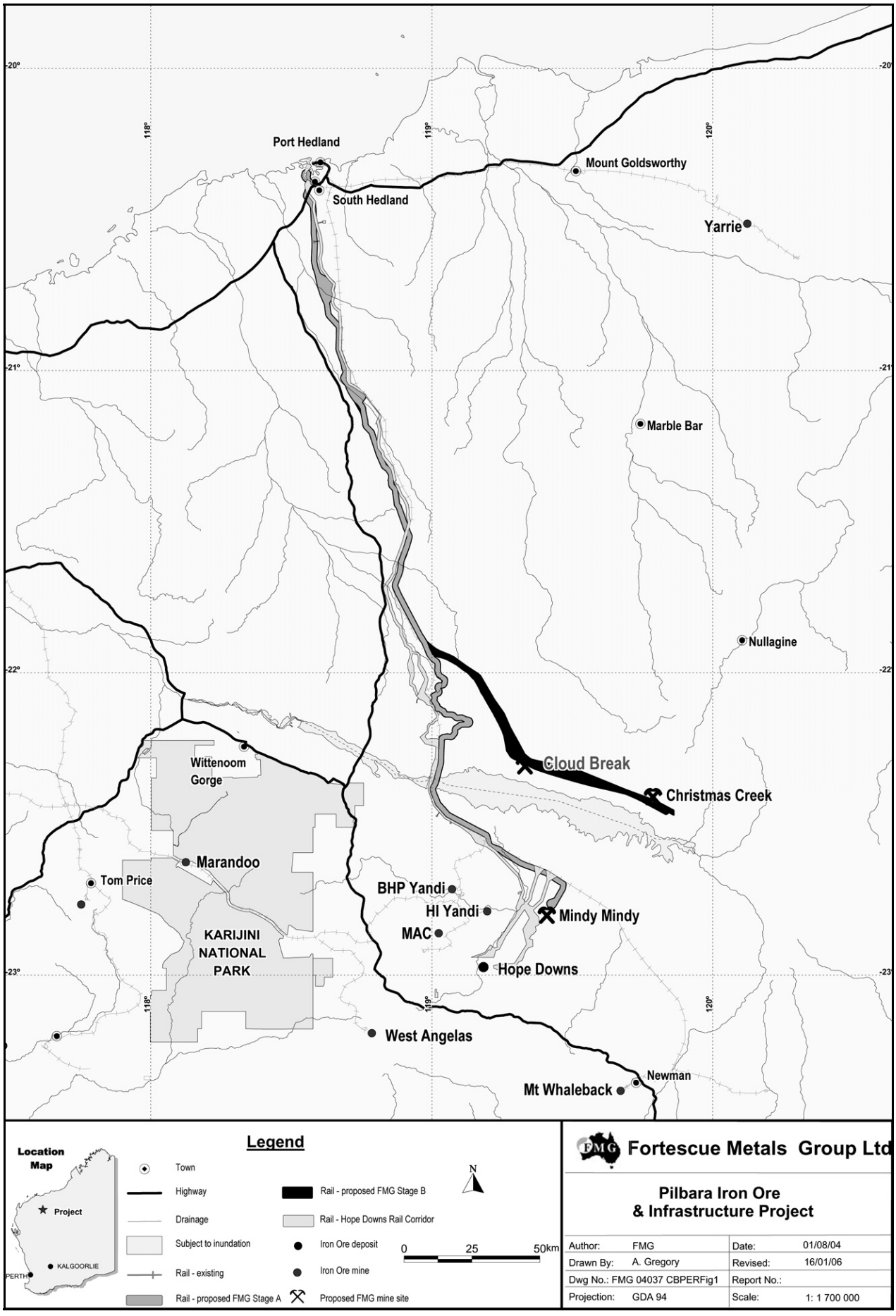

Figure 1: Regional location

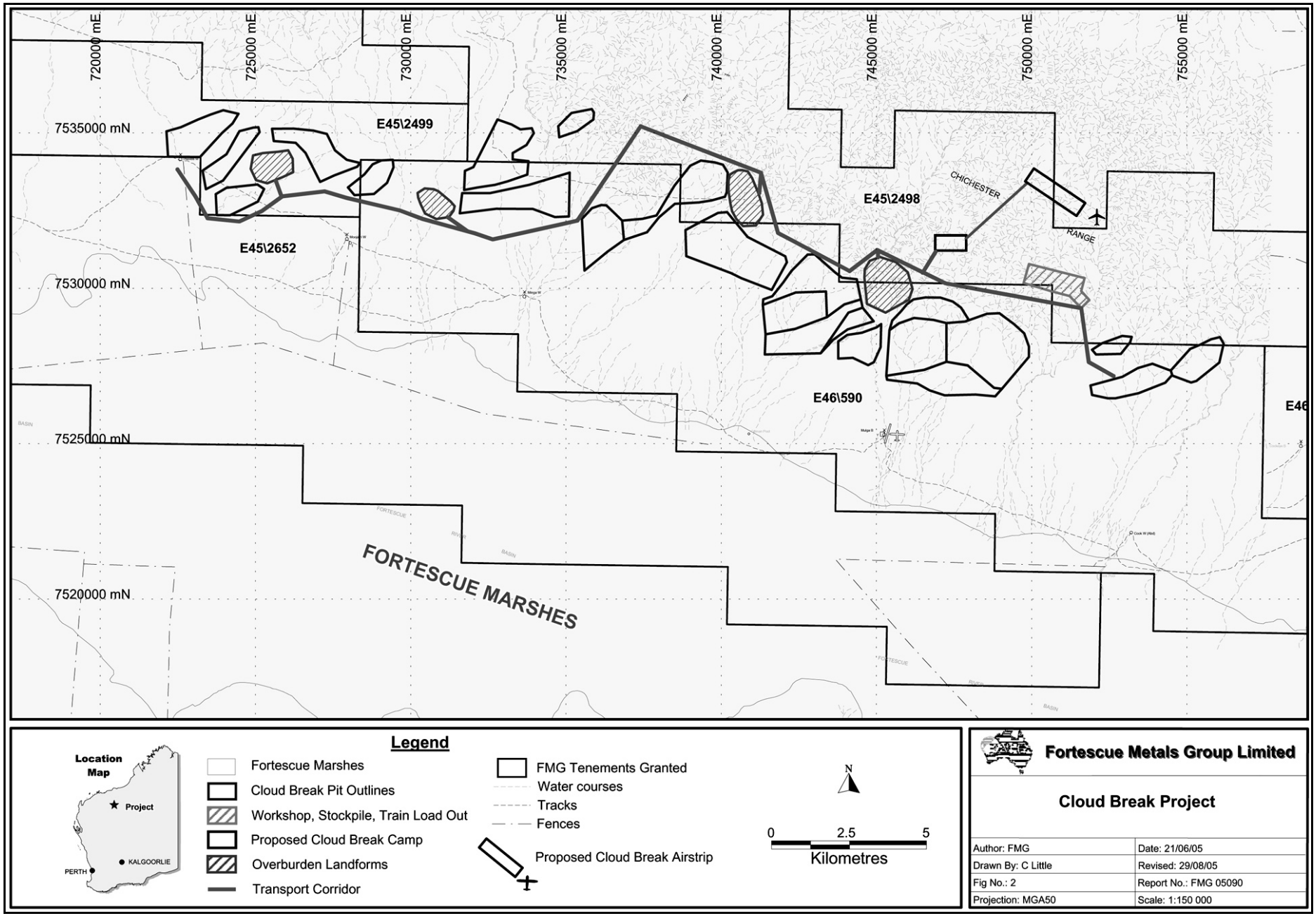

Figure 2: Prospect location

2. The proposal

The proposal, as set out in the proponent's PER, comprises an iron ore mine in the Pilbara region with a haul road to connect it with the east-west railway to Christmas Creek, the latter being a component which was assessed as part of the Stage B proposal. The Stage A and Stage B projects, with which the Cloud Break proposal is designed to integrate, comprise mines at Christmas Creek and Mindy Mindy, an ore beneficiation plant at Christmas Creek, a borefield, an accommodation village, and connecting railways to new stockpiling and ship loading facilities at Port Hedland. While higher grade ores will be transported direct to port from Cloud Break, upgrading of lower grade ores from Cloud Break at the Christmas Creek beneficiation plant is expected to begin after six years of operation.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 5 of the PER (*Pilbara Iron Ore and Infrastructure Project. Cloud Break.* Environ Aust., 2005).

Table 1: Summary of key proposal characteristics

Element	Description
Location	Cloud Break (approximately 85km NNW of Newman)
Main activities	iron ore strip mining, pit backfilling, ore crushing, mine rehabilitation and closure
Resource	500mt - 600mt Marra Mamba iron deposit, pit depths 0-70m
Annual rate of production	a maximum of 30 million tonnes of high grade ore and 43 million tonnes of lower grade material (requiring beneficiation at the Christmas Creek plant). [NOTE: A combined total of 45 million tonnes (with output from Stage B mines at Christmas Creek and Mindy Mindy) will be transported by rail to port]
Contingent activities	pit dewatering, excess water storage/ infiltration in ponds, transport of ore to rail loading facility
Areas disturbed	5500ha, approx. 475ha open working pit at any time
Duration	12 years
Employment	400 personnel for construction on-site; 400 personnel divided between on-site and local towns mainly Newman) for the operational stage
Water requirements	supply from pit dewatering. A reverse osmosis plant may be required
Power supply	not a part of this proposal. Will be a separate referral
Greenhouse gas emissions (excluding power supply)	estimated 7.0kg CO_2 equivalent produced per tonne of ore mined, plus 43,310 tonnes CO_2 equivalent per year on average for the 25 years after mining has ceased

The potential impacts of the proposal, the relevant factors selected for detailed evaluation in this report and their proposed management are summarised in Appendix 3. **T**he setting of the proposal is shown in Figures 1 and 2.

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 report also deals with the evaluation of factors not discussed below. Greenhouse gas emissions were a consideration, but, because the proposal does not include details of the source of power for the project, this aspect cannot be fully evaluated presently. It will be assessed when this aspect of the project is referred. A number of these factors are very relevant to the proposal, but the EPA is of the view that the information set out in Section 3.8 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) flora and fauna;

b) groundwater and subterranean fauna;

c) surface water and mine dewatering discharges;

d) dust, noise, light overspill and vibration; and

e) Aboriginal culture and heritage;

f) landforms, mine closure planning and rehabilitation.

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 3.1-3.7. 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;

c) the principle of the conservation of biological diversity and ecological integrity; and

d) the principle of waste minimisation.

3.1 Flora and fauna

Description

Included in this section are Declared Rare Flora, vegetation and flora of conservation significance, Specially Protected (Threatened) Fauna, and weeds.

Flora

Vegetation at Cloud Break, on the southern edge of the Chichester Range, is a mosaic of low woodland with Mulga and hummock grassland in valleys; low, open tree steppe with Snappy Gum over Spinifex (*Triodia wiseana*); and Kanji over Soft Spinifex and *Triodia wiseana* hummock grasslands.

Surveys of the project area were carried out in October-November 2004 and May 2005 by Mattiske Consulting. They described in detail in the PER eighteen plant communities that were found:

- near creeklines-four types;
- covering the flats and broad plains-six types;
- in the hills and ranges-four distinct groups; and
- four on the fringes of the Fortescue Marsh/ Samphire flats.

Several types of vegetation of local conservation significance were identified and mapped (PER, Table 7). They support Priority Flora species and Mulga communities near their northern extent. The four communities on the Samphire flats, locally restricted and associated with the nationally recognised Fortescue Marsh, are considered to be regionally significant. Because they are downslope from the proposed development they are considered to be at most potential risk from changes to surface water movements and water quality.

A total of 234 taxa (including subspecies and varieties) of flora were recorded in the survey area from both surveys, which were carried out after low rainfall periods. No Declared Rare Flora were recorded.

The Priority 1 species *Eremophila "spongiocarpa"* (ms) has been found growing in the 'Low Woodland to Open Forest' plant community, while the 'Closed Scrub' and 'Low Open Woodland' communities support Priority 3 species *Themeda* sp. Hamersley Station (M E Trudgen 11431) PN and Priority 4 species *Eremophila youngii* subsp. "*lepidola"* ms, respectively. The Priority 3 species *Rostellularia adscendens* var. *latifolia* was mapped in plant communities 4 and 5 of 'Mulga Woodlands' in the survey by Mattiske Consulting. None of the priority species is in areas to be disturbed by clearing for the project (Figure 3).

The mapping did not define any threatened ecological communities. The condition of the various communities varies (from very good to severely degraded) according to the frequency of fires and the intensity of grazing (worse around station bores, generally located in the southern fringes of the project area). The area of the eastern-most deposit (OB5) contains excellent examples of intact drainage systems with good stands of *Grevillea wickhamii* (habitat for a range of bird species). Around OB1 (western end of the Cloud Break proposal) there are stands of Mulga in good condition.

Of key interest is the phreatophytic (dependant on the water table for survival) vegetation which includes River Redgums, Cadjeputs and Coolibahs along creek systems. The proposed mine dewatering and borefield abstraction, resulting in groundwater drawdown, could affect them. This is discussed further in section 3.2.

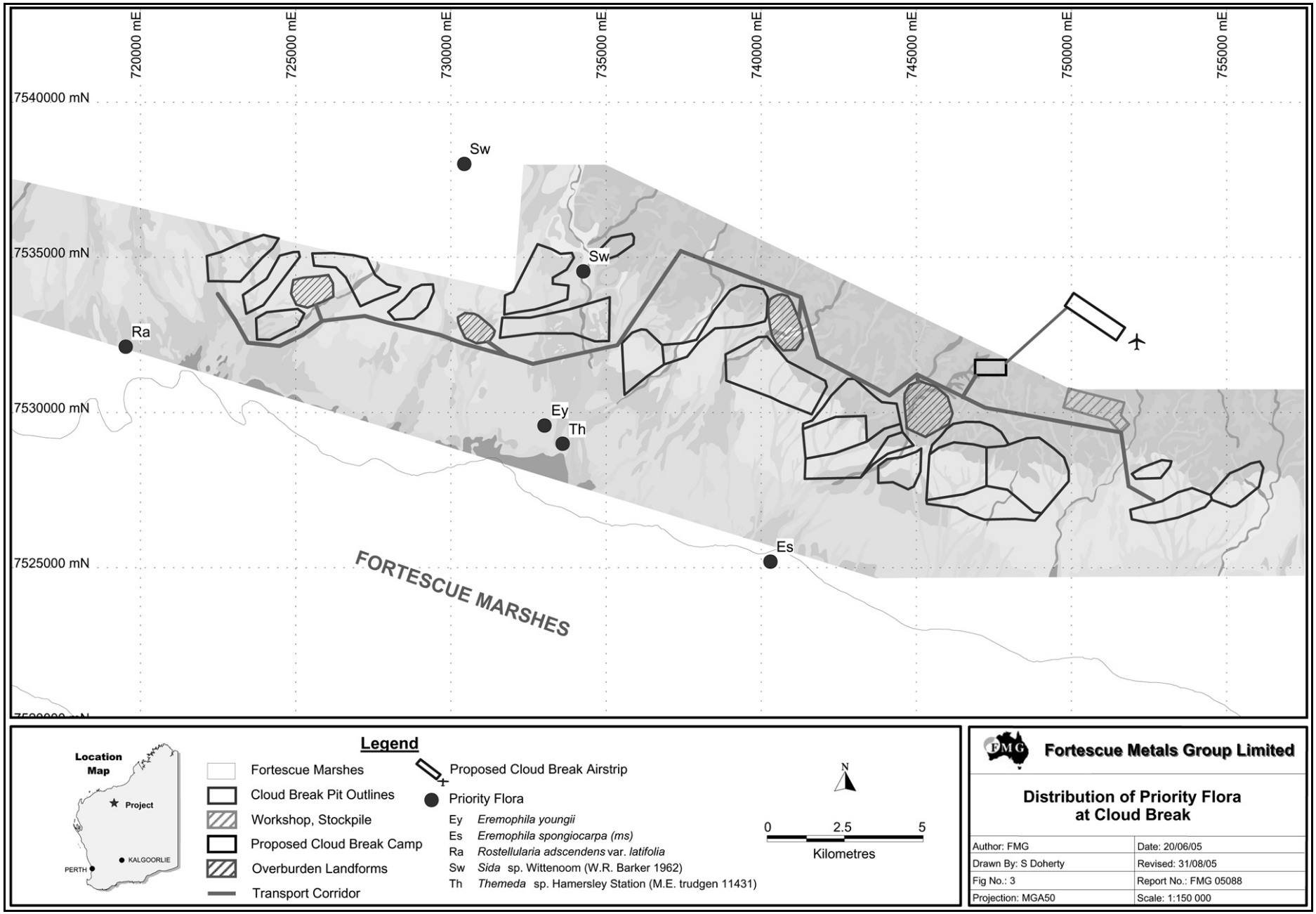

Figure 3: Distribution of Priority flora

Four weed species, *Bidens pilosa*, *Cenchrus ciliaris*, *Cenchrus setigerus* and *Malvastrum americanum* were recorded from the mapped area. Weed management is discussed below.

Fauna

Bamford Consulting Ecologists conducted a general survey in April. During this work (Bamford et al, 2005a) the Night Parrot *Pezoporus occidentalis* (CS1 Critically endangered) was encountered. A follow-up species-specific search for the Night Parrot in May 2005 (Bamford et al, 2005b) failed to repeat the sighting. Conditions preceding the work had been hot and dry with little significant rain for almost a year. The rich vertebrate fauna assemblage was suffering the effects of drought conditions, resulting in low abundances of the recorded species.

The project area's habitats range from Samphire flats on its southern boundary, through areas of Spinifex, Mulga/Acacia woodlands dissected by *Corymbia* sp.-dominated watercourses, to the Spinifex-covered Chichester Range in the north.

Twenty five species of ground mammals were recorded. The highest numbers were captured in areas of dense Spinifex hummocks which appear to offer excellent habitat for small mammals. Species of conservation significance recorded were:

- Bilby (CS1 Vulnerable) was found near Kardarderrie Well and Cockeye Bore; and
- five mounds were found of the Western Pebble-mound Mouse (CS2 Priority 4) from rocky slopes in the north of the surveyed area, as well as one from the edge of the Fortescue Marsh.

The surveys recorded ninety nine bird species. As well as the Night Parrot, other species of conservation significance found were:

- the Star Finch (CS2 Priority 4) at Minga Well;
- Peregrine Falcons (CS1 Schedule 4) at Minga Well, probably breed on cliffs in the area;
- a Grey Falcon (CS2 Priority 4) seen in Eucalypt woodlands along Sandy Creek; and
- the Australian Bustard (CS2 Priority 4) throughout much of the study area.

Only one amphibian, the Desert Tree Frog, was recorded during the survey. Twenty eight species of reptile were recorded, none of special conservation significance. With regard to short range endemic species, because of the paucity of targeted collecting and the lack of taxonomic work on the collected taxa, the consultant is not in a position to be able to identify the majority of invertebrate fauna collected. FMG has offered to undertake further fauna studies prior to ground disturbance as a part of its proposed offsets package (Appendix 5, section 1.1.2). This work would also include invertebrate studies because it is recognised that the general state of taxonomy of invertebrate groups in the Pilbara is not well advanced.

Stygofauna are discussed in Section 3.2.

Submissions

In total eleven submissions were received. The proponent's response to the points raised in these submissions can be viewed in full in Appendix 6 to this report.

Because of the similarities between this project and the Stage B development, many of the points raised in submissions are common to both. The main issues were:

- concern with the size of the footprint of the proposed development and the amount of vegetation (especially those types with significant conservation values) to be cleared;
- disagreement with the description of vegetation being in "good to degraded" condition; it is, in the opinion of the submitter, in "good to very good" condition;
- the values of the Fortescue Marsh are regionally and nationally significant; the effects of the proposed dewatering on Samphire would flow on to the Marsh;
- how would the discovery of a previously unknown population of threatened flora within the area to be disturbed be dealt with?
- an assessment of the ecological water requirements of groundwater-dependent ecosystems is needed, and of the long term (20 years) effects of water deprivation;
- noting the intimate linkage between fauna and their habitat, how would potential adverse impacts on vegetation be managed if dewatering gives rise to unexpected effects?
- concern that rehabilitation will not be satisfactory;
- the project area lies partly within an area of pastoral lease that CALM proposes to acquire in 2015 for the purpose of its conservation. Considerably less than the desired 15% minimum area of each native vegetation association is reserved for the Fortescue Interim Bio-region of Australia and the Chichester sub-region;
- weed management needs to be a high priority;
- concern that fauna survey coverage and methodology, including for short range endemics, has been inadequate;
- development works should not hinder faunal and surface water movements and the storage ponds should not trap fauna;
- impacts of project lighting on fauna need to be recognised and appropriately managed;
- several points were raised concerning the Night Parrot, particularly with regard to how it and its favoured habitat will be protected, given that so little is known about its preferences and needs; and
- the need for comprehensive consultation with CALM, natural resource management authorities, tertiary institutions and pastoral lessees on all aspects of the management of the conservation values of the area.

Assessment

The area considered for assessment of this factor is all locations directly affected by clearing within the mining envelope and infrastructure corridor, as well as areas downslope (such as the four locally restricted communities on the Samphire flats edge of the Fortescue Marsh) which may be affected by changed surface runoff patterns, sedimentation and water quality causing impacts to vegetation.

The EPA's environmental objectives for these factors are:

- for flora and vegetation communities:-maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities and protect Declared Rare and Priority Flora, consistent with the provisions of the *Wildlife Conservation Act 1950*; and
- for fauna:-maintain the abundance, species diversity and geographical distribution of terrestrial fauna.

The EPA accepts that a large area is to be cleared during the course of mining of the Cloud Break area and that only a small portion of it will be active at any time. FMG has stated that the average size of the working pits will be 475ha in total. As mining proceeds progressively larger areas will have been mined and come under rehabilitation.

Direct impacts to flora and fauna are associated with the clearing of vegetation / habitat. Faunal movements need to be considered when embankments and associated structures are constructed so that they do not act as additional barriers. Potential indirect impacts could arise from the redistribution of surface water flows around the mine and its infrastructure. Inspections need to occur irregularly, and especially after rain, to ensure these structures are functioning as intended. Changes to the groundwater regime from pit dewatering could also create impacts on dependent vegetation.

The EPA notes that the project area lies within and upstream of areas with high environmental and conservation significance (the Fortescue Marsh is significant at both the regional and national scales). Key components of those areas need to be targeted so that they can be given protection commensurate with their sensitivities. For this to happen, more work needs to be done on project area fauna, their selected habitats and requirements. It will be important for FMG to consider potential, as well as actual, losses and comprehensive consultation needs to take place with a range of experts so that priority areas can be avoided, appropriate offsets determined and the necessary research conducted. FMG has agreed to consult with a range of authorities to identify the most beneficial research to fill gaps in the current knowledge and has included fauna studies as a component of its proposed offset package (Section 5).

A submission stated that survey work for invertebrates had not been done. It had, in fact, been carried out during the field work for the Stage B proposal rail corridor, which traverses the Cloud Break project area. Of the invertebrates collected in the Cloud Break area, the possibility of short range endemic species has not been determined because it has not been possible to identify the majority of invertebrate fauna collected.

For the Stage B proposal the EPA Service Unit had requested FMG to carry out a risk assessment of the Fortescue Marsh and prepare specific management plans to protect its values. This assessment is valid also for the Cloud Break proposal. It concluded that, provided control measures were considered, the overall risk to the Marsh was minimal. Mindful of the importance of the marsh, the EPA recommends that a Fortescue Marsh Management Plan, to address monitoring, indicators of health, their tolerance and trigger levels, appropriate contingency actions and reporting, be made a condition of approval.

For a Mulga Management strategy to be effective, there must be early detection of any adverse effects to Mulga and a strategy for remedial actions to be used to manage any impacts. For the Stage B proposal the EPA sought a risk assessment of the effects of the project on Mulga woodlands. Similar risks attach to the Cloud Break proposal. The assessment told how those risks would be minimised and identified the residual risks.

Of the several separate impacts considered, only the residual risk associated with ‘drainage changes’ associated with structures such as access corridors was found to be at medium level, all others having been determined to be either low or negligible. Field trials into sheetflow redistribution were subsequently instigated to establish effective

mechanisms for delivering water from culverts evenly across the terrain downstream of barriers. FMG was able to reduce the expected level of residual risk from medium to low by incorporating this mechanism into its sheetflow management strategy. (A detailed account of this work can be found in EPA Bulletin 1202, section 3.3 on the Stage B proposal).

The EPA considers that a specific condition for the protection of Mulga and other flora and communities including Declared Rare Flora, Priority flora, and restricted plant communities, is needed. It should address management, monitoring and reporting, targeted regional surveys that may be required, regeneration or revegetation strategies, completion criteria for affected species or communities and mitigation actions. Because of its significance and complexity the EPA has recommended a separate condition for the Fortescue Marsh, requiring baseline studies, monitoring, and trigger levels for appropriate contingency and remedial actions.

FMG has committed to prepare a Weed Hygiene and Management Plan. It would identify target weeds and controls for them, describe hygiene procedures for all mobile plant, and detail monitoring and any follow up control considered necessary.

Summary

The EPA considers the issues of flora and fauna have been adequately addressed and can meet the EPA's objectives for these factors provided that

1) a Mulga and Other Flora and Communities Management Plan;
2) a Fortescue Marsh Management Plan;
3) a Fauna Management Plan; and
4) a Weed Hygiene and Management Plan;

are developed for the project and implemented.

3.2 Groundwater and subterranean fauna

Description

Mining is to go below the water table and the pits will need to be dewatered. The issues associated with this are: (1) the potential loss of stygofauna habitat if groundwater levels drop; (2) the effects of a lowering water table on phreatophytic vegetation; (3) reduction in yields and water quality from stock bores; and (4) the potential for upconing of saline water.

Surface water samples from the Fortescue Marsh show that its salinity varies depending on how long after rains the sample is taken, from sub-potable through to hypersaline. The last flood event was in August 2004 when the marsh was filled to a depth of a few metres of water. Except for a few small pools, the marsh has been dry since October 2004.

There are two extensive aquifers at Cloud Break: Quaternary to Tertiary alluvium overlying the second; the upper portion of the Marra Mamba Formation, where it is either mineralised or weathered. At depths of >50m there is evidence of a third aquifer, the regionally important Wittenoom Dolomite. The water quality in the alluvium in the area between the ore deposits and the marsh is similar to that sampled from surface pools in the marsh ie saline, while water further away (north) is progressively fresher. Groundwater in alluvium in the vicinity of the pits, at <2000mg/L, is almost fresh.

Depths to water table in this area vary from around 2m (September 2005) to a more typical 5m or more regionally in station stock bores.

So as to gain a better understanding of the relationship between surface and groundwater in the vicinity of the marsh FMG has installed stage boards in the marsh and is monitoring water levels in bores along its northern flank.

The Fortescue Marsh is believed to be a product of surface water runoff rather than an expression of the water table, so should not be depleted by pit dewatering or borefield abstraction if the cone of groundwater depression were to extend beneath it. The modelling has shown that the cone of groundwater depression is not expected to extend beneath the marsh except marginally at the extreme north-west end (Figure 4).

FMG has committed to continue to investigate options for the disposal of potentially saline water from pit dewatering and to implement, if required, an alternative option acceptable to the Department of Environment. This would be required if the water were to become too saline to use in the beneficiation plant or for dust suppression. If this scenario becomes likely, FMG has committed to not discharge this water to natural surface water features, nor to dispose of it in a way that could contaminate fresh groundwater sources.

As part of its Dewatering Management Plan FMG has proposed to develop a Vegetation Monitoring and Management Programme which would include permanent plots for monitoring before, during and after dewatering, and groundwater bores for monitoring water levels and salinity.

Stygofauna

Sampling for stygofauna has been undertaken at six bores in the Cloud Break area, in March and June 2005. A summary of the results of those surveys was included in the PER (Table 2). Only two of the bores (Minga Well and Cook Bore) were inhabited by stygofauna. The latter bore is outside of the modelled groundwater drawdown area. CALM has advised FMG that Cook Bore contains two potentially new species, and these will undergo DNA analysis. Apart from the new species in Cook Bore, no others of conservation significance were recorded.

Centrally positioned with respect to the proposed pits, Minga Well is expected to experience close to 2 metres of drawdown after 13 years of dewatering.

FMG has prepared, in consultation with CALM, a Subterranean Fauna Management Plan for the project. Monitoring of several station bores in the vicinity of the project has begun with the objective of understanding the distribution of stygofauna. Biannual sampling is proposed for two years subsequent to the mid-2005 surveys. The Plan will include management strategies to minimise disturbance to stygofauna populations (eg managing dewatering rates).

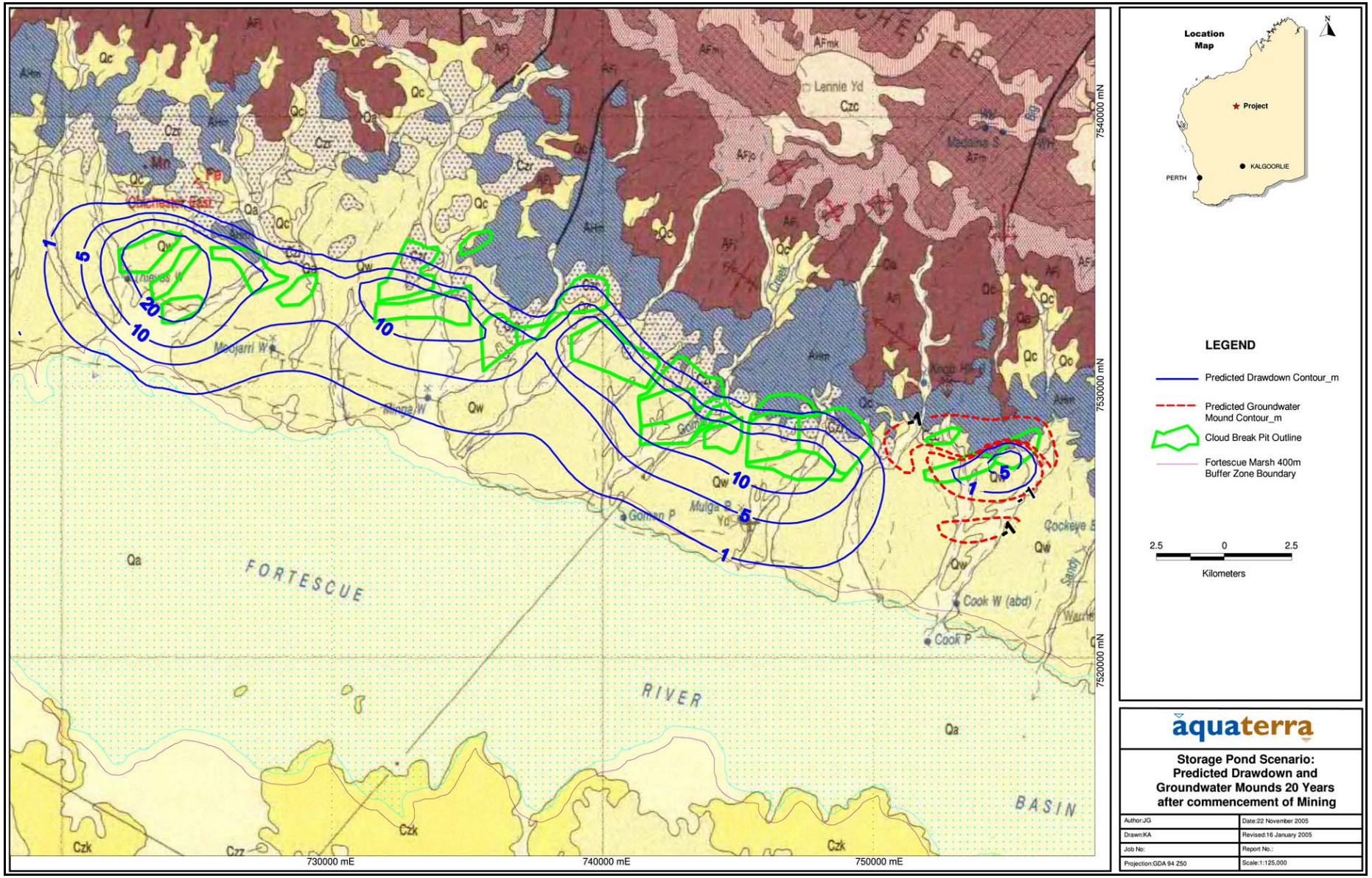

Figure 4: Predicted drawdown after 20 years

Submissions

Groundwater

As it is an important wetland habitat for fauna, the Fortescue Marsh was a focus for submitters mainly concerned at the potential for the reduced duration of pooling of surface waters and the effect on vegetation, habitats and birdlife. Many comments reflect what was proposed in the Stage B assessment; however the projects have much in common, especially their closeness to the Fortescue Marsh. The main issues raised were:

- concern for the affected vegetation communities if there is unmanaged drawdown and/or rise of saline waters;
- desire to see the development and implementation of an appropriate management plan and triggers for mitigating actions, should they be needed;
- continuity of supply and loss of water quality for station bores;
- groundwater models presented in the PER are based on less information than is required to make an adequate risk assessment of the project, so further investigations are required. More survey work required to establish the extent of natural seasonal variation in groundwater levels and to facilitate the issue of water extraction licences;
- fate of excess water from pit dewatering, especially with regard to dissolved salts and turbidity; [see section 3.3 for a discussion of this aspect]
- storage ponds of 3km^2 for excess water from the dewatering are not the first preference of the DoE; re-injection is the best option; and
- the ponds would attract birds and may change their natural behaviour, breeding and population dynamics.

Stygofauna

The main points raised in submissions were:

- the importance of monitoring for stygofauna, its distribution and the frequency with which it should be done;
- the methodology of surveys to date is of concern, as is the perceived inadequate sampling coverage compared to other projects in the Pilbara;
- high turbidity levels in some of the bores sampled is held to be the reason why no stygofauna were recorded; and
- consequently there are insufficient data to enable informed comment on the conservation significance of stygofauna within and beyond the project area.

Assessment

The areas considered for assessment of this factor are the mining envelopes and all areas within the zone of depression of the groundwater table resulting from groundwater abstraction.

The EPA's environmental objectives for these factors are:

(1) groundwater:

- maintain the quantity of groundwater so that existing and potential uses, including ecosystem maintenance, are protected;
- ensure that activities which could affect the quantity of groundwater are appropriately controlled;
- maintain or improve the quality of groundwater to ensure that existing and potential uses, including ecosystem maintenance are protected; and

- ensure that the beneficial uses of groundwater can be maintained.

(2) subterranean fauna:

- maintain the abundance, species diversity and geographical distribution of subterranean fauna and ensure that they are adequately protected, in accordance with the *Wildlife Conservation Act 1950*; and
- improve understanding of subterranean fauna through appropriate research including sampling, identification and documentation.

The hydrogeology of the mine and borefield areas was investigated by Aquaterra Consulting (Aquaterra, 2005(b) in addition to previous work done for the Christmas Creek area for the Stage B assessment. Modelling for a twenty year period has been carried out on the basis that mining and pit backfilling activities will require dewatering for thirteen years, to a maximum depth of 70m, after which the pumping will be stopped. A recovery of water levels to an approximation of pre-mining levels would then be expected.

The average salinity of the water to be pumped is expected to double from around 3000mg/l at the outset to 6000mg/l at the end of the dewatering phase. At the west end of the pits where salinities are higher, the expected levels are around 20,000mg/l.

FMG has recognised that some station bores may be affected, both in terms of their yield and in the quality of water. Monitoring of several bores in the vicinity of the project has begun. If operating station bores become saline as a result of pit dewatering, measures that may include deepening of the affected bores or providing alternative water supplies to the pastoralists would be implemented.

Phreatophytic species of vegetation occur in places within the drawdown zone. A perusal of AQWABase data suggests that seasonal groundwater variations in the vicinity of the marsh may be up to 5m, so that drawdowns less than this are not expected to significantly affect phreatophytic species in that vicinity.

The potential for cumulative impacts from mining operations at Cloud Break and Christmas Creek has been considered. The modelling, however, shows that the drawdown zones from each of these operations do not overlap and, consequently, cumulative impacts are not expected.

FMG intends to undertake:

- a groundwater monitoring programme;
- a revision of the numerical groundwater models;
- vegetation condition monitoring in areas where phreatophytic vegetation has been identified within the drawdown zone; and
- vegetation condition monitoring in the Fortescue Marsh outside the project area.

FMG recognises that further work is needed prior to licensing and construction of the dewatering bores. Additional test bores will be sunk in the alluvial deposits at Cloud Break. Pumping and analysis of the data is expected to provide improved models of the behaviour of the aquifers.

The EPA considers that the management of groundwater in the vicinity of the marsh is one of the most important factors in this proposal, both from an ecological perspective (linked to fauna habitats) and with respect to station stock water supplies. In order to provide the protection that the marsh and its surrounds warrants the EPA recommends that, if approvals are given for the project, a Groundwater and Bore Management Plan should be prepared to protect phreatophytic vegetation, station bore water supplies and to define appropriate environmental triggers for contingency plans, should they be required. The recommended Plan should include monitoring for phreatophytic vegetation. Key to this is the recognition that monitoring must be able to distinguish between natural impacts and those which are related to groundwater drawdown.

With regard to potential effects on stygofauna populations, the greatest amount of lowering of the water table is to take place in the Marra Mamba Formation, which hosts the orebodies. Stygofauna, if they exist in these areas, would be likely to be more affected by loss of habitat than those further from the pits, such as recorded at Minga Well.

The EPA recommends that surveys for subterranean fauna should commence in accordance with a plan which should survey all areas likely to be affected by the project, as well as areas with similar habitats outside the affected territory so as to establish the conservation significance of fauna within the areas to be affected by drawdown. If the results of those surveys indicate that there is a risk of loss of subterranean species or communities as a result of the mining operations, then management measures in accordance with the Plan should be implemented, including timely remedial actions.

Summary

The EPA considers the issues of groundwater and subterranean fauna have been adequately addressed and can meet the EPA's objectives for these factors provided that the environmental management plans developed for the project include:

1) a Groundwater and Bore Management Plan;
2) a Subterranean Fauna Survey Plan; and
3) the previously mentioned Fortescue Marsh Management Plan.

3.3 Surface water and mine water discharges

Description

The minesites and surrounding country vary from typically low gradient, flat and prone to sheetflow-style drainage, to low hills of outcropping Marra Mamba Formation (the Chichester Range). Numerous ephemeral creeks in the area discharge to the marsh, the largest being Goman Creek. Two of the proposed Cloud Break pits abut its floodplain. Pit development areas also intercept sheet flow along the lower slopes of the Chichester Range. The Goodiadarrie Hills terminate the marsh at its western, downstream end. Its boundaries will vary depending on the contained surface water levels, as well as the configuration of the surrounding ecotone. While not able to be accurately depicted at the scales of the attached figures, the boundaries are complex and interdigitate between Samphires and Spinifex.

Runoff to the marsh is of low salinity and generally of low turbidity, although the latter increases significantly during and after peak flooding episodes. Water in the marsh may

attain depths over 4m before slowly dissipating via seepage and evaporation, during which time salinities increase and traces of surface salt can be seen where water has receded. No springs or pools are located within the project area and it lies well above any potential floodwater storage level in the marsh. The highest recorded level (WRC internal records) was in 1980 when it reached 406.5m after two consecutive cyclones. Floodwaters would need to top 413m above sea level to overspill the Goodiadarrie Hills. The pit perimeter levels vary from 415m to 450m above sea level and all mine pits and waste storage will be above the 413m level.

Communities of Mulga have developed on some of the lower slopes. They are thought to be dependent on seepage water provided by the overland flow process. In these flatter areas, small changes in gradient from ground disturbances are likely to cause larger changes in the direction of surface waters, possibly creating areas no longer reached by surface flows (distribution shadow areas). Sensitive management of incident water as a result of the mine and the access infrastructure is therefore important to areas downstream of disturbed areas.

Around the minesite, it is likely that the original surface water flow patterns would not be re-created post-mining. Features such as pits, haul roads and overburden placement areas could interrupt surface water flows. Bunds would be constructed around pits and overburden placement areas to divert water into defined pathways. The overburden landforms may have a dished surface to be internally draining, so that its outer slopes do not become eroded from runoff, but, where appropriate, may be drained from the top and batters to sediment deposition basins before discharge downstream.

Surface water would also be diverted around stockpiles near the rail loading facility. The area would be internally draining to prevent increased sediment loads from disturbed areas from being transported offsite. Pits would be mined sequentially and FMG intends to restrict the maximum pit working area to 475ha at all times. The pits would be backfilled subsequently with waste rock in an attempt to emulate the pre-mining landforms. Low grade ore stockpiles mined in years 1 to 6 would be predominantly located in-pit, on top of waste rock. This resource would be reclaimed prior to rehabilitation and transported to the Christmas Creek beneficiation plant. A small portion (0.04% equating to the maximum of 475ha open at any time during mining) of the total catchment area of the Fortescue Marsh would be internally draining during a rain event, rather than contributing runoff to the marsh. In-pit water would be treated as a resource and used for dust suppression, or, if immediately upslope from a Mulga grove, could be used to irrigate the grove if this would have happened following rain had the pit not been there.

As described in the EPA's assessment (Bulletin 1202) of the Stage B proposal, field trials to investigate mechanisms for distributing surface water sheetflows downstream of mine components expected to divert surface water have been carried out by FMG and demonstrate the effectiveness of spreader ditches and rock levées. The trials indicated that a levée would last for many floods before sedimentation created a problem. A spreader ditch in conjunction with the levée would not only aid in water distribution, but would act to trap much of the sediment. Removal of silt build-up from these ditches is a simple matter. In the event that the levées cease to function due to sedimentation, it is relatively straightforward to remove and replace them. FMG understands that inspections must be carried out on these spreaders and maintenance performed, especially after heavy rains.

Mine dewatering discharge

FMG canvassed several options for the disposal of this water (Table 11, PER). In the first instance it would be used for the camp supply (up to 2000mg/L TDS) and, as it became more saline, for dust suppression (up to 10,000mg/L). Excess water would be stored in a series of storage ponds (500m by 1000m by 5m deep) which would be excavated at the eastern end of the Cloud Break deposits in three areas scheduled eventually to become mine pits. It is intended for these ponds to leak, thus promoting infiltration back to the underlying aquifer. Nevertheless, it has been estimated that, by the end of the 6th year of mining, there would be approximately 6GL of water stored in these ponds. This water would then be piped to the beneficiation plant proposed for Christmas Creek (see the Stage B proposal and EPA assessment) where it would provide more than half of the plant's annual requirements.

Submissions

There are concerns that insufficient studies have been done to generate confidence that FMG can accomplish what it claims it would do in regard to the management of surface water. The key points are:

- more monitoring and modelling is needed before approvals are given;
- the 100 year return flood event should be used for mine design. Extreme rainfall events must be factored into project design;
- FMG needs to demonstrate that pits and overburden dumps can be effectively rehabilitated for the long term and natural surface flow regimes can be restored with no sheetflow rainshadow effects;
- the science (ecology and hydrology) of ephemeral creek systems needs to be better understood; also quantitative sheetflow data to sustain Mulga groves;
- clarify the position on pit backfilling-whether it will be to the top, or just sufficient to cover the water table level, or somewhere in between;
- the potential for backfilled pits to act as sinks for surface water due to the bulking factor needs to be addressed;
- why the need for several permanent overburden landforms, rather than just one at the beginning of the mining? The locations of these structures in high elevation areas uphill from the pits are required for an assessment of their suitability;
- information is needed on the final changes to landscape and their impacts on surface water flow;
- backfilled pits must be designed to drain outwards. Pooling of water within them is not acceptable;
- the Fortescue Marsh needs to be protected from sediment-laden runoff generated by ore moisture controls and dust suppression activities on access and haul roads; and
- need a commitment to maintain spreader structures on an ongoing basis downstream of landforms that have the potential to alter surface drainage patterns.

Assessment

The area considered for assessment of this factor is the mine, waste dumps and access infrastructure developments affecting natural surface water flows around and downstream, including the Fortescue Marsh and stands of Mulga.

The EPA's environmental objectives for this factor are:

- ensure that the beneficial uses of surface water can be maintained and, in this case, maintain the integrity, functions and environmental values of the Fortescue Marsh and Mulga communities; and
- maintain or improve the quality of surface water to ensure that existing and potential uses, including ecosystem maintenance are protected.

The EPA considers that the most sensitive ecosystems in this area are those relating to Mulga trees because they are susceptible to subtle changes in surface water distribution patterns.

The disposal of water from pit dewatering operations into the aquifer from infiltration ponds is expected to shrink the zone of drawdown so that its extent to the south of the mine is reduced. This would be beneficial for the Fortescue Marsh as the expected changes to groundwater drawdown levels would be marginally further from its northern edge.

FMG has outlined several management strategies to minimise surface water impacts arising from the project. Where there are dependant ecosystems downstream of mine-related structures, water redistribution systems would be put in place to ensure that water distribution shadows did not result. Consideration has also been given to the placement and design of borrow pits to minimise surface water disruption. The EPA endorses these strategies and, in addition, recommends that a Surface Water Management Plan be prepared. The plan will address the location of the mine and access corridor components where these have the potential to affect surface drainage patterns and describe the intended mitigatory measures, their locations and specifications.

Summary

FMG's preferred option for mine water discharge varies slightly from those canvassed in the PER. There (Table 11) storage ponds were not available until a pit had been fully mined out. The EPA considers that the current (modified) proposal has a better environmental outcome because water storage and infiltration can begin as soon as excess water is available, although at the more critical times, (from years 6 to 13) all this water would in any case be piped to the Christmas Creek beneficiation plant.

The EPA notes that, while the spreaders appear to be robust and are likely to last for several rain events before needing to be cleaned and maintained, there will nevertheless be a need for timely ongoing inspection and maintenance of these structures, both during the life of the project and subsequently.

The EPA considers the issue of surface water has been adequately addressed and can meet the EPA's objectives for this factor provided that the proponent prepares and implements a detailed Surface Water Management Plan in consultation with staff from CALM and the DoE.

3.4 Dust, noise, light overspill and vibration

Description

Construction and operational stages of the project could affect both flora and fauna in the vicinity, as well as human settlements. The nearest settlements to the project are Warrie Outcamp (8.3km), Mulga Downs Outcamp (19km), Hillside Outcamp (20.4km) and Marillana Homestead, 31.5km south. Only Marillana Homestead is occupied; all the outcamps are considered to be not residential. None of these is close enough to be affected by dust emanating from the project area.

Submissions

Dust

Submissions noted that:

- Marra Mamba ores are typically very dusty and concerns were expressed with the transport of ores to and at Port Hedland. (The port facility was assessed as part of FMG's Stage 'A' proposal and has now received environmental approval). There are implications for the management of dust at the minesite, especially from the crushers;
- dust from vehicle movements around the project area is already causing vegetation near tracks to be coated. Studies need to be done on the effects of dust on relevant species of vegetation;

and asked:

- what are the 'triggers' referred to in the PER for additional suppression measures?; and
- are there likely to be cumulative impacts from other operations in the area?

Light overspill, noise and vibration

- unmitigated light, railway noise and vibrations from blasting might affect bird life, especially breeding populations of waterbirds;
- there are differences in the predicted noise levels between the Stage B and Cloud Break projects on the Fortescue Marsh; and
- concern about the effects of blasting on fauna-potential impacts on birds of high conservation significance have not been adequately addressed.

Assessment

The areas considered for assessment of these factors are along the access corridor, at the minesite, adjacent downwind areas and surrounding areas where the effects of noise and vibration might be significant.

The EPA's environmental objectives for these factors are:

(1) Dust:

- by meeting statutory requirements and acceptable standards ensure that the dust levels generated by the proposal do not adversely impact upon welfare and amenity for surrounding land users or cause health problems; and
- protect the surrounding vegetation from dust and particulate emissions.

(2) Noise and vibration:

- protect the amenity of nearby residents from noise and vibration impacts resulting from activities associated with the proposal by ensuring that levels meet statutory requirements and acceptable standards.

(3) Light overspill:

- manage potential impacts from light overspill and comply with acceptable standards.

Dust

FMG will prepare Dust Management Plans to minimise dust from both the construction and operations phases of the project, in consultation with the Department of Industry and Resources (DoIR). Noting that the prevailing winds are from the east and south east, amenities will be located in this quarter, ie upwind, of high-dust sources, or sufficiently distant from them for dust not to be an issue. Covers and/or sprinklers would be built into the design of dust-generating components of the mine, such as transfer points and stockpiles. Prior to ore leaving the site for transport to Port Hedland it would be moistened to minimise the generation of dust, and trafficked roads would be kept wetted.

Noise and vibration

The mine would operate 24 hours a day so the night time noise and vibration levels are considered to be more critical because at that time ambient levels are lower. Modelled noise from the project is expected to remain well within permissible limits at Marillana Homestead and the outcamps because of the separation distances. The EPA's night time regulation level is L_{A10}35dB[1]; levels at Marillana under worst case conditions are expected to only be L_{A10}7dB and L_{A10}24dB at Warrie Outcamp. Noise levels at the proposed mine campsite at L_{A10}34dB would also be substantially below the accepted industrial level of L_{A10}65dB. Noise levels at Marillana Homestead from the proposed railway also comply, with predicted levels of $L_{Aeq\ (8hour)}$32dB[2] and L_{Amax}37dB.

Operational blasting noise and vibration from the noise prediction modelling comply with relevant noise criteria for all scenarios, including the worst case when associated with unconfined blasting, at the onset of mining when the floor of the pit is still essentially at the surrounding ground level. (Once the pit has begun to deepen the walls offer increasing amounts of shielding with depth). Predicted levels at Marillana Homestead from both confined and unconfined blasting, at 90dB and 113dB (linear peak) levels respectively, would comply with the regulations (PER Table 18).

The effects of noise and vibration on fauna are less well known. Research into noise impacts on different bird species was presented in Appendix N of the PER. Peak levels at the Fortescue Marsh are predicted to be 139dB (unconfined) reducing to 115dB as pit levels deepen and confine blast energy. It suggests that there is likely to be some short term disturbance effect. It is observed, however that many bird species are quick to adapt (Lloyd Acoustics, 2005).

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[1] level of L_{A10} is A-weighted noise which is exceeded for 10% of the measurement period. Considered to be a measure of 'intrusive' noise

[2] level of $L_{Aeq\ (8hour)}$32dB is considered to represent the average noise level

L_{Amax}37dB is the maximum A-weighted noise level

FMG has committed to prepare a Construction, Noise and Vibration Management Plan, in consultation with DoIR. It will adopt noise mitigation strategies such as blasting during favourable wind conditions as well as monitoring of the effects of blasting on birds and other animals using the Fortescue Marsh during the breeding season.

On the issue of light overspill FMG has committed to the preparation of a management plan to include measures such as limited lighting, directed inwards at the operations, light shields etc.

Summary

The EPA has recommended that impacts relating to light overspill, noise and vibration are considered and managed in condition 7 (Fauna). It considers the issues of noise, dust vibration and light overspill have been adequately recognised and addressed and can meet the EPA's objectives for these factors provided that FMG prepares and satisfactorily implements the abovementioned:

- Dust Management Plan; and
- Construction, Noise and Vibration Management Plan;

in consultation with the stated government agencies.

3.5 Aboriginal culture and heritage

Description

The project area is subject to three native title claims, the Nyiyaparli, Palyku and Martu Idja Banyjima. FMG has signed protocols with each of these claimant groups to establish procedures under which Aboriginal heritage surveys and native title negotiations are carried out. It has engaged the Pilbara Native Title Service (PNTS) to facilitate regular meetings.

Archival and field surveys of Aboriginal heritage sites began in 2003. Clearance surveys have occurred over all areas disturbed to date and FMG has committed to not disturb any ground without first conducting an Aboriginal cultural heritage survey over it. Remaining surveys will be conducted prior to any ground clearance. Consultations with the traditional owners representing the native title groups are a part of the process.

FMG has engaged the PNTS and the traditional owners to undertake heritage surveys and has avoided impacting the known Aboriginal sites, some of which are archaeological sites of significance.

Survey results have revealed ethno-archaeological sites of significance (mainly stone artefact scatters) in the area. These are being avoided where encountered as part of FMG's exploration drilling programme, but there are some archaeological sites which it may not be possible to avoid during the mining phase.

The long-term management of Aboriginal sites within the project area will need the involvement of the traditional owners to agree, develop and apply a Cultural Heritage Management Plan. This is a commitment given by FMG. A component of this Plan will be to employ Aboriginal monitors to oversee the construction of the project infrastructure. Should there be a need to disturb a site, it will be done after consultation with the monitors. Any mitigation would be done with the participation of the traditional owners.

Submissions

No submissions raised matters relating to Aboriginal heritage or sites.

Assessment

The area considered for assessment of this factor is the access corridor and areas potentially disturbed by clearing for the mine and infrastructure.

The EPA's environmental objectives for this factor are:

- ensure that the proposal complies with the requirements of the *Aboriginal Heritage Act 1972*; and
- ensure that changes to the biological and physical environment resulting from the project do not adversely affect cultural associations with the area.

There are Aboriginal sites within the access corridor and in the vicinity of the proposed mines. FMG considers that it will be possible to avoid all the known ethnographic sites but not all the archaeological sites. The Cultural Heritage Management Plan would be in place prior to construction and remain in effect during operations, decommissioning and rehabilitation stages of the proposal. Agreed management measures would be implemented by FMG in consultation and with the participation of the traditional owners.

The Plan would contain procedures for the protection and mitigation of any burial sites that are uncovered during construction, and protocols for the management of sites close to construction areas.

Should there be an unavoidable need to disturb a site or affect the environment in a way that influences Aboriginal heritage and culture, then consultation with the traditional owners would occur first. The aim would be to keep disturbance to a minimum and safeguard salvaged material in an appropriate "keeping place" prior to any application to disturb under Section 16 of the *Aboriginal Heritage Act 1972*.

Summary

The EPA considers the issue of Aboriginal culture and heritage has been adequately addressed and can meet the EPA's objectives for this factor provided that the Cultural Heritage Management Plan discussed above is prepared, agreed to and implemented with the assistance and cooperation of the traditional owners and the PNTS.

3.6 Landforms, mine closure planning and rehabilitation

Description

Compared to many other iron ore mines in the Pilbara, the topography of the areas and surrounds to be mined is relatively subdued. The Chichester Range, which includes the Marra Mamba ore formation on the northern side of the Fortescue Valley, consists of low hills broken by a number of water gaps, on the north side of which are broad valleys with re-entrants.

The current land use at the mine site is pastoral, and rehabilitation needs to aim for clear targets, with agreed completion criteria. Some of this land is proposed to be set aside for conservation purposes when the pastoral leases are reviewed in 2015 and, to be consistent with that strategy, completion criteria for it should encompass the use of appropriate

native vegetation. These would be developed in consultation with key stakeholders, such as DoIR, pastoralists and CALM. The land needs to be able to carry at least the same numbers of stock after mine closure and rehabilitation as it does before disturbance from the project, and there should be no ongoing maintenance liability.

FMG presented a Rehabilitation and Revegetation Management Plan as part of the PER (Appendix J). An essential strategy is that areas to be disturbed for clearing will be minimised. Equally important is that rehabilitation be progressive so that lessons learnt early in the project life can be applied (re-applied if necessary) subsequently.

At the beginning of mining, starter overburden dumps will have to be created. FMG does not intend to replace this material into pits once space becomes available, and the dumps will be rehabilitated in-situ as soon as possible after they are closed (expected to be after the first two years of operations). Subsequently, pits would be backfilled. The PER states that, based on the mine life of twelve years, the external overburden placement in the first two years and the bulking factor, there is estimated to be a volume surplus of 14% of material. Apart from the starter overburden dumps, some of this material would be used as foundations for the crusher and railway works. The remainder would be placed in the mined out pits.

Closure

Mine closure will require the safe dismantling and removal of infrastructures and the appropriate disposal of wastes. The aim is to return the mine sites to safe, stable landforms consistent with the background environment, and capable of supporting a self-sustaining ecosystem of local plants and animals, with the minimum downstream impact to vegetation. Within two years of the commencement of mining activities FMG would develop a Life-of-Mine Closure Plan that would update the Conceptual Mine Closure Plan (Appendix M of the PER) and include the following components:

- stakeholder consultations;
- a risk register for aspects of mine closure;
- confirmation of closure objectives;
- standards and preliminary completion criteria;
- revised closure design criteria and schedule;
- description of progressive closure methodology;
- closure research and monitoring plans; and
- basis for financial provisioning.

The Life-of-Mine Closure Plan will require approvals under both the *Environmental Protection Act 198*6 and the *Mining Act 1978* and will be developed, in consultation with CALM, to address the abovementioned methodologies. FMG considers that it must integrate rehabilitation plan objectives and commitments into short term mine planning.

Ongoing monitoring would be necessary to assess the effectiveness of progressive rehabilitation and any remedial works. Baseline surveys would therefore be done before any disturbance for mining. Control sites would be established and re-visited for monitoring purposes during the life of the project and beyond, if necessary. They would assist rehabilitation improvements during the life of the project and help to develop appropriate closure criteria. Appropriate remedial or rehabilitation actions would

continue until the set completion criteria had been achieved. Remedial work could consist of, among other things, repairing eroded areas, replanting, pest and weed control and fire management.

FMG has also committed to a Waste Management Plan incorporating a procurement policy which minimises waste generation in the first place.

Submissions

Submissions focussed on the need for effective, long term rehabilitation practices. In particular:

- sufficient and timely follow up work;
- strip mining requires that material is returned to the pits in the right proportions to emulate the original soil profile;
- indigenous seed should be used and collected from the areas to be mined;
- the original Mulga communities should be resembled as closely as possible;
- appropriate completion criteria are vital and the minimum requirements for rehabilitation should be specified;
- it is not appropriate to return ground to a degraded grazing pastoral condition;
- issues such as weeds, alteration to natural surface drainage patterns and issues relating to ground water need to be addressed; and
- borrow pits are opened and rehabilitated in a timely manner in coordination with mine development.

Assessment

The area considered for assessment of this factor is that disturbed by the project, including downstream areas that might be affected.

The EPA's environmental objectives for these factors are:

(1) Landforms:

- ensure that, as far as is practicable, the post-mining landform is stable, and is integrated into the surrounding environment.

(2) Mine closure planning:

- ensure that mine closure planning and rehabilitation are carried out in a coordinated, progressive manner and are treated as an integral part of mine development, consistent with the ANZMEC/MCA *Strategic Framework for Mine Closure*, and best practice;
- ensure that the visual amenity of the area and adjacent surrounds is not unduly affected by the proposal; and
- ensure that regionally significant landforms and geo-conservation values are protected.

(3) Rehabilitation:

- ensure that clearing does not result in land degradation;
- ensure rehabilitation of the site to an acceptable standard that is compatible with the intended land use, consistent with appropriate criteria.

The EPA considers that, with the large area of total disturbance from the strip mining technique to be employed, it will be very important to ensure that progressive rehabilitation is undertaken, as proposed.

Summary

The EPA notes that FMG has prepared a Conceptual Mine Closure Plan and a Rehabilitation and Revegetation Management Plan (PER Appendix J). The Conceptual Mine Closure Plan is to be upgraded to a Life-of-Mine Closure Plan, revised at intervals of two years. FMG has also committed to prepare weed and fire management plans. The Authority considers that all these plans are essential components of an effective and ongoing mine project management programme. Accordingly the EPA recommends that a condition relating to decommissioning and final rehabilitation should be applied to complement all these elements.

The EPA considers that landforms, mine closure planning and rehabilitation have been adequately addressed and can meet the EPA's objectives for these factors provided that they are incorporated into a Conceptual Closure Plan and subsequent revisions of the Plan (the Life-of-Mine Closure Plan), as required by the recommended condition on decommissioning and final rehabilitation.

3.7 Greenhouse gas emissions

Description

The creation of greenhouse gases is associated with vegetation clearing and the use of fossil fuels for both the construction and operations phases of the project.

The power supply for this proposal is not part of the assessment. The power will come from an external supplier. That supplier will be responsible for creating its own documentation and referral to the EPA, which will be dealt with as a separate proposal. The EPA has not received a proposal to date.

FMG has calculated that it will need 45MW of power for its combined Stage B and Cloud Break mine projects. On that basis (PER Table 15) it has estimated that 7.0kg of CO_2 equivalent would be produced per tonne of ore mined, based on power generation using natural gas. The value is conservative, however, because the progressive rehabilitation of cleared areas has not been factored in. However, even after mining has ended, as vegetation and soil break down there will continue to be a conversion of carbon to carbon dioxide. An average of 43,310 tonnes CO_2 equivalent per year is expected to be released for a 25 year period after mining has ceased, offset by the areas of the mine which have been rehabilitated and revegetated.

Submissions

Points raised in submissions were:

- keen to see the promotion of renewable energy sources throughout the project to help meet energy needs;
- query the significant differences between the estimates of gas emissions rates for the Stage B and the Cloud Break projects-makes it difficult to calculate the cumulative impacts;
- funding biosequestration to offset projected emissions would make the project more palatable; and
- opportunities to offset gas emissions by purchasing land for conservation and managing wildfires on the land and improving vegetation condition.

Assessment

The area considered for assessment of this factor is the access corridor and all mine areas which are to be cleared.

The EPA's environmental objective for this factor is:

- ensure that greenhouse gas emissions meet acceptable standards and requirements of Section 51 of the *Environmental Protection Act 1986* (all reasonable and practicable measures are taken to minimise greenhouse gas discharge);
- ensure that greenhouse gas emissions, both individually and cumulatively, meet appropriate criteria and do not cause an environmental or human health problem; and
- use all reasonable and practicable measures to minimise the discharge of greenhouse gases.

As the power supply for this proposal is not a part of this assessment the only contributors to greenhouse gases are from the initial clearing, machinery used on site (haul trucks, drill rigs and other vehicles, portable generators for lighting), the blasting used to mine the ore and the road trains to be used to take ore to the rail head for transport to the Christmas Creek beneficiation plant.

Summary

FMG intends to prepare and implement a Greenhouse Gas Management Plan to ensure the most efficient use of resources and equipment.

Given that the power supply for the mine is not a part of this proposal the EPA considers the issue of greenhouse gas emissions has been addressed to the extent possible. The proposed implementation of a Greenhouse Gas Management Plan should enable FMG to meet the EPA's objectives for this factor.

3.8 Other issues

Cumulative effects

The EPA considers that it would have been preferable to assess the Stage 'A', Stage 'B' and any subsequent proposals (such as Cloud Break) as one, but recognised that there were practical constraints to doing so. Nevertheless, the cumulative effect of the proposals, as well as those of other companies in the region, is a key factor for assessment.

FMG has investigated the potential for cumulative impacts from various factors, as discussed below. The total area of mine disturbance from the Stage B and Cloud Break projects has been reduced significantly (by approximately 4930ha) with the withdrawal of the Mt Lewin and Mt Nicholas areas from mining and their proposed connecting railway.

With regard to the clearing of Mulga from both the Stage B and Cloud Break projects, (Table 20 in the PER) disturbance to the Mulga surrounding the marsh amounts to 2.3% of the total in this community, and to 4.5% of the total in the Chichester Range footslopes.

Runoff to the Fortescue Marsh is not expected to be significantly affected by the mine developments upstream. At Cloud Break the maximum area of working pits at any time is 475ha while in the Stage B area the figure is 450ha. If an assumption is made that a quarter of the proposed mining area for both projects would be active at any one time (this includes areas being pre-stripped for mining) this amounts to 0.1% of the Upper Fortescue River catchment. This amount is considered to be insignificant when compared to the natural seasonal variation in surface water runoff.

Areas of the Fortescue Marsh which are marked for possible exclusion from the renewal of pastoral leases in 2015 so that they can be added to the conservation estate amount to 1.6% for Cloud Break and 0.04% at Christmas Creek, these percentages being of the total 213,400ha proposed to be excluded for conservation purposes. This issue is discussed further in Section 5 'Other advice' in relation to FMG's proposed offset package.

With regard to tonnages of ore transported from the Stage B and Cloud Break proposals, the figure remains at 45mtpa, which was the figure assessed for Stage B. The Cloud Break project will be included in that overall tonnage. A proposed beneficiation plant for Cloud Break has been dropped from the project, with lower grade ore going instead to Christmas Creek for concentrating. Water from the dewatering of pits both at Cloud Break and Christmas Creek will be used in this plant and this will reduce the demand from the proposed borefield in the Mt Lewin area (assessed in the Stage B proposal). The total water requirement for both Stage B and Cloud Break will remain fixed at 11GL per year, as originally proposed for the Stage B project.

The modelling of drawdown effects from mine pits at Cloud Break and Christmas Creek and the Mt Lewin borefield show that the areas of groundwater depression from abstraction remain separate from each other and are expected to encroach marginally upon the Fortescue Marsh (Figure 4).

In submissions on cumulative impacts points raised revolved around the fact that the Stage B project had changed in scope and that impacts from both projects in their current form need to be assessed together.

Acid mine drainage

The potential for acid generation from the mining of sulphidic rock, such as black shales (the Roy Hill Shales), was questioned. FMG has carried out geochemical characterisation of the rock formations at Cloud Break. Unless the underlying Roy Hill Shales are disturbed, there is no sulphidic source from which acid could form. There is no intention to mine these black shales. If dewatering and the falling water table were to potentially expose black shale material to oxidation processes, the shale, because of its clay matrix, is expected to remain near-saturated, stopping the contained pyrite (sulphidic material) from oxidising and generating acid. The groundwater modelling does not show the cone of depression from dewatering extending into the black shale horizon.

Any oxidation of exposed pyrite would be largely generated by the fragmentation from blasting. FMG would monitor bores sited within the cone of depression from dewatering to determine if acid is being generated. If necessary, FMG would develop a management plan for the encapsulation of any acid-generating material encountered.

Site environmental management

The transportation of ore by rail from Cloud Break to the beneficiation plant will occur after year 7. Haulage of ores within Cloud Break will occur along the transport corridor shown on Figure 2.

Social considerations
Unless these have a direct effect on environmental concerns they do not comprise a part of the EPA's assessment. Nevertheless there were several questions raised in a submission about the lack of satisfactory consultation and the impacts of the proposed development on pastoral activities, such as restricted access for stock and vehicles onto active mining areas and areas undergoing rehabilitation.

3.9 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 set out in the PER and subsequently modified, as shown in Appendix 4, should be made enforceable. These include preparing and implementing the following:

- Environmental Management System (EMS);
- Environmental Management Plan (EMP);
- Weed Hygiene and Management Plan;
- Fire Management Plan;
- Construction and Operations Dust Management Plans;
- Greenhouse Gas Management Plan;
- Acid Mine Drainage Management Plan, if required;

- Waste Management Plan;
- Construction, Noise and Vibration Management Plan;
- Operational Noise and Vibration Management Plan; and
- Cultural Heritage Management Plan.

In addition, FMG would:

- investigate and implement a suitable option for disposal of saline waters from mine dewatering if required; and
- treat any waste water runoff that is potentially contaminated prior to discharge.

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 and recommends they be imposed if the proposal by Fortescue Metals Group Ltd. to develop iron ore mines and processing facilities at Cloud Break is approved for implementation.

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

(a) that the proponent shall fulfill the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 4;

(b) Mulga and other flora and communities;

(c) fauna management;

(d) Fortescue Marsh management;

(e) groundwater and bore management;

(f) subterranean fauna;

(g) surface water management; and

(h) decommissioning and final rehabilitation.

5. Other Advice

Conservation of the northern Fortescue Marsh/Chichester Range area
The Pilbara Bioregion is listed as high priority for funding for land purchase under the National Reserves System Cooperative Programme and portions of pastoral leases in the area have been earmarked for exclusion for public purposes in 2015. CALM has proposed that parts of Mulga Downs, Roy Hill and Marillana Stations be set aside in a reserve to protect the Fortescue Marsh and outwash plain, listed by the Federal Department of Environment and Heritage as a 'Nationally Important Wetland'. The marsh is also listed as an 'Indicative Place (natural heritage)' on the register of the National Estate due to its importance for the conservation of waterbirds.

FMG calculates that 36.4 km^2 of land systems containing Mulga will be impacted by the proposed construction corridor for the East-West railway (Stage B project), the mines and associated infrastructure. Regionally, the Chichester footslopes Mulga woodland can be considered as a management unit. The Chichester footslopes contain 1641km^2 of land

systems dominated by Mulga. Therefore the disturbance of Mulga resulting from the project as a proportion of the total Chichester footslopes is 2.1%.

Offsets
Because of the special values of the Fortescue Marsh and of Mulga woodlands affected by the project, an offset package has been proposed by FMG. The proposed offsets for the Cloud Break Project are linked with, and in addition to, the offsets previously proposed for the Stage A and Stage B Projects. Offsets are a means of counterbalancing environmental impacts. Their aim is to achieve no overall environmental deficit as a consequence of the project.

A summary of FMG's offset package for Cloud Break follows:

- FMG will resource CALM to enable acquisition of land nominated for exclusion from the 2015 pastoral lease arrangement for inclusion to the conservation estate;
- a PhD project to be run consecutively for at least nine years; OR equivalent funding for research into the Night Parrot;
- similarly, a PhD project to be run consecutively for nine years; OR equivalent funding for research into the Bilby;
- a PhD project to be run consecutively for nine years; OR equivalent funding for research into the conservation values of the Fortescue Marsh;
- development and funding of a broadscale feral predator control programme for the Fortescue Marsh area to be managed by CALM for the life of the project; and
- funding to CALM to fence off areas it has acquired for conservation purposes.

A memorandum of understanding will be developed between CALM and FMG prior to construction. Details of the offsets are attached as Appendix 5. The offsets proposed by FMG are considered by the EPA to be commitments and will be treated accordingly.

The EPA understands that the northern Fortescue Marsh and outwash plain area proposed for conservation by CALM is not currently planned to be set aside for conservation before the pastoral leases expire in 2015. The EPA considers that if mining is to proceed in the area there would be merit in increased conservation management ahead of the 2015 lease expiry. FMG has given the undertaking that fencing to exclude non-native herbivores so as to encourage pasture regeneration would commence once the project is operational.

6. Conclusions

The EPA has considered the proposal by the Fortescue Metals Group Limited (FMG) to develop an iron ore mine north of the town of Newman at Cloud Break, to integrate with the previously assessed and approved Stage A and Stage B iron ore projects.

The EPA notes that the Cloud Break minesite and the access corridor linking the mine to the rail corridor are located in or near to high conservation value features such as Mulga woodlands and the Fortescue Marsh and that these features are at some risk from project activities. Sightings of the critically endangered Night Parrot and burrows of the Bilby (the latter on State and Commonwealth registers as a species of conservation significance) near the periphery of the Fortescue Marsh serve to emphasise the conservation significance of this feature.

In order to mitigate these risks and impacts, FMG proposes to prepare and implement several management plans as well as an offset package directed to assist the Department of Conservation and Land Management in related research fields. The EPA considers that these measures are appropriate and has prepared a complementary set of recommended conditions.

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 their commitments and the recommended conditions set out in Appendix 4 and summarised in Section 4.2.

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 an iron ore mine, on-site accommodation for around 400 personnel and a haul road (to connect to the crusher and proponent's previously assessed Stage B project east-west railway and beneficiation plant at Christmas Creek);
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 5, and summarised in Section 4.2, including the proponent's commitments.
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Appendix 1

List of submitters

Organisations:

BHPBilliton
Care for Port Hedland
Conservation Council of WA
Department of Conservation and Land Management
Department of the Environment
Department of Industry and Resources
Hancock Prospecting P/L
Hunt and Humphry
Wildflower Society
Mulga Downs Partnership

Individuals:

Dr G Thompson

Appendix 2

References

ANZMEC/MCA (2000). *Strategic Framework for Mine Closure.* Commonwealth of Australia. August 2000.

Aquaterra Consulting P/L (2005a). *East Pilbara Iron Ore Project. Hydrogeology Report Public Environmental Review.* (Unpubl. report for FMG Limited). November 2004.

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Bamford Consulting Ecologists (Davis, R A, Wilcox, J A, Metcalf, B M, & Bamford, M J). *Fauna Survey of Proposed Iron Ore Mine, Cloud Break.* Report prepared for Fortescue Metals Group. 2005a.

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Appendix 3

Summary of identification of relevant environmental factors and principles

Identification of Relevant Environmental Factors and Principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
BIOPHYSICAL			
Flora and Fauna	Clearing for the mine and infrastructure will affect previously uncleared pastoral lease land with some areas of high conservation value Mulga stands and groves. The unique Fortescue Marsh lies downslope of the Cloud Break mine area and needs specific management measures to ensure its high conservation values are not affected by the project.	• approval should not be given for this proposal because of the high environmental values of the area, which need to be better defined for environmental review • the high biodiversity values of the area, in particular the Fortescue Marsh, and its limited representation in conservation reserves, will be compromised by the proposal. At least 15% of the pre-European extent of each native vegetation association should be reserved • are any of the vegetation communities recognised as threatened ecological communities? • there appears to be inconsistency between FMG's consultant's assessment of the condition of vegetation (good to degraded) and that of the Department (good to very good condition) • the proposed mine occupies a massive footprint, including several vegetation types that are restricted in their occurrence, or otherwise significant. Four vegetation communities considered to be regionally significant; long term impact by changes to the water regime were not identified in the PER. The flow-on effects to the Marsh of disturbing the samphire flats need to be considered, as well as the impacts of activities outside the areas to be cleared • What vegetation offsets are being considered to compensate for the loss of the 5500ha to be cleared? • Seeking an action plan to ensure that restricted occurrence or otherwise significant vegetation will not be threatened, and rehabilitation goals. Unlikely that rehabilitation will be satisfactory • no indication in the PER of the area and percentage of vegetation communities currently in conservation estate-there is no data of their significance in either a local or regional context • if a previously unknown population of threatened flora is identified in the disturbance area, in what instance would removal of the whole population change the conservation status of the species? Would FMG consider the translocation of the species, and how would these conditions affect operations on Mulga Downs Station? • a significant portion of the Mulga Downs and Hillside areas identified for exclusions from 2015 as a conservation area is within the mine footprint. • the survey work is insufficient to adequately assess the terrestrial fauna assemblages in each of the habitats and has not been peer-reviewed. Data have not been considered in a regional context • there needs to be comprehensive consultation with CALM and natural resource management authorities (Rangelands NRM Group) and relevant universities in order to avoid priority areas, carry out necessary research and determine mutually agreed offsets • the PER recognises the need for faunal surveys in 2 seasons but only one was carried out, and	Submitters have raised important issues. The actual and potential impacts require flora and fauna to be considered as relevant environmental factors

		at the wrong time of the year. Also, there were too few trap nights. The proposal should not go ahead until the Marsh has been subject to a full fauna survey while in flood, or only proceed on the basis that such a survey will be done • the sighting of the Night Parrot has resulted in less attention being given to other species. Additional surveys should be undertaken • the clearing will affect fauna habitats, including those of the Bilby and Night Parrot, and potentially affect surface water movements. The effects of vegetation loss on faunal communities has not been the subject of multi-year, independent studies • FMG should commit to ongoing surveys for the Night Parrot within and outside of the project area. Given the uncertain habitat requirements of this bird, how is it possible to map its habitat? Should a Night Parrot be found in the disturbance area, what would FMG do? • the Night Parrot Management Plan should address the impact of introduced predators, fire and disturbance associated with the project, including artificial light and noise, throughout the project area and include commitments to mitigate those impacts • inadequate surveys for bats and invertebrates, including short range endemics • where impacts are unavoidable, documentation on why impacts will not result in unacceptable fauna loss is too limited • what is the likelihood of the storage ponds to attract and accidentally trap fauna? Risks and potential management strategies should be discussed • request more detail on FMG's commitment to control feral fauna, especially re resources, proposed area of management and control techniques • the proposed Weed Hygiene and Management Plan should be given a high priority, needs to be reviewed by CALM and implemented as soon as possible	
Groundwater and Subterranean Fauna	Mine water requirements will be largely met via mine dewatering. A reverse osmosis plant may be required to supplement this for potable uses. Mine dewatering has the potential to affect the Fortescue Marsh, phreatophytic vegetation and populations of stygofauna.	• what are the regional effects of groundwater usage by FMG and especially on station bores? Concerns that station water supplies may be reduced or become saline • groundwater studies over the past 12 months should not be used to predict the future as they have been the driest in recent history. FMG should be required to complete baseline monitoring of the Fortescue Marsh as well as monitor and manage any impact to it resulting from the project. The oldest data on the hydrogeology of the marsh is from September 2004- more should be collected before the project is considered for environmental approvals and the modelling should be revised as new data come to hand • unreasonable to assert that groundwater drawdown will not extend below the marsh until more monitoring and modelling of that system is done. FMG must commit to an ongoing monitoring programme, until satisfactory recovery of the groundwater system after mine closure. Appropriate triggers for remedial action need to be defined in the event that depressed groundwater levels encroach into the marsh. The cost of monitoring and remediation should be built into the DoIR rehabilitation bonds	Modelling of ground-water drawdown indicates that the Fortescue Marsh should not be affected, but more data are required to refine the model and a Management Plan is needed. More studies needed on the occurrence of stygofauna. Considered to be relevant environmental factors

		• the Fortescue Marsh is an important fauna habitat. Changes to the hydrological regime (such as the duration of pooling of surface waters) from dewatering and clearing could upset ecological processes in the Fortescue Marsh and associated ecological communities • concerned about the effects of unmanaged drawdown on vegetation communities reliant on groundwater and request an appropriate management plan including monitoring and management measures. Vegetation monitoring should be a part of this. Need a better understanding of which species, and how many of them, would be affected by extended periods of dewatering, say over 20 years • pit dewatering could result in an upconing of saline waters, which might then affect phreatophytic vegetation. Monitoring is required of the fresh/saline water interface to prevent its rise to levels where it could have an adverse effect • the impacts of groundwater drawdown on the marsh and phreatophytic vegetation don't appear to have been adequately addressed. What will be done if phreatophytic vegetation deteriorates more than expected from seasonal variations? Need detailed evaluation of how long-term groundwater drawdown will affect the vegetation's health. Explicit triggers need to be developed • the use of surface irrigation to support phreatophytic vegetation is not supported • what would be done with excess water from pit dewatering, especially if it were saline, because of the proximity to the Fortescue Marsh? Investigations into aquifer re-injection should be completed for this assessment • storage ponds near the marsh would provide an artificial habitat for birds and aquatic fauna which may change the natural behaviours and population dynamics of present avian inhabitants and visitors. The ponds would become temporary saline wetlands and the environmental impacts with regard to flora and fauna need to be addressed • careful management of these ponds is critical and must include prevention of surface runoff from cyclonic rains. The detailed pond design should address the reliability of the pond liners to be used • the sampling frequency for stygofauna should be quarterly rather than biannually in the first 2 years prior to commissioning. Why has the calcrete aquifer close to the marshes not been sampled for stygofauna? • CALM concerned at the methodology used and the validity of results of the stygofauna sampling programme-the number of bores sampled is inadequate	
Preliminary Factors	**Proposal Characteristics**	**Government Agency and Public Comments**	**Identification of Relevant Factors**
Surface Water	The development will affect surface flows from rain. Mulga and the Fortescue	• need to show that the delineated boundary of the Fortescue Marsh, as shown in the PER, is a true reflection of the wetland boundary. It should be determined through soil, biological, and hydrological criteria. Should climate change effects be factored in?	Active management needed to address these issues.

	Marsh downstream from disturbed ground could be affected.	• is the marsh a surface water feature or groundwater expression? The PER makes conflicting statements. Insufficient data available to categorically state it is one or the other and on which to base an assessment. Do more modelling before completing the assessment • the importance of ephemeral creek system habitats and hydrology, the area of their disturbance from the project and any long term management liabilities associated with their disturbance need to be discussed • will the mine pits be completely or partially backfilled? There are conflicting statements made in the PER. • FMG should provide additional data on the changed hydrological characteristics caused by altering the geological and soil structure through mining and backfilling. Given the bulking factor quoted by FMG, what's potential for backfilled areas to act as sinks for surface water? Need to ensure that all backfilled pit areas will drain externally • need to know what the effect on the water levels–recharge and surface flows-in the Fortescue Marsh will be from mine and infrastructure. FMG needs to demonstrate that natural surface flow regimes can be effectively restored • why are there to be 4 permanent overburden dumps? The preferred scenario is for none, or at the most one such dump • need to see details of proposed placement of overburden stockpiles. Show that they will be established in higher elevation areas upstream from the open pits where drainage is in defined channels • why will water be diverted into nearby surface water pathways? Where diversion is not successful, what management measures are proposed for dealing with shadow effects on Mulga groves? • seek adequate provisions for bunding (including of initial overburden and rejects dumps) and onsite drainage works to protect the marsh. Needs more than just contouring to secure overburden and rejects under heavy rainfall events • need appropriate management and monitoring to minimise water turbidity leaving site en route to the marsh • FMG has not adequately considered high rainfall events in its mine design. Need to identify 100 year flood levels and to ensure there is adequate containment of mine wastes and discharges above that contour level • changes to patterns of erosion and sedimentation expected. Mulga clearing will lead to increased rates of erosion. Concern at the scarcity of data on how Mulga trees satisfy their water needs from surface water flows. No data on the upstream catchment area required to sustain Mulga communities, or on the degree to which Mulga groves and inter-grove areas depend on current drainage patterns • FMG should undertake research into the taxonomy and conservation status of Mulga • assurances sought that adequate provision made to manage runoff and protect nearby creeks	Considered to be a relevant environmental factor

		from activities such as ore moisture control and dust suppression • discussion about the appropriate sizing and spacing of culverts. The proposed water-distributing structures need to be regularly inspected and maintained over the life of the mine. Need a Surface Water Management Plan	
Landforms, Mine Closure Planning and Rehabilitation	Mining will be progressive and pits will be infilled to a level above the lowest point on the pit perimeter to allow for runoff to drain externally. All surfaces will be rehabilitated when no longer active.	• need for quality baseline data before construction at the sites begins so that comparisons can be subsequently made with completion criteria during the closure and rehabilitation stages • FMG should provide data on the long term stability of waste/overburden dumps, diversion structures and other stabilisation measures. When it is ready to relinquish control of the tenements FMG needs to show that the disturbed land will, without further management, return to a self-sustaining functional ecosystem. This must include attention to weeds, natural surface drainage patterns, prolonged water drawdown and the creation of artificial water sources • indigenous seed should be used and should be collected from areas to be cleared • concerns about air voids in the backfilled pits, return of rejects and slurry. Important to return spoil in the right proportions and at the right time to the mined out areas. Borrow pits also need appropriate rehabilitation • re-establishment of vegetation to resemble as closely as practicable the original Mulga communities. Is the commitment to rehabilitate so that the site will resemble pre-mining conditions achievable? Is it fair to return mined areas to their original condition if that condition pre-mining was 'degraded pastoral'? • A Rehabilitation Plan should be made publicly available and an enforceable condition needs to be a part of any approval. It must specify details of monitoring, completion criteria, the time taken to achieve them and whether the rehabilitated areas would be able to be grazed by cattle. Follow up (remedial) work needs to be factored in	The Cloud Break mine area is located in and adjacent to high-conservation-value lands. Considered to be relevant environmental factors
POLLUTION			
Dust, Noise and Vibration	Potential impacts from both the construction and operations stages of the project	• noting that Marra Mamba ore is typically very dusty there were concerns about its transport and whether the assessment included the ore crushers, which are significant sources of dust • there are also implications for dust management at the minesites and along access tracks, and measures such as the use of water to manage it • what trigger level will be used to activate additional dust suppression measures if normal dust avoidance and management measures are insufficient? No work appears to have been done on the effects of dust on adjacent vegetation-shouldn't estimates of vegetation loss be re-worked to include dust-related damage? • unmitigated noise, light and vibrations from blasting might affect bird life, especially the breeding population of waterbirds at the Marsh. The extent of impacts on birds of high conservation significance has not been adequately addressed. CALM recommends that further study is needed ahead of major blasting so that FMG can demonstrate that the risk of its impact	Considered to be relevant environmental factors

		on fauna, especially the Night Parrot and migratory waterbirds, is low • apart from avoiding worst case meteorological conditions, blasting should be avoided when herpetofauna and birds using the marsh are breeding	
Acid mine drainage	Roy Hill Shale unit below the orebodies contains sulphides which, if exposed to air by dewatering or mining, could generate acid runoff	• need comprehensive testing for Roy Hill Shale and potential for salt water intrusion before each strip is mined • the PER expresses considerable uncertainty about the potential for acid mine drainage to be generated, so more data collection and monitoring is required before any approvals	Not considered to be a relevant factor
Greenhouse Gas Emissions	Generated by the use of machinery at sites and from the clearing of vegetation	• would like to see renewable forms of energy promoted. Project would be more acceptable if FMG were to fund biosequestration measures sufficient to deal with all project-sourced emissions. Also opportunities to offset emissions by purchasing land for conservation (through managing wildfire and improving vegetation condition)	Not considered to be a relevant environmental factor
SOCIAL SURROUNDINGS			
Aboriginal Culture and Heritage	Clearing at the minesites and for access infrastructure has the potential to affect significant sites	• seeking clarification on FMG's position with respect to aboriginal sites and rock art	Considered to be a relevant environmental factor
Pastoral station consultation	Station managers may be affected by the proposed management measures for significant flora and fauna	• Mulga Downs lessee has not been adequately consulted with regard to the proposal, including a feral pest management programme and impacts of FMG's activities on the pastoral lease The permanent loss of access to various parts of Mulga Downs Station may have a significant impact on the ability of the pastoralist to carry out pastoral activities • Mulga Downs lessee has concerns over whether the proposed Night Parrot management measures could affect the day to day operations of the station	Not considered to be a relevant environmental factor

PRINCIPLES		
Principle	**Relevant**	**If yes, Consideration**
1. The precautionary principle *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.* *In application of this precautionary principle, decisions should be guided by –* *(a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* *(b) an assessment of the risk-weighted consequences of various options.*		
	Yes	The mine development and associated clearing for access and ore transport have the potential to affect Mulga stands, priority flora and significant fauna habitat. Dewatering of the mine pits will change the groundwater regime and may affect

		the Fortescue Marsh due to a lowering of the water table in the vicinity. Dewatering may also significantly affect stygofauna habitat where groundwater levels are lowered. Noise from blasting and light overspill could affect the habits of susceptible fauna
2. The principle of intergenerational equity *The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.*		
	Yes	The proposal itself is not considered to represent an unacceptable impact on the health, diversity and productivity of the environment for future generations. The EPA has provided 'Other Advice' on future conservation reserve areas in the region.
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	The proposal, with its management plans and contingency measures, is not considered to represent an unacceptable impact on the conservation of biological diversity and ecological integrity. The EPA has provided 'Other Advice' on future conservation reserve areas in the region.
4. Principles relating to improved valuation, pricing and incentive mechanisms *(1) Environmental factors should be included in the valuation of assets and services.* *(2) The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.* *(3) The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.* *(4) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximize benefits and/or minimize costs to develop their own solution and responses to environmental problems.*		
	No	
5. The principle of waste minimisation *All reasonable and practicable measures should be taken to minimize the generation of waste and its discharge into the environment.*		
	Yes	FMG's Environmental Management Plan and specific Dust, Water, Water Quality, Hydrocarbon / Oilspill and Waste Management Plans have been developed to address this principle.

Appendix 4

Recommended Environmental Conditions and Proponent's Consolidated Commitments

Statement No.

RECOMMENDED CONDITIONS AND PROCEDURES

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

PILBARA IRON ORE & INFRASTRUCTURE PROJECT:
CLOUD BREAK (NO BENEFICIATION)

Proposal: The proposal encompasses open pit iron ore mine at Cloud Break, and an accommodation village as documented in schedule 1 of this statement.

Proponent: Fortescue Metals Group Limited

Proponent Address: 50 King's Park Road, WEST PERTH, WA 6005

Assessment Number: 1577

Report of the Environmental Protection Authority: Bulletin 1216

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 and procedures of this statement.

2 Proponent Commitments

2-1 The proponent shall implement the environmental management commitments documented in schedule 2 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 Audit and Performance Review

5-1 The proponent shall prepare an audit program 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 after the start of operations, 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 practical 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.

6 Mulga and Other Flora and Communities

6-1 Prior to commencement of ground-disturbing activities and in consultation with the Department of Conservation and Land Management, the proponent shall prepare a Mulga and Other Flora and Communities Management Plan to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

The objective of this Plan is to ensure the protection of vegetation values generally, including conservation of significant flora species and communities which occur within the vicinity of the mine, the adjacent Fortescue Marsh and the transport corridor.

This Plan shall address:

1. the ongoing management, monitoring and reporting of impacts on vegetation communities including Declared Rare Flora and Priority flora species, Mulga and restricted plant communities, within the project area;

2. the results of targeted flora and vegetation surveys where surveys have not been completed or where the result of previous surveys cannot be extrapolated prior to ground-disturbing activities to provide further information on the conservation and baseline values status of each of the species and/or communities within the project area;

3. the development of criteria for establishing impact to vegetation communities as referred to in item 1 above, including Mulga;

4. any regeneration or revegetation strategies which are required for species and/or communities referred to in item 1 above, including completion criteria to be met following the survey for species and/or communities impacted by the project;

5. any management or mitigation actions required to address any failure to achieve regeneration completion criteria arising from item 3 above; and

6. any further investigations into the regeneration and seed ecology of affected species or communities in order to determine appropriate regeneration methodologies, if completion criteria are not being achieved.

6-2 The proponent shall implement the Mulga and Other Flora and Communities Management Plan required by condition 6-1.

6-3 The proponent shall make the Mulga and Other Flora and Communities Management Plan required by condition 6-1 publicly available.

7 Fauna

7-1 Prior to ground-disturbing activities and in consultation with the Department of Conservation and Land Management, the proponent shall prepare a Fauna Management Plan to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

This Plan shall address management and monitoring to:

1. demonstrate that the effects of vegetation clearing, noise and vibration, light overspill and any other impacts on fauna are minimised; and
2. ensure that habitats likely to be associated with the Night Parrot (*Pezoporus occidentalis*) and Bilby (*Macrotis lagotis*) are not disturbed;

within the project area, the adjacent Fortescue Marsh and the transport corridor.

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 Fortescue Marsh

8-1 Prior to commencement of construction activities, the proponent shall prepare a Fortescue Marsh Management Plan detailing how the objective of maintaining the health of the Fortescue Marsh will be achieved, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.

This management plan shall define the boundaries of the Fortescue Marsh by detailed mapping of the different fringing vegetation types and take into consideration that the marshland Samphire vegetation is interdigitated with Spinifex.

The objectives of this Plan are to:

- determine the ecological boundary to establish the baseline health condition and water level of the adjacent Fortescue Marsh prior to construction undertaken as part of this proposal;

- monitor and assess on an ongoing basis any changes in the health and water levels of the adjacent Fortescue Marsh attributable to the project following the commencement of construction; and

- implement appropriate actions, where necessary, to maintain the health of the adjacent Fortescue Marsh.

The proponent shall:

1. locate and identify monitoring sites and reference sites to measure the Fortescue Marsh environment referred to in the detailed mapping referred to in 8-1;

2. identify indicators to quantitatively measure the health of the Fortescue Marsh using the monitoring sites identified in condition 8.1.1;

3. undertake baseline and ongoing monitoring on a quarterly basis of the indicators identified in condition 8.1.2;

4. identify tolerance levels of the indicators referred to in condition 8.1.2 and trigger levels which require contingencies and/or remedial actions;

5. identify the contingencies and/or remedial actions and implement these actions when trigger levels identified in condition 8.1.4 are reached;

6. notify the Department of Environment and the Department of Conservation and Land Management within twenty four hours when trigger levels are reached and advise what actions have been implemented in accordance with condition 8.1.5; and

7. detail reporting requirements.

8-2 The proponent shall implement the Fortescue Marsh Management Plan required by condition 8-1.

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

9 Groundwater

9-1 Prior to commencement of construction activities, the proponent shall prepare a Groundwater and Bore Management Plan, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

The objectives of this Plan are to:

- provide a framework to predict and measure impacts;
- protect and maintain the quality of the water in the aquifer;
- ensure that station bores within the area of groundwater drawdown maintain adequate outputs for pastoral purposes;
- protect phreatophytic vegetation; and
- define appropriate environmental triggers for contingency plans.

This Plan shall address the following:

1. the layout and specifications of appropriate monitoring sites;
2. protocols and procedures for monitoring and quantitatively assessing the salinity and effects of water abstraction on phreatophytic vegetation;
3. threshold levels to be used to determine if and when action is to be taken to protect station bores and phreatophytic vegetation;
4. the actions (including an immediate reduction in the rate of borewater abstraction from affected bores) which will be taken to address the increase in salinity or adverse effects on phreatophytic vegetation if monitoring reveals that salinity in the production or monitoring wells is increasing and/or if abstraction is affecting phreatophytic vegetation;
5. reporting requirements; and
6. closure procedures.

9-2 The proponent shall implement the Groundwater and Bore Management Plan required by condition 9-1.

9-3 The proponent shall make the Groundwater and Bore Management Plan required by condition 9-1 publicly available.

10 Subterranean Fauna

10-1 Within six months following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act 1986*, the proponent shall commence surveys for subterranean fauna in accordance with a Subterranean Fauna Survey Plan prepared to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.

The Subterranean Fauna Survey Plan shall set out procedures and measures to:

1. survey areas likely to be affected by project operations; and

2. survey areas with similar habitats outside the areas to be affected by project operations to establish the conservation significance of fauna within the areas to be affected.

10-2 In the event that the results of the surveys required by condition 10-1 indicate that there is a risk of loss of subterranean species or communities as a result of project operations, the proponent shall institute management measures 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 and the Department of Conservation and Land Management.

The Subterranean Fauna Management Plan shall set out procedures and measures to:

1. avoid and/or demonstrate management of impacts on subterranean fauna species and/or communities and their habitats where the long-term survival of those species and/or communities may be at risk as a result of project operations;

2. monitor the distribution and abundance of species and/or communities of subterranean fauna, groundwater levels, groundwater quality and other relevant aspects of subterranean fauna habitat to ensure that the long-term survival of subterranean fauna species and communities is not compromised as a result of project operations; and

3. take timely remedial action in the event that monitoring indicates that project operations may compromise the long-term survival of subterranean fauna and / or communities.

10-3 Prior to the commencement of dewatering activities for the project, the proponent shall, if applicable, implement the Subterranean Fauna Management Plan required by condition 10-2.

10-4 The proponent shall make the Subterranean Fauna Management Plan required by condition 10-2 publicly available.

11 Surface Water

11-1 Prior to ground-disturbing activity relating to the transport corridor and mine activities, the proponent shall prepare a detailed Surface Water Management Plan to the requirements of the Minister for the Environment on advice of the Department of Conservation and Land Management and the Water and Rivers Commission.

The objective of this plan is to minimise direct and indirect impacts (such as by modified surface drainage, saline water application) on flora, fauna and vegetation.

This Plan shall detail:

1. the alignment of the transport corridor and the components within it;

2. locations of associated infrastructure and resources (eg bunds, storage ponds, roads, conveyors, borrow pits, communications facilities);

3. measures which demonstrate that the impacts of the infrastructure and resources referred to in (2) above on fauna, flora and the Fortescue Marsh have been minimised; and

4. the specifications and locations of altered surface drainage mitigation measures such as levées and spreader ditches.

11-2 The proponent shall implement the Surface Water Management Plan required by condition 11-1.

11-3 The proponent shall make the Surface Water Management Plan required by condition 11-1 publicly available.

12 Decommissioning and Final Rehabilitation

12-1 The proponent shall rehabilitate and decommission the project areas in accordance with the Conceptual Closure Plan in the Public Environmental Review (Appendix M FMG/Environ, 2005), or subsequent revisions of the Plan (the Life-of-Mine Closure Plan), to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority, the Water and Rivers Commission, the Department of Industry and Resources and the Department of Conservation and Land Management.

12-2 The proponent shall review and revise the Life-of-Mine Closure Plan at intervals of two years, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority, the Water and Rivers Commission, the Department of Industry and Resources and the Department of Conservation and Land Management.

The objective of this plan is to ensure that closure planning and rehabilitation are carried out in a coordinated, progressive manner and are integrated with development planning, consistent with the Australian and New Zealand Minerals and Energy Council / Minerals Council of Australia *Strategic Framework for Mine Closure*, current best practice, and the agreed land uses.

Each revision of the Life-of-Mine Closure Plan shall set out procedures and measures to:

1. manage over the long term ground and surface water systems affected by the open pits and waste rock dumps;

2. rehabilitate all disturbed mine and infrastructure corridor areas with native vegetation to a standard suitable for the agreed end land use(s);

3. backfill the pits to minimise impacts on groundwater quality, subterranean fauna and surface drainage patterns, and to encourage appropriate revegetation;

4. identify contaminated areas, including provision of evidence of notification and propose management measures to relevant statutory authorities; and

5. develop management strategies and/or contingency measures in the event that operational experience and/or monitoring indicate that a closure objective is unlikely to be achieved.

12-3 The proponent shall make revisions of the Life-of-Mine Closure Plan required by condition 12-2 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 The Minister administering the intended *Iron Ore (FMG Chichester Pty Ltd) Agreement* will establish a formal review mechanism to ensure that a bond is placed on the proponent at the appropriate time to ensure the adherence and completion of environmental programs.

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 / Licence / Registration for this project under the provisions of Part V of the *Environmental Protection Act 1986.*

3. Within this statement, to "have in place" means to "prepare, document, implement and maintain for the duration of the proposal".

4. Compliance and performance reporting will endeavour to be in accord with the timing requirements of the intended *Iron Ore (FMG Chichester Pty Ltd) Agreement Act*.

Schedule 1

The Proposal (Assessment No. 1577)

The proposal (see location figures 1 and 2) comprises:

- a mine at Cloud Break;
- a transport corridor to link the Cloud Break mine with the Stage B east-west railway from Christmas Creek;
- water storage ponds; and
- an accommodation village.

Table 1 – Key Proposal Characteristics

Element	Description
Location	Cloud Break (approximately 85km NNW of Newman)
Main activities	iron ore strip mining, pit backfilling, ore crushing, mine rehabilitation and closure
Resource	500 million tonnes-600 million tonnes Marra Mamba iron deposit, pit depth 0-70 metres
Annual rate of production	a maximum of 30 million tonnes of high grade ore and 43 million tonnes of lower grade material (requiring beneficiation at the Christmas Creek plant). A total of 45 million tonnes (combined with output from Stage B mines at Christmas Creek and Mindy Mindy) will be transported by rail to port
Contingent activities	pit dewatering, excess water storage in ponds, transport of ore to rail loading facility
Areas disturbed	5500 hectares, approx. 475 hectares open working pit at any time
Duration	12 years
Employment	400 personnel for construction on-site; 400 personnel divided between on-site and local towns mainly Newman) for the operational stage
Water requirements	supply from pit dewatering. A reverse osmosis plant may be required
Power supply	not part of this proposal. Will be a separate referral
Greenhouse gas emissions (excluding power supply)	estimated 7.0kg CO_2 equivalent produced per tonne of ore mined, plus 43,310 tonnes CO_2 equivalent per year on average for the 25 years after mining has ceased

Figures (attached)

Figure 1 – Regional location map

Figure 2 – Project area map

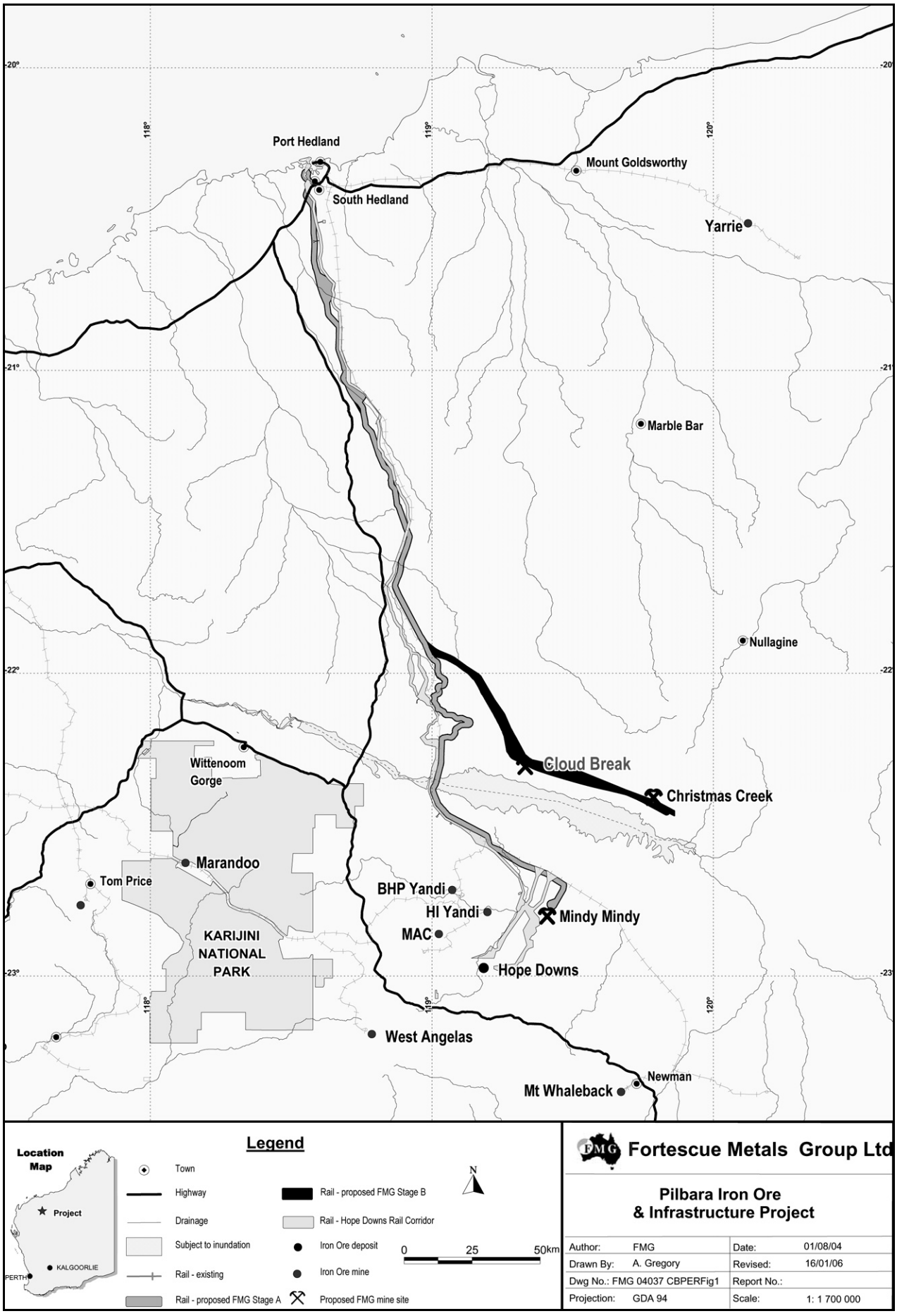

Figure 1 – Regional location map

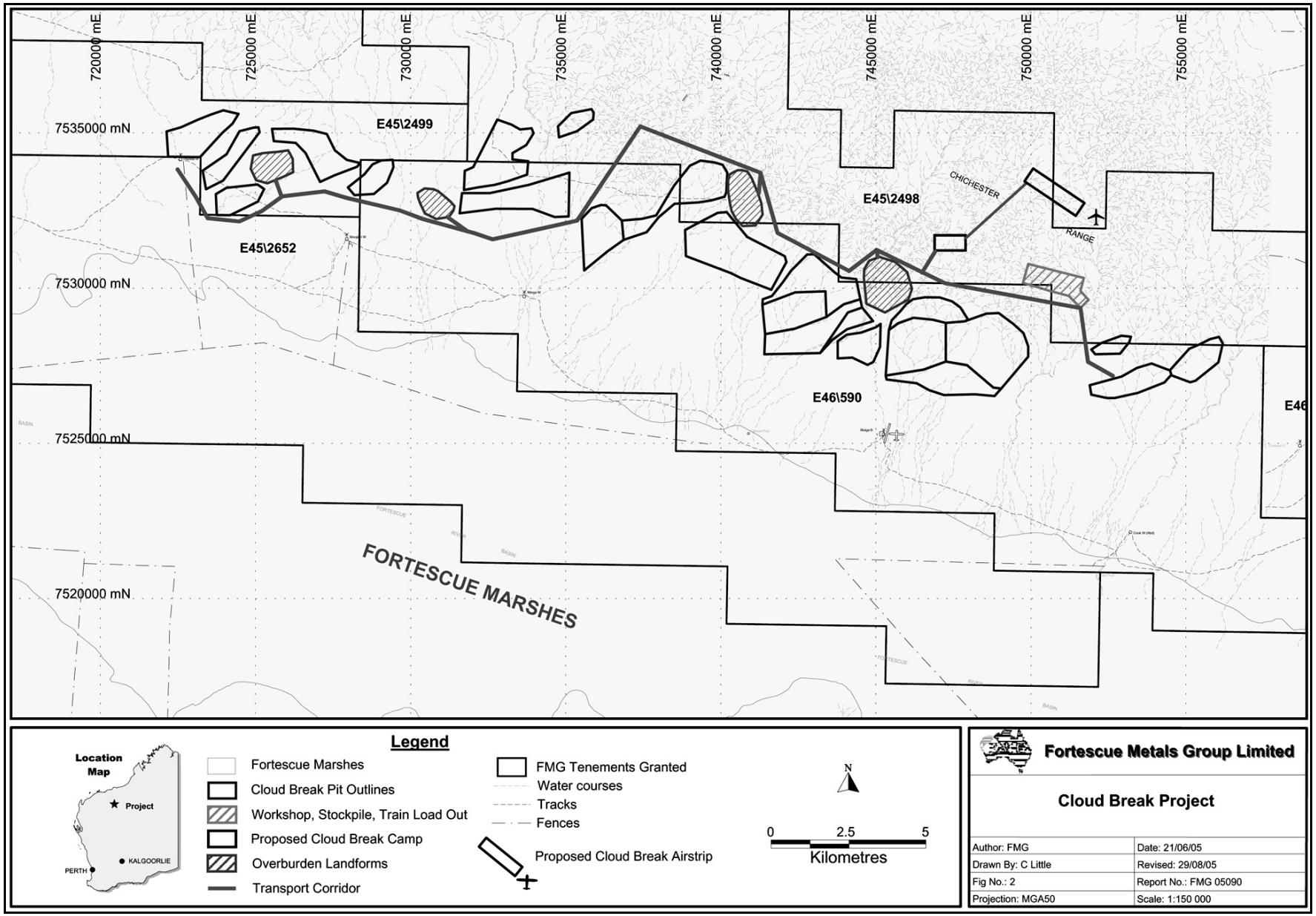

Figure 2 – Project area map

Schedule 2

Proponent's Environmental Management Commitments

September 2005

PILBARA IRON ORE & INFRASTRUCTURE PROJECT
CLOUD BREAK
(no beneficiation)

(Assessment No. 1577)

FORTESCUE METALS GROUP LIMITED

Proponent's Environmental Management Commitments
November 2005

Pilbara Iron Ore and Infrastructure Project: Cloud Break (no beneficiation) (Assessment No. 1577)

Note: The term "commitment" as used in this schedule includes the entire row of the table and its six separate parts as follows:

- a commitment number;
- a commitment topic;
- the objective of the commitment;
- the 'action' to be undertaken by the proponent;
- the timing requirements of the commitment; and
- the body/agency to provide technical advice to the Department of Environment.

Proponent's Environmental Management Commitments-Pilbara Iron Ore and Infrastructure Project
CLOUD BREAK (no beneficiation)

Topic	Objectives	Actions	Timing	Advice from
Environmental Management Plan (EMP)	To minimise the environmental impacts associated with the Project. To provide a mechanism for monitoring environmental parameters, impacts, compliance with legal requirements, feedback, reporting and continual improvement.	1. Prepare an EMP as part of the Environmental Management System (EMS), containing specific environmental management strategies for the <u>construction</u> of the Project *(refer to Appendix I for draft)*. 2. Implement the Construction EMP. 3. Prepare an EMP as part of the EMS, containing specific environmental management strategies for the <u>operation</u> of the Project. 4. Implement the Operational EMP. 5. Ensure that all personnel and contractors comply with the requirements of the EMPs and be made aware of their obligations through an Environmental Awareness Training programme.	Prior to the start of construction. During construction. Prior to commissioning. During construction and operations. During construction and operations.	DoIR DoIR
Weed Hygiene and Management Plan	Maintain the abundance, species diversity, geographic distribution, and productivity of vegetation communities.	6. Prepare a Weed Hygiene and Management Plan that contains procedures to minimise the introduction and spread of weeds, including: • identifying target weeds; • hygiene inspection and washdown procedures for all mobile plant and equipment; • control measures that may be necessary for some species; • monitoring and any follow-up control including reporting to relevant authorities. 7. Implement the Weed Hygiene and Management Plan. 8. Ensure sites (including temporary construction camps) have contained wash down facilities.	Prior to construction. During construction, operations, and decommissioning. During construction, operations and decommissioning.	CALM/AgWA
Fire Management	Reduce the risk of unplanned fires and provide contingency measures	9. Prepare a Fire Management Plan to include: • installation of necessary fire breaks;	Prior to construction.	CALM/FESA

Topic	Objectives	Actions	Timing	Advice from
Plan	to minimise any impacts in the event that a fire starts.	• safe work procedures for all welding and grinding work; • personal fire hazard procedures; • vehicle fire hazard procedures; • emergency fire response procedures; and • bushfire contingency plans. 10. Implement the Fire Management Plan.	During construction and operations.	
Mine dewatering	Maintain or improve the quality and quantity of groundwater to ensure that existing and potential uses, including ecosystem maintenance, are protected.	11. Continue to investigate alternative options for disposal of potentially saline water from mine dewatering. 12. Implement, if required, an alternative option acceptable to DoE (WRC) for disposal of saline water from mine dewatering.	Prior to commencement of dewatering activities. Prior to commencement of saline dewatering activities.	WRC WRC
Dust Management Plan: construction	Protect the surrounding land users such that dust and particulate emissions will not adversely impact upon their welfare and amenity or cause health problems, and ensure that dust emissions, both individually and cumulatively, meet appropriate criteria and do not cause environmental or human health problems.	13. Prepare a Construction Dust Management Plan that addresses: • minimising clearing (as practicable) • minimising the generation of dust and impacts and emissions on and off site; • dust control measures; and • outlines a complaints and response process. 14. Implement the Construction Dust Management Plan.	Prior to construction. During construction.	DoIR
Dust Management Plan: operations	Protect the surrounding land users such that dust and particulate emissions will not adversely impact upon their welfare and amenity or cause health problems, and ensure that dust emissions, both individually and cumulatively, meet appropriate criteria and do not cause environmental or human health problems.	15. Prepare an Operations Dust Management Plan that addresses: • minimising the generation of dust and impacts and emissions on and off site; • dust control measures; • ore stockpiles moisture content; • dust monitoring; and • outlines a complaints and response process. 16. Implement the Operation Dust Management Plan.	Prior to commissioning. During operations.	DoIR

Topic	Objectives	Actions	Timing	Advice from
Greenhouse Gases Management	To minimise Greenhouse Gas emissions for the Project and reduce emissions per unit product to as low as reasonably practicable, and mitigate Greenhouse Gas emissions in accordance with the Framework Convention on Climate Change 1992, and with established Commonwealth and State policies.	17. Develop a Greenhouse Gas Management Plan that addresses efficient use of resources and equipment and other measures to reduce Greenhouse Gas emissions. 18. Implement the Greenhouse Gas Management Plan.	Prior to construction. On commencement of construction.	
Water Quality – surface and groundwater	To maintain or improve the quality of surface and groundwater, to ensure that existing and potential uses, including ecosystem maintenance are protected.	19. Treat any waste water or surface water runoff that is potentially contaminated prior to discharging to the environment. 20. Ensure potentially polluting substances are stored, bunded, and handled in accordance with appropriate standards.	During construction and operations. During construction and operations.	
Acid Mine Drainage	Minimise the risk to the environment resulting from potentially acid forming materials.	21. Complete sampling and analysis of materials potentially exposed during mining. 22. Develop an Acid Mine Drainage Management Plan if potentially acid-generating materials are likely to be disturbed. 23. Implement the Acid Mine Drainage Management Plan if potentially acid-generating materials are likely to be disturbed. 24. Undertake additional investigations (such as oxygen diffused modelling) if monitoring indicates that the cone of groundwater depression is likely to extend into black shales.	Prior to commencement of mining. Prior to, or during mining (as required). Prior to, or during mining (as required). During dewatering operations (as required).	DoIR DoIR DoIR
Waste Management Plan	Ensure that disposal/management of wastes do not adversely affect environmental values or health, welfare and amenity of people and land uses, by meeting statutory requirements and acceptable standards.	25. Develop a Waste Management Plan. As part of the Waste Management Plan, FMG will implement a procurement policy which minimises waste generation. 26. Implement the Waste Management Plan.	Prior to construction. During construction, operations and mine closure.	DoE

Topic	Objectives	Actions	Timing	Advice from
Noise Management Strategy	Ensure noise levels comply with statutory requirements and acceptable (and appropriate) standards.	27. Prepare a Construction Noise and Vibration Management Plan that: • identifies noise reduction strategies; • identifies impacts on susceptible fauna, including the Night Parrot, Bilby and other species of Specially Protected (Threatened) Fauna and strategies to mitigate the impacts to them; • minimises disturbance to the Fortescue Marshes and residence(s) from blasting noise generated at operations; • outlines monitoring program to measure noise emissions and assess optimal placing of noise barriers. 28. Implement the Construction Noise and Vibration Management Plan. 29. Prepare an Operational Noise and Vibration Management Plan for the Mines that: • identifies noise reduction strategies; • identifies impacts on susceptible fauna, including the Night Parrot, Bilby and other species of Specially Protected (Threatened) Fauna and strategies to mitigate the impacts to them; • minimises disturbance to the Fortescue Marshes and residence(s) from blasting noise generated at operations; • outlines monitoring program to measure noise emissions and assess optimal placing of noise barriers. 30. Implement the Operational Noise and Vibration Management Plan.	Prior to construction. During construction. Prior to commissioning. During operations.	DoIR

Topic	Objectives	Actions	Timing	Advice from
Aboriginal Heritage	Ensure the proposal complies with requirements of the Aboriginal Heritage Act 1972 and that changes to the biological and physical environment resulting from the Project do not adversely affect cultural associations with the area.	31. Complete ethnographic and archaeological surveys of the Project Area.	Prior to the start of construction.	DIA/PNTS
		32. Develop a Cultural Heritage Management Plan for the Project in consultation with the Aboriginal Traditional Owners.	During the design phase.	DIA/PNTS
		33. Implement the Cultural Heritage Management Plan in consultation with the Aboriginal Traditional Owners.	During construction, operations and decommissioning.	DIA/PNTS

KEY

AgWA	Department of Agriculture		
CALM	Department of Conservation and Land Management	DOIR	Department of Industry and Resources
DIA	Department of Indigenous Affairs	FESA	Fire and Emergency Services Authority
PNTS	Pilbara Native Title Service `	WRC	Water and Rivers Commission

NOTE

The word ‘Marshes’ as used in this table has the same meaning as the word ‘Marsh’ used elsewhere in this bulletin.

Appendix 5

Fortescue Metals Group
Proposed Offset Package

CONTENTS

NOTE
The word ‘Marshes’ as used in this report has the same meaning as the word ‘Marsh’ used elsewhere in this bulletin.

1 Introduction

Offsets have been proposed for the Fortescue Metals Group Ltd (Fortescue) Pilbara Iron Ore and Infrastructure Project (the Project). The project involves a series of iron ore mines, port and rail infrastructure. An offsets package has been developed for the Stage A component of the Project and this document articulates the offsets that have been proposed for the Stage B and Cloud Break Projects.

The following document is separated into three sections. Section one outlines the proposal to develop a memorandum of understanding between the Department of Conservation and Land Management (CALM) and Fortescue to guide the development of a collaboratively working relationship. Sections two and three outline the offsets proposed for the Stage B and Cloud Break projects.

1.1 Memorandum of Understanding

FMG and CALM will be required to work collaboratively together for the duration of the Pilbara Iron Ore and Infrastructure Project and it is FMG's aim to maintain a good working relationship with CALM. As such, FMG proposes that a "Memorandum of Understanding" (MOU) be developed between both organisations which outlines;

- Further details on the operational aspects of each offset;
- A process for agreeing on key inputs and deliverables;
- Key dates and milestones;
- Communication processes and protocols; and
- Responsibilities and accountabilities.

It is proposed that this MOU is developed in collaboration by both parties prior to commencement of construction, in accordance with FMG's Project timeline. A pre-requisite for the development of the MOU is a firm commitment from CALM to work to the FMG Project timeline, to ensure it is developed prior to Stage B and Cloud Break construction. FMG makes no commitment to delay the Project construction, if the MOU is not finalised.

1.2 Stage B Offsets proposal

Key issues associated with the Stage B Project are associated with the 36.4 km^2 of land systems containing Mulga which will be impacted by the proposed construction corridor for the East-West railway, the mines and associated infrastructure. To place this into a regional context, the Chichester footslopes Mulga woodland can be considered as a management unit. That is, the Chichester footslopes contain 1 641km^2 of land systems dominated by Mulga. Therefore the disturbance of Mulga resulting from the Stage B Project as a proportion of the total Chichester footslopes is 2.1%, which can be considered to be a relatively small proportion of the total management unit.

In order to mitigate this impact on the Mulga woodlands, offsets will be considered in consultation with CALM. Further information on these offsets is provided below.

1.2.1 Research

1.2.1.1 Mulga (or other poorly known taxa)

As stated in the Stage B PER (Section 6.3.1.2, page 125), offsets will be considered such as research into the ecology and/or taxonomy of Mulga (or some other poorly known taxa) in the East Pilbara in consultation with CALM and academic experts. Offsets may include research for management and resolution of outstanding taxonomic issues identified in biological survey documents. FMG will strongly support and encourage partnerships with third party users of its infrastructure and other companies in the Pilbara.

FMG will develop an integrated research program aimed at further understanding and protecting the conservation values of the Chichester footslopes Mulga woodlands. This will include the research Project committed to in Stage A (a research Project at PhD thesis level or equivalent) plus the following additional research Projects:

- Three additional research Projects at PhD thesis level or equivalent will be conducted consecutively for a period of nine years.
- Three additional research Projects at honours thesis level or equivalent will be conducted consecutively for a period of three to six years (depending on completion time of each Project).

Commencement of the research program will occur once construction is complete and will be reviewed every three years, in consultation between FMG, CALM and Academic Advisors. The scope of research to be undertaken will be developed in collaboration with CALM through the following process:

- Desktop review of all current research in the Pilbara area, relevant to impacts of FMG's Stage B Project, concerning Mulga (or some other poorly known taxa).
- Discussions with CALM regarding research that requires further work or possible new areas of research.
- Consultation with CALM to select appropriate areas of research to be pursued.
- Initiate discussions with Academic Advisors and Experts in the fields of study selected in order to scope the Research Program further.
- Develop a Scoping Document describing the potential methods, timing and deliverables for the Research Program.
- Select a study team or individual to carry out various components of the work, provide adequate resourcing, technical support, academic and/or expert advice and set a start date for the research.

1.2.1.2 Mulga Plant-Water Relationships

As stated within the Stage B PER (Section 6.1.4.2, page 104) FMG will continue to conduct research on sheetflow redistribution systems to improve the current state of knowledge on

effective methods for capturing and maintaining sheetflow during rainfall events. This research will be conducted in liaison with CALM.

While the above work is considered by FMG to be a normal part of Environmental Management of its activities, to complement the above research FMG will also conduct an internal research Project, on Mulga plant-water relationships as an offset. This Project will aim to gain further knowledge on the extent of dependence of Mulga on sheet flow for survival. The Project will be ongoing for at least five years and will be scoped and managed internally by FMG personnel with advice from CALM and academic experts in this field.

1.2.3 Development of Research Programs

FMG will establish an offsets research trust account. A panel will be formed to determine the scope of the research projects and exactly how the funding should be distributed. CALM, DoE and FMG will sit on the panel (or board of trustees). Academics will be consulted where necessary. Scoping of the research programs will commence prior to construction and initial programs should be initiated prior to commencing operations.

1.2.4 Weed Management Program Extension Program

FMG has committed to the management of weeds within the proposed Project areas as discussed in Section 6.3.4 (page 126) of the Stage B PER. Weed control measures will be implemented to ensure that new weed species are not introduced and that weed species identified within the development areas are not spread during the construction and operation of the Project.

While the above management of the introduction and spread of weeds is a normal Project requirement, as an offset FMG will extend its weed management program. The Weed Hygiene and Management Plan will be extended in consultation with CALM, to focus not only on the introduction and spread of weeds, but reducing (and if possible eradicating) weed infestations, not only within the Project area but also in adjacent areas selected collaboratively with CALM and Department of Agriculture. This will occur for the duration of the Stage B Project and will focus in particular on environmental weeds such as Ruby Dock.

Design and commencement of the Weed Extension Program should occur prior to construction of the project.

1.2.5 Threatened Fauna Species

FMG committed to considering offsets for threatened fauna including funding towards taxonomic issues, or other relevant research such as CALM's research programme on Mulgara.

FMG will commit to the following additional research / funding:

- A research Project at PhD level or equivalent, for a period of at least three years; or

– A funding proposal (of similar cost to a PhD Project) which contributes to knowledge/research for a fauna issue relevant to the Stage B Project.

The Research Project / Funding Proposal will be developed in consultation with CALM and Academic Advisors through the following collaborative process:

– Desktop review of all current research in the Pilbara area, relevant to the potential impacts of FMG's Stage B Project, concerning Mulgara or other threatened species.
– Discussions with CALM regarding research that requires further work / funding or possible new areas of research / funding, to better understand and manage the impacts of rail and port infrastructure (similar to infrastructure proposed by FMG in Stage B) on Mulgara or other threatened species.
– Consultation with CALM to select an appropriate area of research / funding to be pursued.

If a PhD Project is proposed the following process would then also be undertaken:

– Initiate discussions with Academic Advisors and Experts in the field of study selected in order to scope the Research Project further.
– Develop a Scoping Document describing the potential methods, timing and deliverables for the Research Project.
– Select a study team or individual to carry out the work, provide adequate resourcing, technical support, academic and/or expert advice and set a start date for the research.

The above process to scope the research / funding will commence at the outset of Project construction and be complete within 18 months (well before construction is complete).

1.2.6 Funding of a Position within CALM

FMG will commit to the funding of a position within CALM to manage the Fortescue Marshes area including provision of conservation advice relevant to the implementation and operation of the Project (over the operational life of the Stage B Project) focusing on issues pertinent to the management of the Fortescue Marshes including land affected by the FMG Project.

Prior to employment of the person FMG and CALM must undertake consultation on:

– selection criteria;
– a salary range and on-costs for the person (these are to be fully funded by FMG);
– a position description; and
– key performance indicators.

Final selection of the person, ongoing management and resourcing for equipment, materials and place of work would be the responsibility of CALM. It is proposed that this person would be recruited prior to the commencement of Stage B construction. FMG can provide facilities at the mine camp and Newman of normal support services (such as food, accommodation, office facilities) during field work to offset costs.

1.2.7 Fortescue Marshes Management Plan

FMG will commit to working with CALM to develop a statutory Fortescue Marshes Management Plan. This plan will identify the conservation values of the Fortescue Marsh and surrounding area (such as the Chichester Footslopes Mulga Woodland) and will include:

– Future Management Objectives
– Opportunities and Risks
– Management Strategies
– A Proposed Monitoring Program
– Areas Requiring Further Research

FMG will provide 1000 person hours (consulting and/or internal FMG personnel) or equivalent financial support to assist CALM in the development of this Management Plan.

1.3 Cloud Break Offsets Proposal

The Cloud Break Iron Ore mine is located in the same region as the Stage B proposal and the offset package that has been developed for the Cloud Break proposal is therefore linked to the above offset proposal for Stage B. In addition, the development of the offset package for Cloud Break is to complement that which has already been developed as part of the Stage B offset negotiations.

1.3.1 Land Acquisition

In recognition of the conservation importance of the Fortescue Marshes to the State of Western Australia and the potential for this area to be listed as a RAMSAR wetland in the future, FMG will commit to providing resources to CALM to enable them to acquire land, to contribute to a net conservation benefit outcome. The area nominated for exclusion from the 2015 pastoral lease negotiations for early inclusion to the conservation estate will form a priority acquisition, followed by extensions to the Fortescue Marshes reserve system (or other pastoral areas of high conservation value if extensions to the Fortescue Marshes reserve system are not achievable)

FMG will provide the funds to CALM which are to be held in a trust fund and be used to purchase lands for addition to the conservation estate. While negotiations for the areas to be purchased will be undertaken by CALM, FMG is to be consulted as to the proposed areas to be purchased (FMG's views will not be binding on CALM, but CALM will give those views due consideration). The money to be provided for land acquisition will be committed once the project is operational and will be provided over a 2~3 year period.

1.3.2 Research Projects

Outlined below is the range of research projects proposed as part of the Cloud Break Offset proposal:

- Research into the Night Parrot;
- Research into the Bilby; and
- Research into improving understanding of local conservation values, and could include short range endemic invertebrates, fire ecology of Acacia xiphophylla or samphires.

Fauna surveys for FMG's Cloud Break PER identified the existence of threatened species near the project area. FMG have committed to considering appropriate offsets for threatened fauna as part of the Cloud Break project.

Currently, there are no established survey techniques for the Night Parrot and this will limit the ability to develop research projects into the species. FMG will, as part of their ongoing operations, continue to undertake surveys for the Night Parrot to try to establish appropriate survey techniques. However, if and when an established technique is determined to allow the safe capture, tag and release of this species FMG would fund an ongoing research project into the Night Parrot

FMG will commit to the following additional research / funding:

- One research project at PhD level or equivalent, to be run consecutively for a period of at least nine years; or
- A funding proposal (of similar cost to a PhD Project) which contributes to knowledge / research for the Night Parrot.

The Research Project / Funding Proposal will be developed in consultation with CALM, DoE, DEH and Academic Advisors through the following collaborative process:

- Desktop review of all current research in the Pilbara area, relevant to the potential impacts of FMG's Cloud Break Project, concerning Night Parrot.
- Discussions with CALM / DEH regarding research that requires further work / funding or possible new areas of research / funding, to better understand and manage the impacts of mine infrastructure on the Night Parrot.
- Consultation with CALM / DEH to select an appropriate area of research / funding to be pursued.

If a PhD Project is proposed the following process would then also be undertaken:

- Initiate discussions with CALM, DoE, DEH, Academic Advisors and Experts in the field of study selected in order to scope the Research Project further.
- Develop a Scoping Document describing the potential methods, timing and deliverables for the Research Project.
- Select a study team or individual to carry out the work, provide adequate resourcing, technical support, academic and/or expert advice and set a start date for the research.

FMG will also develop an integrated research program aimed at further understanding and protecting the bilby. This will include the following research projects:

- One research Project at PhD thesis level or equivalent will be conducted consecutively for a period of nine years; or
- A funding proposal (of similar cost to a PhD Project) which contributes to knowledge/research for the Bilby.

Commencement of the research program will occur once construction is complete and will be reviewed every three years, in consultation between FMG, CALM and Academic Advisors. The scope of research to be undertaken will be developed in collaboration with CALM through the following process:

- Desktop review of all current research in the Pilbara area, relevant to impacts of FMG's Cloud Break Project, concerning Bilby.
- Discussions with CALM regarding research that requires further work or possible new areas of research.
- Consultation with CALM to select appropriate areas of research to be pursued, but would consider their current numbers, distribution range, populations trends and pressures on current populations.

- Initiate discussions with Academic Advisors and Experts in the fields of study selected in order to scope the Research Program further.
- Develop a Scoping Document describing the potential methods, timing and deliverables for the Research Program.
- Select a study team or individual to carry out various components of the work, provide adequate resourcing, technical support, academic and/or expert advice and set a start date for the research.

The above process to scope the nine year research effort will commence at the outset of Project construction.

FMG will also develop an integrated research program aimed at further understanding and the local conservation values of the Fortescue Marshes. This will include:

- One research Project at PhD thesis level or equivalent will be conducted consecutively for a period of nine years; or
- A funding proposal (of similar cost to a PhD Project) which contributes to knowledge/research for the conservation values of the Fortescue Marshes.

Commencement of the research program will occur once construction is complete and will be reviewed every three years, in consultation between FMG, CALM and Academic Advisors. The scope of research to be undertaken will be developed in collaboration with CALM through the following process:

- Desktop review of all current research in the Pilbara area, relevant to impacts of FMG's Cloud Break Project, concerning the conservation values of the Fortescue Marshes focusing on short range endemic invertebrates, fire ecology or samphires.
- Discussions with CALM regarding research that requires further work or possible new areas of research.

1.3.3 Feral Animal Control Program

The management plans that have been developed for the Night Parrot and Bilby have identified that pressures on endangered species populations includes feral predators, such as fox, cat and wild dogs, is potentially an important part of managing these species. While small scale programs will be conducted as part of FMG's operating practices, the development of a broadscale program to control predators over a much larger area is necessary before any benefits will be registered. Therefore, in addition to funding research into the conservation of threatened fauna species, FMG will also commit to contributing to a CALM Predator Control Program for the Fortescue Marshes area.

The Project will be ongoing for the life of the project and will be scoped between FMG personnel, CALM and academic experts in this field. The responsibility for the management of the program will be undertaken by CALM as part of their current Pilbara regional predator control programs. This project should commence as soon as practicable after commencement of construction of the project. If it is found that there are increasing risks to threatened species

from the occupation of the area by feral herbivores such as camels, horses and donkeys, FMG and CALM will discuss the variation of the project to meet these needs.

1.3.4 Fencing

FMG recognises that the key pressures on threatened fauna species and native vegetation are the impacts associated with grazing activity and predators in their vicinity. While FMG will liaise with affected landholders regarding the impacts of the project on their pastoral stations that may require the restrictions of grazing animals in certain areas, there is a broader concern regarding grazing and predator pressure on threatened fauna species.

FMG will commit to providing funding to CALM to enable them to fence areas that they have acquired through the resources provided by FMG for conservation purposes or areas in the vicinity of the Fortescue Marshes that contributes to the best conservation outcome for CALM. The final areas to be fenced and the type of fencing will be determined between FMG and CALM personnel. Allocation of resources to fencing can commence once the project is operational..

Appendix 6

Summary of Submissions and
Proponent's Response to Submissions